9th FIEP European Congress
7th International Scientific Congress "Sport, Stress, Adaptation"

Physical Education and Sport – Competences for Life

9 -12 October 2014

National Sports Academy "Vassil Levski", Sofia, Bulgaria

CONGRESS PROCEEDINGS

SCIETIFIC JOURNAL
EXTRA ISSUE, 2014

WWW.FIEP2014SOFIA.COM

9TH FIEP EUROPEAN CONGRESS

7TH INTERNATIONAL SCIENTIFIC CONGRESS

„SPORT, STRESS, ADAPTATION“

CONGRESS PRPCEEDING

9 – 12 OKTOBER 2014

SOFIA, BULGARIA

PROCEEDINGS BOOK
9th FIEP EUROPEAN CONGRESS and
7th INTERNATIONAL SCIENTIFIC CONGRESS „SPORT, STRESS, ADAPTATION"
9 – 12 October 2014, Sofia

SPORT, STRESS, ADAPTATION
SCIENTIFIC JOURNAL

Extra issue, 2014
ISSN 2367 – 458X

Editor's Office:
Sofia 1700, Studentski grad, National Sports Academy " Vassil Levski" Tel: 02/4007517
E-mail ssa@nsa.bg

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ORAL SESSION

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TALENT DEVELOPMENT IN SPORT

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Key words: t*alent development, talent detection, talent identification, sport career*

Realization of competitive athlete is a complicated and complex phenomenon. It is a complete, integrated result of the preparation of the athlete. Its effectiveness depends on several factors. In manifestation, they influence each other and in their unity determine the effectiveness of the actions and behavior of the athlete. The world of elite sport puts athletes to ever greater challenges – sport-technical, personal, organizational, and financial. In this sense, the identification and talent development is becoming a major challenge for the whole system of sport and logically attracted growing research interest.

Detection, identification and development of talent are the subject of academic interest over 50 years [35] Carry out systematic studies of the development of skills in one or more areas of human activity [21]. In a sports context, this issue is of particular importance in recent years. Elite sport implies early detection and development of a set of attributes - anthropometric, physical, physiological, technical, tactical, psychological [17]. Despite the great interest of researchers in this area still lacks consensus and debates continue as to how to define and identify talent, what programs should be implemented to develop and appearances in order to achieve maximum competitive realization. Still lacks a clear theoretical and conceptual framework as a starting point in the study and interpretation of the problem. Regardless of their differences, however, authors are increasingly united around the concept of the dynamic and multidimensional nature of sport talent. The diversity and complexity of the issues involved and influencing the of talent development in sport requires a comprehensive and dynamic monitoring.

For elite sport is of great importance not only early detection and selection of talent in terms of short-term success and its long-term development and expression.

This paper aims to summarize the literature on the problem, the main methodological approaches and models for the talent development in sport and offer exemplary conceptual model.

The existence of different models reflects the lack of a unified opinion on the definition of talent and related key issues. Is talent innate or developed? What is the proportion of genetic and environmental factors in the process of talent development? What characterizes successful development of talent in sport and how we can make a supportive and stimulating environment? The debate in this area is increasingly turning to environmental factors, the inclusion of social and cultural variables [33; 32].

In literature the term **"talent"** is used both as a prerequisite for success (innate ability) and as a result of the development process (sporting achievement) [21; 35; 24; 37]. N. Popov (1994) defines talent as "a high degree of development of the abilities and brilliance that allows obtaining a product of the activity, characterized by innovation, excellence, social relevance and originality" [2]. Talent by Gagne (2009) is the result of systematic development of skills in one or more areas of human activity [21].

Csikzentmihalyi (1993) notes that talent is a social construct, label approval, we put the revealed qualities and abilities that have value for the future. Debate "nature-development (training)" is central to the definition of sports talent [14].

The authors in this field agree on the complexity of the problem and noted the need for it to be seen in its complexity and multidimensionality integrity. There are still no valid and reliable methods of identifying and selecting talent for elite sport in the early stages of sports career. In most cases they are related to the demand for short-term effect, not the long-term development and deployment of talent, especially in sports where early physical maturation is considered a short-term advantage.

Approach for detecting talent is based on *the idea of innate natural talent*. As noted by Gagne (1985) has to be made between talent as a prerequisite, and potential product and result [21]. Giftedness (sports fitness) refers to the innate potential and reflects the spontaneous, natural abilities, while the term "talent" refers to reach a new high of sport technical mastery as a result of systematically developed skills. Williams and Reilly (2000) define the ***discovery of talent (talent detection)*** as *detecting potential contractors who still do not participate in sports activities* and ***talent identification*** as the *recognition of already engaged in sports with the potential to become elite athletes* [37].

This approach has been criticized for a number of reasons [29] Talent is a complex construct and its definition and measurement is especially very complex problem. A number of factors are relevant and play an important role in determining the likelihood that a young athlete to make a successful transition to elite sport.

Researchers in this field appear two directions in the study of the problem, which play a crucial role in the realization of excellence: **1) Talent identification** – ("TID"), which is defined as the process of recognition of these players with the potential to excel in a particular sport and 2) **Talent Development** – ("TDE") - provide the most appropriate environment for learning and development to realize their potential [37]. Number of publications suggests that research efforts are diverted ever more insistently to the conditions, factors and content of programs for talent development in sports – TDE [5; 16]

Approach to talent development focuses on *acquired motor and psychological skills* and not so much on innate potential, the quality and *quantity of educational training process in order to reach peak performance* [12; 32]. In this approach identified two different directions. First advocated by Erickson et al. and launched the thesis of early specialization and deliberate practice leading to high athletic performance [17;16; 20; 18]. Eriksson emphasizes the need for a well-structured, purposeful, controlled intensive educational training process aimed at improving performance and requires appropriate cognitive and physical effort. According to him, the development of talent and achievement of high sports mastery depends almost exclusively on the quality and quantity of human and material resources and time sports activity (Erickson sets a period of 10 years). This approach to early specialization in one sport and a great deal of load require the athlete to be highly motivated and have the opportunity and ability to overcome the limitations associated with the resources, motivation and effort.

The second direction [10; 11; 12; 13] offers a different approach – trying out different sports before selecting a specialization. According to these authors, early specialization is not a requirement for the achievement of high sports mastery. They displayed three phases of the sport career that brought different requirements for participants in educational training process - athletes, coaches (sports and technical staff) parents. In the first phase, the sport for beginners, the emphasis is on creating an encouraging and supportive environment, development of intrinsic motivation, orientation to the tasks and achieves personal goals. As noted by Ramadas and Serpa at this stage is very important for children to be committed in games and sports activities, providing positive emotions [30] as a gradual transition to conscious sports activities. At the stage of specialization is an important balance between them. The stage of high sports is characterized by increased pressure from opponents, high personal and social expectations. Some authors note that at this stage it is very important to distinguish between competitors "to reach there" and "stay there". To cope with the high expectations demanding but competitors must

possess and develop a number of personal qualities and skills - perseverance, motivation, confidence, independence, commitment, coping strategies [16]. Essential at this stage have a self-regulatory skills, especially in the stages of transition, which can be critical for young athletes and give rise to mental instability, problems with implementation racing and sometimes lead to the termination of his career [4].

Special emphasis is placed on the specific functions of the participants in the triangle **"athlete-parent-coach."** On the one hand emphasizing their positive role and need for support and good cooperation from other states that high expectations and pressure from parents, and even intervention in the sporting and technical manual may become a serious negative factor [38], give rise to considerable tension in the preparation and implementation of the athlete. In recent years it has become a serious problem for Bulgarian sport (especially in sports that involve early specialization and expression and require serious material support from parents).

Summing these two directions Cote notes [13] that early specialization and intensive training process at an early age can develop the potential of the athlete and he can reach high sports achievements, but it is likely to result in a risk to physical health, reduced opportunities and early termination of the sports career in some of them. This is a not uncommon problem in Bulgarian sport. In our literature the problem of planning and development of the sport career is still very poorly understood. It should also be recognized that the path that is selected depends on the type of sports and socio-cultural context. Late specialization is not suitable for all sports. Talent development in sport is closely linked to the development of sports skills and competition realization, which are focused in a relatively short period of his sporting career. But as the N. Stamboulova career development should be seen in the wider context of talent development, talent far as an athlete is not only a set of motor skills and qualities, but also the ability to develop and effectively use their resources in order to provide the requested transition in and out of sport [32] Special emphasis is placed on the crucial importance of socio-cultural support for the development of talent [14]. Two aspects appear to be particularly important in this area - the quality of education and higher commitment to long-term perspective [6].

The latest trends in the analysis of this problem are related to the implementation of **dynamic and holistic approach** [32; 27; 28; 25]. Modern research based on the psychological aspects of the development of the talent of focusing on individual characteristics of the athlete and his micro-environments that form the basis of a holistic ecological approach to the development of talent. Central role it occupies in the overall environment and its potential effects on elite athletes and examining the development of talent in its complexity to the real environment. **Holistic ecological approach to the talent development in sport** is based on the principles of the systems approach, environmental psychology, cultural and cross-cultural psychology. Using as a basis for bio-ecological theory of Bronfenbrenner [7; 8; 9], it combines micro and macro level, specific sport and social environment, the set of factors which together determine the effectiveness of development - preconditions, processes, individual development and organizational culture. The authors offer two variables that are crucial for development: 1) *the organization related to the interdependence of the elements* and 2) *the complexity of the activities, which include athlete*. In our view remains underestimated in the literature, but also in developing and running programs for talent development, the issue of their personal activity athlete development process. To some extent it advocates by Gagne (2009), which appears in the complex process of talent development, several key factors: intrapersonal catalysts (physical, motivational, voluntary, self-regulatory, personality), environmental factors (social environment, people, support events), and even a chance [21].

Some authors consider the reasons for the failure of the career of athletes identified as **"potentially gifted".** Evidence suggests that such reasons are considered family, inadequate loading, the relationship with the coach, lack of resources to promote the talents participate in alternative activities that compete with dedication to the sport [36] Other authors point to the lack of coping strategies [26], the lack of maturity and confidence [31], low motivation [22] lack of autonomy [23] and others.

We take as a starting point the bio-ecological theory of [8; 9]. Consider the ***talent development in the***

context of its interactions with the specific environment that combines micro, mezo and macro level, the set of factors which together determine the effectiveness of development - the preconditions, processes, individual development and organizational culture. Insofar as developed theoretical models and operating programs for talent development in sport is reported primarily what is "out" (the relationship and interaction of the elements of the organization, complexity and organization of sports activities) and not "inside" the personality of athlete, his personal activity, we include another topological structure - "inner ego-system" which includes "elements of self-awareness, values and attitudes of the individual to itself; her subjective experience and the criteria that determine the position and actions of the athlete" [1; 3]. Thus, **the talent development, competitive implementation and overall athletic career is considered in the overall context of the ongoing processes in the external and internal environment,** which allows revealing more fully the underlying mechanisms, assumptions and factors, which subsequently find their practical application programs for the development of talent in sport. **Figure 1** shows a working model based on accepted our conceptual framework for the development of talent.

Macro system includes certain culture or subculture that affects ideology formed in society value sys-

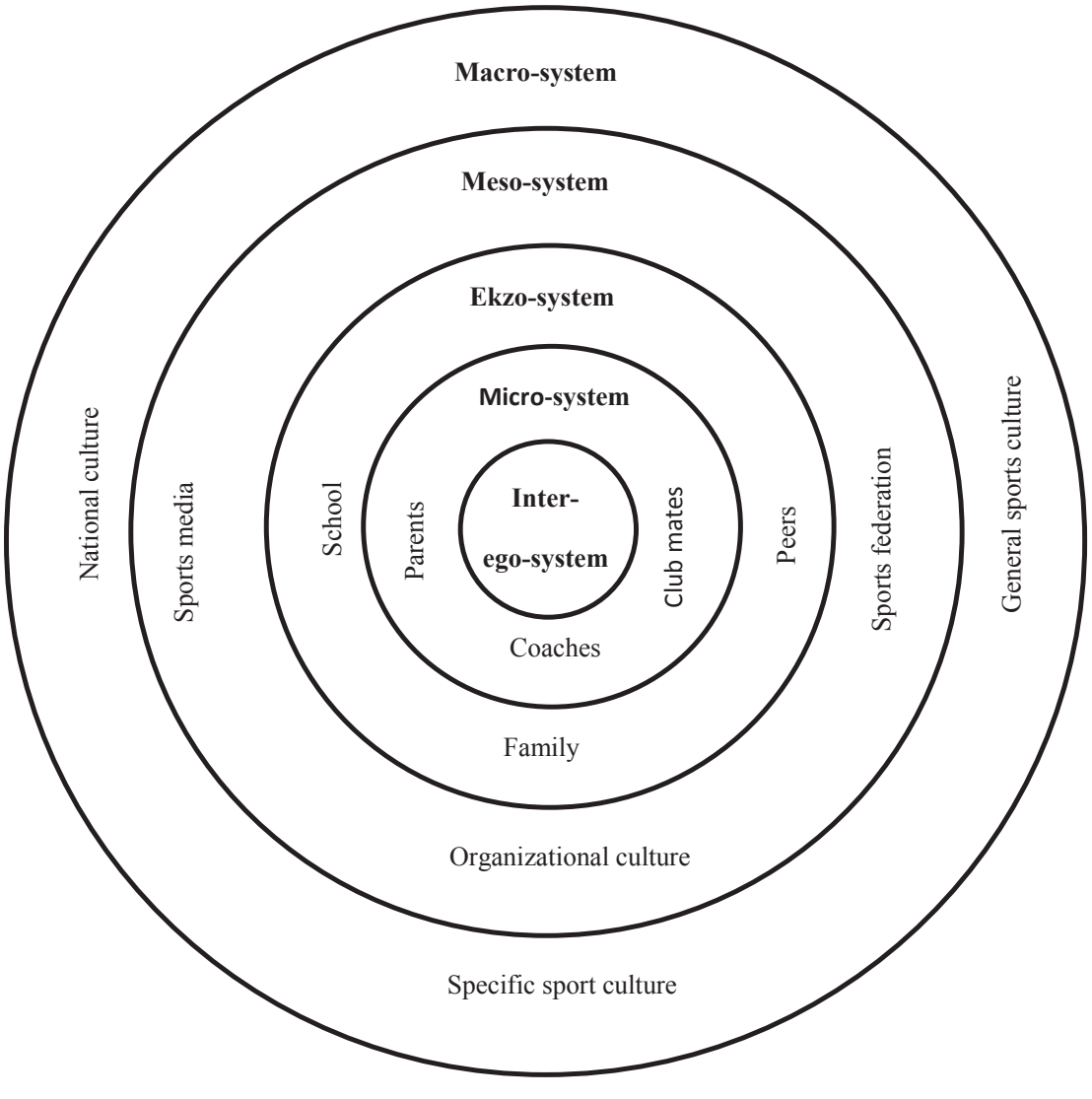

Fig. 1. Athletic Talent Development Environment working model

tems, lifestyle, attitudes to sport, the media and others. It has a significant impact on the nature of the sport being on the choices and realization within the globalizing society internationally and nationally. In recent years there have been significant changes in the sport subculture, which change significantly

from one country being very sporty, especially in terms of "elite" sport, the other - public attitudes. Requirements and public expectations of athletes increase dynamically. Increasing demands on the duration of sports career as his own career. This magnified psychological tension in the field of professional sports, and suggesting appropriate approach to talent development, planning and career management.

At the same time, the processes at the macro level are accompanied by a significant reduction and impoverishment of ekzo, meso and micro. **And the level of ecosystem** sports environment is characterized by certain specificity. One of the trends of modern sport is constantly slowdown in age and early specialization dealing. In this connection, the role of family, school and friendly environment play an important role in the initial orientation of adolescent sport. Early specialization and early involvement of athletes in sport and high bit-rate requirements inherent to the volume and intensity of training loads imposed most of the players to leave their families too early (or time spent with them is very limited).

These limitations exert their specific effects on the level of **mesosystem.** Professional expression in sport requires concentration of all the powers of the individual and limiting all other effects and modes of expression in order to maximum sports development. This generates a deficit environment, which can be compensated by the system of sports training.

Specificities of the sport environment macro, meso- and ekzo- level inevitable impact on the microenvironment. **Microenvironment** includes the immediate context, the system of connections and relationships in which the athlete is immediately enabled and that have the most significant influence on the development of talent and overall athletic career. These include coach and athlete support staff, parents, teammates. Impoverishment of the social environment during the preparation of adolescent athletes, restricting activities and the range of activities under certain conditions can lead to some reduction of poverty and social interactions of young athletes and affects their overall development. There are damages to launch as crucial for the development of talent balance triangle "**athlete – parent - coach."** In this sense, crucial is the overall production activity and behavior coach to compensate for these limitations of the environment and to create optimal conditions for the development of talent.

These specific features of the sports environment challenge the establishment and operation of inner-ego system. Extremely high demands and expectations of potential elite athlete require increased attention to the construction of the respective personality mechanisms that ensure the functioning of this level. Talent development and successful implementation of the athlete have a significant role: the level of development of awareness, skills and self-mobilization, confidence, personal activity. They have a significant influence on the development of talent and the effectiveness of sports career. In this connection we may consider the merits of the athlete in two respects. On the one hand, these are the skills, qualities and skills that define the so-called. „Sports fitness" and are the basis for a successful implementation and practice of the sport. On the other hand, these are the skills, qualities and skills Linked with regulation of behavior, actions, efforts and interactions with the environment that determine the effectiveness of competitive development. While the first set of qualities and skills is essential for the detection and identification of talent and determine the potential for development and expression of the competitor, the second is crucial for the development of talent and his realization. We can define them as **"competitive skills and abilities**". These two groups of qualities and skills are in mutual connection and dependence, and their unity is largely how we develop talent and overall athletic career. Talent development and effective implementation racing implies purposeful management and self-regulation of competitive behavior within **"potential - current".**

Among the key factors at this level, which can help or stunted development of talent can be distinguished: *the commitment and tackling fame and publicity*, especially given the kind of early expression, early publicity and media attention amid a the still fragile personality; intensive (in some cases exaggerating) *development of social Self*; *discrepancy between the levels of social context and inner ego-system and others*.

It outlines a number of problems whose solution has to be one of the highlights of the programs for the

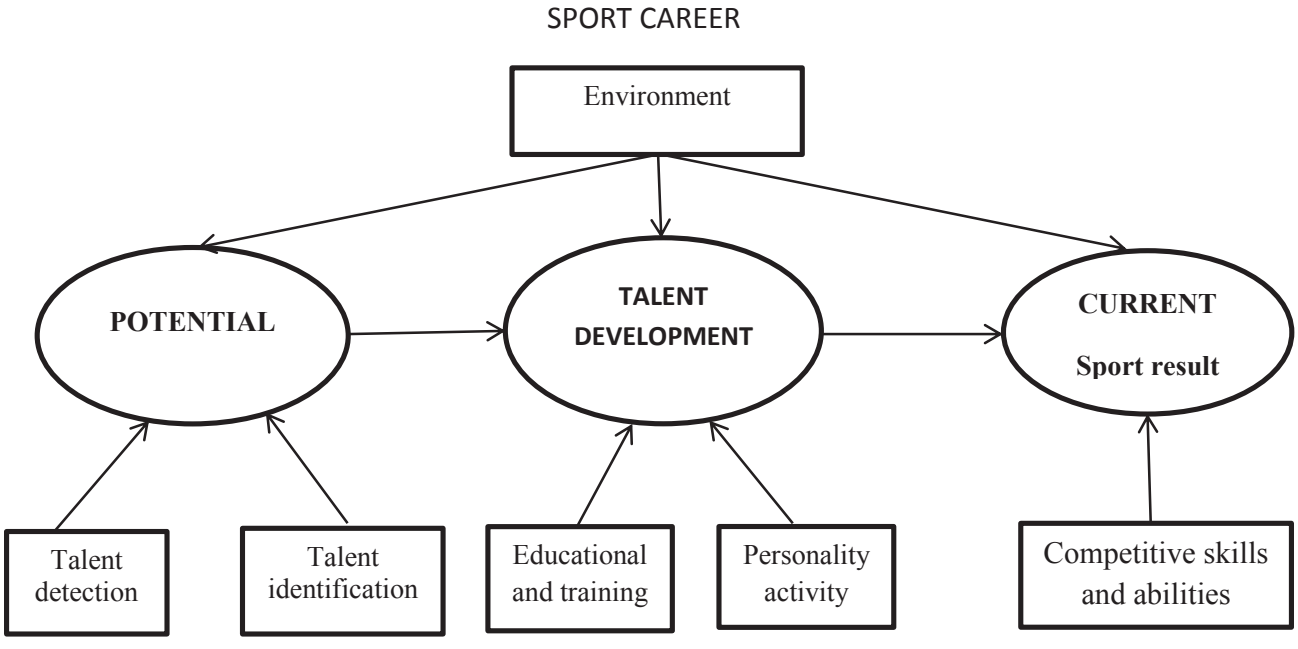

Fig. 2. Talent development in context of Sport career

talent development in sport. Objectively complicated situation in modern elite sport rise too high demands on the activity, behavior and implementation of the athlete. On one hand, increases the requirements for the organization and management of the process of preparation, on the other, the qualities of the personality of the players and coaches. All this objectively increases the role and importance of inner ego-system as a base while integrating mechanism in the sports environment and the appearance of an athlete in it and hence adequate care for its development and improvement as a vital component of the system of talent development in sport.

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PRESENT AND FUTURE ISSUES IN PHYSICAL EDUCATION

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INTRODUCTION

The 'motto' of this 9th FIEP European Congress *Physical Education and Sport: Competences for Life* and the opportunity for 'Round Table' discussion were instrumental in the choice of theme for my presentation. The focus is on Physical Education (PE) in Europe though the issues raised have world-wide applicability. I intend to be provocative with a view to discussion generation.

A range of initiatives, influences and evolutionary developments have variously shaped, or contributed to shaping, national systems of PE. Hence, it is unsurprising that diversity and elements of congruence in concepts and practices of PE and school sport are evident across Europe (indeed the whole world). The politico-ideological division of Europe into East and West between the ending of World War II and the Mikhail Gorbachev inspired emergence of *perestroika* (reconstruction) and *glasnost* (openness) exacerbated the complexities of interchange, adaptation and assimilation. It was not only a 'Cold War' period of *Iron Curtain* politics but also of two contrasting *physical education* and *body education* concepts. The latter was well exemplified in convergence between different "body education curricula" in central and eastern European countries, where Marx-Leninist ideology prevailed. The so-called 'socialist bloc' was exposed to, and dominated by, largely Russian driven sovietization policies and practices and much in evidence in the early years of the 'Cold War' period. It was a form of harmonisation, but one borne out of political and social control. Physical culture and sport had its roles to play, especially in building national conscience and consciousness and preparing the citizens for labour and defence in which fitness and military undertones were prevalent. Ideological superiority over the 'West' was embedded in striving for supremacy in the sporting arena for which the development of elite sport systems was paramount and PE in schools including any extra-curricular activity was one stage in talent identification and development – the rise of the State-supported Sports School was inherently guaranteed. Meanwhile in western Europe, at least three new roots of PE concepts emerged, namely the sport education concept, the movement education concept and the health education concept.

Specifically in the former 'socialist bloc', countries, in the aftermath of the circa 1990 various 'silent' revolutions, were exposed to so-called western-style democracy, which made politicians prone to ideological 'wish-listing'. Within the education domain, 'wishes' were translated into idealistic curricula policy and planning principles. The realities of implementing these 'idealistic curricula' were not, however, "properly thought through, as their realisation required financial investment, new pedagogical and didactical interventions and relevant infrastructure" (Hardman, 2005, p.9). In PE, the early 1990's' conceptual re-orientations embedded in ideas on humanism and democratic freedom brought elements of liberalisation, frequently based only on pupils' interests and neglecting knowledge of young people's needs, as well as scientific research.

As early as 1992, low participation rates in leisure activities in and out of school were being cited in support of a contention that the post-1990 changes in theoretical conceptions designed to create more positive attitudes towards physical activity engagement were not being realised in practice. Despite government encouragement of PE as a curriculum requirement, somewhat negative outcomes became evident in schools in the political transition years: school PE became undervalued as a subject; school senior management showed little interest in it and its contribution to the general development of pupils was not adequately appreciated; and PE teachers were considered inferior, less capable and less skilful. Arguably across central and eastern Europe, this transition period with its educational reforms metaphorically resulted in the 'baby being thrown out with the bath water'!

Today, in the broader European region, PE is often advocated as a source of a plethora of positive developmental characteristics from early childhood, through adolescence to late teen-age and now, when it is perceived to be a lifelong process, throughout adulthood, epitomised in the notion of the 'physically educated person'[1]. Its perceived role has expanded. As a school subject, PE has been ascribed a relatively unique and indispensable position with some kind of responsibility in some way and somehow addressing many contemporary issues with its perceived distinctive features within the educational process with characteristics not offered by any other learning or school experience. This alleged distinctive, characteristically unique PE profile was addressed in the 2007 European Parliament's *Resolution on the Role of Sport in Education* (2007/2086NI). A significant number of the *Resolution*'s 62 items had either specific references to, or had resonance for, PE. Implicit in the *Resolution* was the view that PE has the propensity to make significant and distinctive contributions to children, schools and wider society: respect for the body, integrated development of mind and body, understanding of physical activity in health promotion, psycho-social development (self-esteem and self-confidence), social and cognitive development and academic achievement, socialisation and social (tolerance and respect for others, co-operation and cohesion, leadership, team spirit, antidote to anti-social behaviour) skills and aesthetic, spiritual, emotional and moral (fair play, character building) development, a panacea for resolution of the obesity epidemic, inactivity crisis and sedentary lifestyles, enhancement of quality of life etc. Two fundamental questions arise here:

1. Where or what is the evidence to support any or all of the educational outcomes or benefits claimed on physical education's behalf?
2. How can PE deliver all that is claimed in its name?

Relevant is a list of associated questions. For example: how is it possible to impact on children's obesity with only one or two 30-minute PE lessons a week?; how can we develop a broad range of movement skills in large class sizes of 30 or more pupils, seen, in some instances, by the physical educator for less than 36 hours a year?; is even an hour of daily PE enough?; and with the knowledge that the intensity, duration, and frequency of physical activity do more than anything to immediately impact on student health, how can we successfully help students experience the joy of movement in PE classes. Maybe it is an issue of 'changing minds' and, thereby, 'winning holistic bodies'! We need to juxtapose advocacy rhetoric with scientific evidence. I now turn to **Issues** relevant to the present situation of PE in Europe.

1. PE Implementation:

In Europe, 84% of countries (globally, 71%) adhere to implementation regulations and delivery but they can, and do, differ from school to school in the majority of countries. Conversely, in Europe, 16% (an increasing tendency) of countries, PE is not actually being implemented in accordance with legal/mandatory obligations or expectations; globally 29% of countries indicate a shortfall in implementation.

Table 1. Implementation of Physical Education: 2000, 2007, 2013

Area	% 2000	% 2007	% 2013
Global	71	79	71
Europe	93	89	84

1*Physically educated persons* might be described as being physically literate, having acquired culturally normative skills enabling engagement in a variety of physical activities, which can help to maintain healthy well-being throughout the full life-span; they participate regularly in physical activity because it is enjoyable; and they understand and value physical activity and its contribution to a healthy lifestyle.

2. PE Curriculum Time:

Table 2 presents data on average weekly PE curriculum time in Europe and globally. Interestingly, the both European and global data show small reductions in time allocated indicated in previous surveys in 2000 and 2007.

Table 2. PE Curriculum Time Allocation: Minutes per Week

Area	Primary	Secondary
Europe	109 (R=30-290)	105 (R=30-240)
Global	97 (R=25-270)	99 (R=30-240

3. PE Curriculum:

There are many examples of good practice in PE in schools across the world but there are also too many examples testifying to negative experiences and impacts, lack of commitment to teaching and pedagogical and didactical inadequacies. Increasing rates of drop out from sport by young people, physical inactivity and corresponding sedentary lifestyles, especially in high to middle income countries, may, in part, be due to a failure by teachers to provide personally meaningful and socially relevant experiences in school environments. According to 'official' documents, many countries commit to a 'broad and balanced' range of curricular activities' opportunities, which serve to prepare pupils for beyond school life, typical of which is Northern Ireland, where schools are obliged to offer:

"A balanced and broadly based curriculum that promotes the spiritual, emotional, moral, cultural, intellectual and physical development of pupils…and thereby of society; and prepares pupils for the opportunities, responsibilities and experiences of life by equipping them with appropriate knowledge, understanding and skills" (Sport Northern Ireland, 2010, p.4).

Analysis of survey data, challenges the actual extent to which breadth and balance are provided. Examination of activity areas' time allocation across the world reveals how, in practice, competitive sport activities dominate the physical activity experiences of pupils globally. Globally and mirrored in Europe, there is an orientation to a performance sport discourse, predominantly Games (team and individual) followed by Track and Field Athletics and Gymnastics, which collectively account for 76% and 74% of primary and secondary school respectively curricular content. This orientation is reinforced in the European Commission's *Eurydice Report* (2013): "… Among the mandatory physical education activities in schools, games are most common… After 'games' come gymnastics, athletics…" (p.21). Such orientation runs counter to societal trends and, therefore, it is not surprising that pupil interest in PE declines throughout the school years and young people become less active in later school years. The experiences acquired from unwilling engagement in competitive sport-related PE can be for many a 'turn-off'. I shall return to this issue later in the presentation.

4. Resources

a) Teachers/Training etc.

A EUPEA Survey (Onofre *et al*, 2012) of 22 European countries indicated that in several countries, 'Generalist Teachers' are responsible for delivering PE in primary/elementary schools. Onofre et al (2012) allege that often such teachers are inappropriately prepared for teaching PE classes and hence, compromise the quality of student learning. In secondary phase schools, the global evidence suggesting that PE is predominantly taught by specialist PE practitioners, who hold either a Bachelor's or a Master's level degree is supported in the EUPEA Study. However, while some countries might claim that all their

PE teachers are trained specialists holding at least a Bachelor's degree, there are some with teachers responsible for PE delivery who have not experienced a single PE-related pedagogy course.

Generally, survey data supported by research literature point to deficiencies in teacher supply, particularly of PE specialists, inadequate preparation of PE teachers, especially, but not exclusively so, in primary/elementary schools and to negative attitudes and low levels of motivation of some teachers responsible for delivery of PE in schools. Such concerns about the quality of PE teacher training, teaching and teaching resources, inadequate supervision of practice, lack of professionalism and appropriate ethics and impacts on the quality of school pupil experience of PE curricula are articulated in Europe as well as globally. Other issues raised in some countries relate to an ageing profile of PE teachers, low salaries, low levels of recruitment of teachers into the profession, attitudinal dispositions of some PE teachers, undervaluing PE teachers' contributions, restricted career opportunities or transfer to other jobs and lack of, or inadequate professional agency support, with consequent implications for quality and range of PE provision.

Table 3 reveals that globally 70% countries/autonomous education regions provide opportunities for In-service Training (INSET) or Continuing Professional Development (CPD); in Europe it is 64%. However, there are cases where the mandatory requirement is not actually implemented, either because of structural inadequacies or reluctance of teachers to engage in the further professional development process.

Table 3. Requirement for INSET/CPD Participation: Global/Regional (%) 2012

Area	Yes (%)	No (%)
Global	70	30
Europe	64	36

Inadequacies in INSET/CPD provision for PE teachers are apparent across Europe. In some cases they transcend training or further professional training beyond school to include training of professionals for deployment in teacher provider institutions, administrative and advisory etc. positions. Even when opportunities are provided, some teachers are resistant to improving practice or their professional development and there are no recriminations if teachers do not attend the courses provided.

b) Facilities, Equipment and Maintenance

Various surveys as well as other research literature have drawn attention to deficiencies in the provision of PE facilities and equipment in schools. In Europe (where there is a clear East-West divide), 26% countries report below average/inadequate quality of facilities and equipment, 26% report limited/insufficient quantity of facilities and 38% report limited/insufficient quantity of equipment. The level of such provision together with challenges presented by inadequate maintenance (67% countries report maintenance problems) can detrimentally impact on the nature, scope and quality of PE programmes.

5. PE Monitoring:

Table 4. Monitoring of Physical Education (%)

Area	Legal Requirement	Actual Monitoring
Global	88	80
Europe	92	81

Mixed practices in all aspects of monitoring processes in school PE programmes are evident. Even where monitoring is required, it may be irregularly, infrequently or rarely carried out, or there is either no administrative system in place, or there is a shortage of appropriately qualified/experienced personnel to facilitate the process.

6. Equality: Gender and Disability

Previous World-wide Physical Education Surveys drew attention to varying practices across countries and regions in implementation of inclusion policies to secure gender and disability equality of provision and identified many countries with legislation in place; however, barriers to inclusion remained in both gender and disability areas. The most recent World-wide Physical Education Survey provides evidence of increased consideration being given to equity issues with gains made but with some underlying issues and concerns remaining.

a) Gender

The general world-wide pattern of gender equality can be observed in part in table 5, which, unlike previous Surveys, distinguishes gender inclusion data between three categories of school PE programmes: amount, quality and content.

Table 5. School PE Programmes: Gender Equality (%)

	Amount		Quality		Content	
Area	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Global	91	9	91	9	88	12
Europe	94	6	97	3	92	8

Globally, equality of opportunities for boys and girls in school PE programmes is reported in 91% (amount and quality) and 88% (content) of countries. In Europe, the category figures remain high (94% amount, 97% quality and 92% content). Despite the almost generally strong support for equality of opportunity in PE programmes, a number of European countries identified some differences in provision: curriculum content with emphasis on perceived gendered activities for boys and girls; performance expectations and assessment; and quality with associated reasons. Additionally, and somewhat at variance with the mechanisms referred to above, in some countries there are perceptions that more opportunities are available for boys than for girls, that girls are more reluctant to engage in PE (PE kit issues, religio-cultural dispositions, parental discouragement), that there are social and cultural barriers and inadequately prepared teaching personnel.

b) Disability

From a policy perspective, survey evidence indicates greater consideration of *Inclusion*: anti-discrimination legislation fostering deeper awareness of inclusion and disability issues, and advocacy of inclusive practices in participation in PE programmes for pupils with disabilities. However, in several countries, even though legislation is in place, when applied, operational problems exist such as the special attention usually required in contexts of class sizes, which are too large in numbers.

Table 6. Access to PE lessons opportunities for pupils with disabilities: Global/Region (%); 2007-2012

	2007			2012		
Area	**Yes %**	**No %**	**N/A %**	**Yes %**	**No %**	**N/A %**
Global	77	8	15	72	28	-
Europe	79	4	17	78	22	-

Some countries report inadequate infrastructure (including policy), availability of, and access to, facilities and adapted equipment and lack of qualified teachers and 'special needs' support personnel/ assistants, lack of teacher confidence, low levels of integration, lack of monitoring procedures and poor institutional collaboration as being barriers to disability inclusion. Whilst these deficiencies are predominantly evident in low income regions/countries, they are also seen in higher income countries. The reference to confidence of teachers in including children with disabilities in PE classes is indicative of the wider problem of a lack of specialist or trained teachers identified as a significant barrier to inclusion. It is important that teachers have a full and accurate understanding of the needs of all learners so that they can deploy a range of skills in order to promote achievement. Pupils with special needs or disabilities, as well as learners from minority groups, who might be at risk of under-achievement depend on teachers to manage their learning and provide support. There is some inconsistency in the amount of time spent during PETE programmes in supporting pre-service teachers in the areas of inclusion, and specifically how to include and support children with special educational needs in PE. Beyond initial training, there would also appear to be less training or support for serving teachers.

Sectoral or wider societal attitudes can be barriers to inclusion: prejudices and negative attitudes to the point of discrimination and sheer ignorance of needs; and in some instances parental reticence in supporting participation in PE classes or at least in school physical activities. An additional barrier is the erosion of inclusive practice by financial cutbacks in the education sector due to austerity measures being a favoured instrument to address current economic difficulties. A number of countries have brought about change in inclusion and disability issues, epitomised in policies related to entitlement to PE, inclusion, integration, employment of support assistants, differentiated teaching methods, use of adapted equipment etc. Nonetheless, persistent barriers continue to undermine the drive for a more holistic and inclusive PE environment and these barriers are not limited to any one country, they are globally widespread. There is a mixed messages scenario. Whatever, there is clear evidence that those with disabilities do not receive equal access to the PE experience. The preparation of teachers and their CPD is a specifically identified area, which requires immediate attention: the challenges inherent in inclusion and disability suggest the need for a sustained review of training programmes. Initial Teacher Training providers should consider how to do more in the preparation of teachers to work with those with special educational needs.

7. PE Status:

Legal and perceived actual status of PE and its teachers is a contentious issue: the former can be subject to 'local' interpretations and/or implementation, and the latter to variable perceptions. Table 7 data indicate that globally, equal subject legal status is claimed in 77% of countries, whereas in Europe the figure is 92%. Globally, and in Europe, data suggest that in actual practice PE is considered to have lower status than other subjects (54% globally, and 46% in Europe).

Table 7. PE Subject Status (%)

Area	Legal (Same)	Actual (Same)	Actual (Lower)
Global	77	46	54
Europe	92	54	46

Across Europe, there are illustrative references to PE's lower status: little interest in PE; low levels of awareness of its usefulness and intrinsic/extrinsic values; a non-examinable, non-academic, recreational and non-demanding subject; greater emphasis on literacy and numeracy; less time curriculum time allocation; negative attitudes of 'significant others' (including teachers responsible for PE), particularly in primary/elementary schools; lack of parental and other stakeholders' support; and its perceived relevance to and undervaluation by, some pupils in schools.

Frequency of cancellation of lessons is one indicator of subject status. Whilst over the years there is an apparent reduction in PE lessons' cancellation, latest data indicate that globally in 44% of countries (in Europe 31%) PE lessons are cancelled more often than other so called academic subjects.

Table 8. Cancellation of Physical Education Lessons (%)

Area	2000	2007	2012
Global	61	63	44
Europe	53	59	31

Apart from its attributed low esteem and status as of little educational value etc., other reasons for the cancellation of PE lessons/classes include: government financial cuts; attitudes of teachers and/or school principals, including apathy; insufficient numbers of qualified PE teachers and provision of facilities and equipment; absence of teachers with no availability of replacement support; priority attached to other 'examinable'/more academically perceived subjects; adverse weather conditions; low level awareness of the importance of PE within the school community; the use of dedicated PE lesson space for preparation for and 'taking' examinations, school events or other activities such as medical or health screening, teachers' meetings and strikes' meetings, arts festivals, book fairs; preparation for examinations; concerts; ceremonial occasions such as celebratory prize giving; religious exercises and events; use as dining areas, and election polling (voting) station *inter alia*.

Globally, in 18% of countries PE teachers do not enjoy the same status as other subject teachers; in Europe it is 9%.

Table 9.Physical Education Teacher Status: Globally/Regionally (%)

Area	Higher Status	Same Status	Lower Status
Global	2	80	18
Europe	2	89	9

8. School PE-Community Links

Survey evidence points to inadequate and/or insufficient links between school PE programmes and wider community physical activity providers in some countries. Where links of various kinds are evident, many pupils are not made aware of available pathways to out-of-school provision and/or physical activity programmes. Table 10 indicates that globally in only 27% of countries are there formally arranged school-community partnership pathways in place. Regionally, European countries have the highest proportion of school-community partnership links (68%). Noteworthy in relation to this item, there may be some distortion of the situation resulting from relatively high proportions of "Not Applicable (NA)"/"No Response (NR)".

Table 10. School Physical Education–Community Links: Global/Regional (%)

Area	Yes	No	NA/NR
Global	27	20	53
Europe	68	11	21

Reasons proffered for shortfalls in school-wider community agency partnerships include: lack of teacher-outside school agency communication, infrastructural deficiencies, non-implementation of mandated requirements and financial cut-backs. Where there is school-wider community agencies' provision, there are pervasive links (both formal and incidental) between schools' competitive sport activity programmes (curricular and extra-curricular), tournaments and/or development of talented young athletes from local, through district and regional to national and international level agencies. Despite the competitive sport emphasis of established links, some countries also have informal and/or formal school-community pathways, which variously encourage participation in physical (or sport-related) activity after, or outside of, school curriculum time and, which embrace a broader 'sport for all' philosophy. Thus, opportunities to participate in physical activity are available in the form of extra-curricular days, sports associations' afternoons/evenings, community festivals, galas and gymkhanas, teacher/coach involvement in separate or reciprocal sport community sport-school sport provision.

A school's role should extend to encouraging young people to continue participation in physical activity, through the provision of links and co-ordinated opportunities for all young people at all levels and by developing partnerships with the wider community to broaden and improve the opportunities available for them to remain physically active. As indicated by the European Commission's *Eurydice Report* (2013):

" The presence of a local community sports infrastructure may… increase opportunities for organised physical activities and enhance the quality of (schools) provision" (Eurydice, 2013, p.22).

The principle of partnerships embracing multi-sectoral policies is an essential feature of the World Health Organisation's (2004) *Global strategy on diet, physical activity and health* policy framework as well as the European Parliament's 2007 *Resolution*. With limited curriculum time allocation per week, physical education cannot itself satisfy physical activity needs of young people or address activity shortfalls let alone achieve other significant outcomes. Bridges do need to be built, especially to stimulate young people to participate in physical activity during their leisure time and beyond school life. Teacher education programmes should address the facilitation and intermediary roles of teachers responsible for PE. Thus, at the very least, their professional preparation should embrace familiarisation with pathways for participation in wider community multi-sector provision. Support is fundamental to the realisation of such ideals. It can be achieved through the collaborative, co-operative partnership approach involving other professionals and committed, dedicated and properly mentored volunteer individual and group enthusiasts. Personnel functioning in partner institutions should have appropriate skills and competences, which might be acquired through some special training. In response to concepts of active

life styles in life-long learning contexts, the development of partnerships is essential in any redefinition of purpose and function processes to accommodate broader life-long educational outcomes including healthy well-being and links with personal and social development.

Present and Future Direction of PE

1. Informed Opinion on the Situation of PE in Europe

A couple of years ago, I sought informed opinion from academic experts in countries across Europe on the direction that school PE is, or might be taking, and what PE might look like in each respective country in 10-20 years time, that is a crystal ball view of the future of PE. The opinions expressed add to the disquiet already mentioned earlier.

"Decision-makers decide based on their personal feelings/beliefs and politicians (can be) deceptive. Most officers working in the Ministry of Education have a negative attitude towards PE; they do not criticise maths or physics because they did not like the subject or the teacher. According to conservative professionals, teaching should be almost exclusively based on the "old-fashioned" curricula, concentrating on traditional sports, such as athletics, gymnastics, and swimming. The level of inactivity is reaching shocking heights, which is becoming the complementary phenomenon of the negative attitude towards physical activity. The current number of PE lessons is low".

"Recent developments (reductions in teacher supply and increase in class sizes) will be detrimental to PE quality of weekly number of PE classes in senior grades, and the introduction of a new subject *Selected sport*, which is a separate subject, exclusively dedicated to training and improvement of certain technical and tactical elements of sport indicates a tendency view of schools as bases for creation of future elite athletes. The Ministry of Sport and the Youth has made more government sector initiatives than the Ministry of Education. The contents of swimming, gymnastic, track and field syllabuses in the majority of schools are not realized".

"Primary school teachers are not sufficiently trained for teaching PE and probably never they will be, even with the new school reform. Teacher status will become problematic: the average age of PE teachers is about 50/55 years old; in ten years time, the majority of PE teachers will be retired and most of PE tradition will be lost. Increasing school educational autonomy will produce local school curricula, which might result in a decrease of PE in some schools to provide time for other schools subjects or projects considered more important".

"PE is rather marginalized. Team ball games pre-dominate and health promotion is neglected. PE lessons are mainly influenced by the lack of facilities and equipment. Inflated grades seem to be a reality and a mismatch between intentions and practice is evident".

The concerns contained in experts' opinions and articulated in the recent international Surveys are summed up in a central European PE academic's statement:

"PE in (recent years) has gone through intensive development and many changes. In spite of attempts by PE professionals, PE teachers, pupils and parents still struggle, sometimes more, sometimes less successfully with a range of problems: decreasing amount of compulsory PE; often decreasing quality of education; large PE class sizes and increasing pupils' behavioural problems; growing numbers of non-participating and 'excused' pupils from PE lessons; stagnating physical fitness and performance of youth; care of pupils with disability; inadequacies in provision and lack of PE facilities; increase in PE teachers' average age and low interest of young graduates to work in the field of PE; inadequate social and financial reward of PE teachers, low work ethic of PE teachers that results from insufficient evaluation of their work; low representation of PE teachers in schools' management positions; absence of monitoring of PE teaching – there is a limited number of inspectors; monitoring by school directors is non-existent; weak organisation (professional associations) of PE teachers; shortages in pre-graduate teachers' preparation; unfinished system of lifelong PE teachers' education; lack of financial resources for science (research) in the field of physical education and sport".

Elsewhere, polarised views offered by teachers on what lies ahead for physical education and what physical education will look like in 2020 range from:

„Eliminate high school physical education and sign students up at a local health club instead. They'd get more exercise and it would save schools money";

to

„PE should be completely personalized so that students can choose what they want to do".

Need I say that neither of these scenarios is particularly attractive.

All the concerns expressed suggest that today the PE profession faces issues that threaten PE's very school existence. So what is to be done? Whatever, it is, there is urgency for all of us who care about the future of PE to reflect on what is needed in these changing times. We need to re-examine the concept and context of physical education and more effectively communicate what it should look like now and in tomorrow's schools. For socialisation into physical activity engagement, there is a need to encourage thinking about PE in new ways. I now return to the two prime issues of PE **relevance** and **quality**, and **QPE** and **QPETE Indicators**.

2. Relevance and Quality Physical Education

The issue of **relevance** of the PE curriculum manifest in the discrepancy highlighted earlier between what the school offers and what the pupils are looking for is not untypical in many countries. The curricular focus on achievement-oriented competitive sport has little relevance to their life-style context. This is a narrow and unjustifiable conception of PE's role, which "limits participatory options rather than expands horizons" (Hardman, 2008).

Central to any debate on relevance and quality PE (QPE) is the recognition that the very essence of PE involves movement competence, which is acquired and developed throughout the full lifespan. The latter enables individuals to participate effectively in multiple contexts or social fields, which contribute to an overall successful life for individuals and to a well-functioning society. It is a part of health care and disease prevention. It is connected not only with sport and recreation but also with everyday life activities and only secondarily with specific sports skills. It can be learned, taught and developed (both indirectly and directly) in a range of institutions and other settings (educational, social and cultural public, private, commercial and voluntary systems and sub-systems). In turn, movement education in the form of PE can make a unique contribution to the education of **all** through the development of 'physical literacy' and health literacy'[2] and is key in sowing the seeds in the formation of the **physically educated person.**

The knowledge, skills and understanding acquired through school PE can prepare us for life. PE stimulates physical and mental development and through the PE process we can learn about the world and ourselves, learn how to play and to respect others, how to cooperate and compete, and the differences between success and failure, what is fair and unfair, ethical and dishonest. The same knowledge and skills are necessary to perform a variety of physical activities, maintain physical fitness, and to value, as well as enjoy, physical activity, which is in itself an essential pre-requisite for enhancement of quality of life and good health over the full lifespan. Motor activity in physical education, sport and physical activity is an important irreplaceable phenomenon in physical, cognitive, functional, sensory-motor, psychosocial development, in wellness development of all age groups and especially of children and youth. It is a springboard for involvement in sport and physical activities throughout life. It is also a source of inter-personal communication and, in addition, can involve an appreciation of the natural environment as well contribute to moral and aesthetic education and development. PE is the **only** educational experience where the focus is on the body, its movement and physical development, and it helps children

[2]Physical literacy is the ability to move with competence in a variety of physical activities and health literacy is the skills needed to obtain, understand and use the information to make good decisions for healthy living/well-being; they are key in curriculum development desiged to help students develop the necessary skills to make informed healthy choices!

and young people to learn to respect and value their own bodies and abilities, and those of others. Its aim is systematically to develop physical competence so that people can move efficiently, effectively and safely and understand what, why and how they are doing. Its outcomes embrace commitment, confidence, willing participation, knowledge and understanding and acquisition of generic and specific skills, positive attitudes, active lifestyle and activity enjoyment etc.

If children are to be brought back from the virtual reality of cyberspace, or persuaded to abandon the 'potato couch' and attracted into lifelong physical activity engagement, then any re-conceptualisation of PE, needs to be accompanied by improvements to teacher education preparatory training. Quality PE and PETE are inextricably intertwined. Today, teachers face new situations, in which individual development, inclusion, evaluation as well as management of pupils raised in changed and changing socio-political and cultural environments are key features. PE has come to be seen as a process, in which there has been a shift from obedience to responsibility (Normell, 2008). The teacher is widely perceived as a facilitator of learning. Nonetheless, PE teachers are required to undertake a variety of tasks, which encompass overt and discrete contributions to young people's learning as well as facilitation, co-ordination and management of experiences available to young people in PE through sources internal and external to the school. The need for more adaptable and flexible teachers is clear and PE teachers must be no less adaptable and flexible than others. It is evident that their roles are changing and if they are to be empowered to teach effectively, they will need to develop academic and professional competencies within a range of contexts, which themselves may be subject to change.

Societal changes, developments and trends invoke demands for appropriate innovative approaches to teacher training. The demands of PE in contemporary and ever changing school and wider community settings pose a challenge to teacher education institutions in equipping teachers, responsible for PE, with the necessary competence to deliver relevant, QPE programmes, which provide meaningful experiences and, which attract young people to the joy and pleasure of physical activity and so foster an 'active life-style' philosophy with a focus on relevance and understanding. Initial and in-service training/ further professional development should properly address pedagogical and didactical developments and social and cultural shifts and so help to enhance the PE experience of children and consequently contribute to the development of physically educated persons.

As teachers are agents of change, they require not only subject and people knowledge and understanding but also the ability to manage change. One consequence is that PETE providers should be instrumental in developing and fostering such agents through programmes designed to produce the 'model teacher' as: (i) competently knowledgeable[3]; (ii) analytically reflective[4]; and (iii) professionally effective[5].

3. Quality PE and PETE

As a comparativist, I am aware of the dangers of prescriptive recommendations for unquestioned adoption or assimilation in diverse contexts and I am, therefore, reluctant to take the prescriptions route to suggestions on keys to QPE and QPETE. Relevant in the framing of 'keys to quality physical education' discussion is recognition that historical antecedents, culture-bound practices, politico-ideological orientation, extent of socio-economic development settings and varying levels of national and/or regional and local legislation etc. have diversely shaped school PE and Higher Education Institution PETE provision and practice worldwide. Any formulation of Quality Indicators should recognise the realities

[3] E.g. familiar with the content of the requirements of the PE curriculum subject matter for the age-range studied; this includes acquisition of a subject content knowledge base, including key concepts and skills that provide the material to be taught and the ability to employ a range of teaching styles and methods within a variety of contexts.

[4] E.g. able to critically evaluate own practice in relation to these issues and to synthesise and apply knowledge and understanding to the critical analysis and evaluation of physical education theory research and practice.

[5] E.g. show an active commitment to the provision of equal opportunities for all pupils in PE and able to communicate and work co-operatively with colleagues, parents and others in negotiating the curriculum and overall provision for, and care of, children in school.

of such diversity in pan-national/cross-cultural contexts. Policy and practice are subject to localisation and/or local interpretations and there is not a 'one size fits all' solution. The term "Quality" itself has different meanings and QPE will appropriately 'look different' in different educational contexts. However, in planned development of PE provision, there are some 'universalities' that do have transnational or cross-cultural applicability and with suitable adaptation, they can be considered for 'local' application. Hence, the identification of characteristics of Quality need to be framed as **Core Principles**, and **NOT** sets of 'tick-list' **Specific Prescriptions,** which do not have the inherent propensity to cross boundaries and hence, have restricted applicability. These 'Core Principles' should be sufficiently flexible and adaptable to empower countries to apply them within their specific situations, conditions and circumstances and accord with their respective needs while aspiring to higher standards of **Quality**. Core Principles should be grounded in 'bottom up' research evidence and should take into account a number of issues, not least of which is QPE in school contexts, which has consequences for PETE Programmes, their learning outcomes and job competences.

Keys to Quality Physical Education: Core Principles

QPE has become a widely used term but its nature and scope has been defined in very few countries. Conceptually, it needs to be viewed in the context of inter-related strategies to embrace the formulation and development of inclusive curricula, which provide personally meaningful and socially and culturally relevant experiences. QPE curricula need to be based on the vision that the knowledge, skills and understanding acquired, facilitate attainment of physical and health literacy. See Appendix 1 for Quality PE Core Principles.

Keys to Quality Physical Education Teacher Education: Core Principles

Initial training is seen as the foundation stage in a process of continual learning and as a consequence PETE models should begin to reflect this. QPETE Indicators need to take into account a number of issues including QPE in school contexts, which has consequences for PETE Programmes of Study, their learning outcomes and job competences. Formulation of any PETE Curriculum Model should acknowledge societal needs in evolving *socio-cultural and economic* settings within a constant, dynamic and developmentally changing world, which may impact on, and hence, alter the functional roles of the designated professional area. With this scenario, occupational identity and associated functions and activities will essentially need to be flexibly adaptable. With regard to flexible adaptation in a context of globally diverse accreditation practices, some consideration should be given to different pathway routes (single subject, major/minor subject status and multiple subjects) to qualified PE teacher status at initial graduate (bachelor's) and postgraduate (master's) levels. Any such flexible adaptation could embrace traditions and recent developments of routes to teacher qualification and acknowledge the different career motivations/decisions of students entering provider higher education institutions (HEI's). However, a requirement of a minimum of accumulated study credits should be respected.

The identification of the core general principles' Indicators, serve as a guideline framework for providers and as a basis for Accreditation benchmarks. The framing of such principles has the propensity to represent a degree of harmonisation in any formulation of a PETE model curriculum, which could have applicability throughout institutions involved with preparation of teachers world-wide. The rationale of a PETE programme has at its core a model of the teacher who understands that pupils have individual needs and can respond to them, who is competent in curriculum areas and classroom practice and who, as an effective practitioner, is analytical, critically reflective and professional as well as one who demonstrates a continuing openness to new ideas. The ability to respond to, and manage change, is a central requisite. Teachers need also to be learners, and to be able to handle issues in an informed way so as to develop their practice in a changing world. In order to plan, deliver and evaluate the curriculum effectively, the teacher needs professional skills. Programmes of Study should be driven by clear conceptions and shared sets of institutional provider beliefs about what is valued in, and expected of, a teacher. Advocated Principles should have global applicability and accord with the notion of harmonisation. See Appendix 2. For Core General Principles.

Concluding Remarks

To conclude: what are the major issues to be addressed to sustain a secure future for PE in schools. The following are of particular concern:

persistent gaps between school PE policies and actual implementation as well as a failure to strictly apply legislation on provision;

continuing deficiencies in curriculum time allocation with evidence of unrealised prescriptions and/or guidelines and even reductions in some countries;

relevance and quality of the PE curriculum, especially in countries where there is a pre-disposition towards a competitive- and performance-oriented discourse; there are concerns about level of curriculum implementation and monitoring;

broad-spread disquiet about initial teacher training programmes, teacher supply and quality embracing insufficiency in numbers and inadequacy of appropriately qualified physical education teachers, especially in primary/elementary schools, as well as inadequate provision and/or uptake of further professional development opportunities;

considerable widespread inadequacies in quality and quantity of facility and amenity provision as well as equipment and learning/teaching materials supply and maintenance challenges, especially in low income (though not exclusively so) countries; a related issue in the facility-equipment concern is insufficient funding;

whilst some improvements in gender- and disability-related inclusion policies and practices supported in many countries by state legislation can be identified, barriers to equal provision and access opportunities for all still remain; for school children and young people with disabilities in particular, persistent barriers to full inclusion comprise inadequate infrastructure, insufficiencies in supply of appropriately qualified teaching personnel and support assistants, shortages in adapted facilities and equipment as well as learning and teaching materials;

at a time of declining levels of fitness of young people, increasing sedentary lifestyles and rising levels of obesity, the associated concerns are exacerbated in some countries by insufficient and/or inadequate school-community co-ordination and linked pathways to participation in physical activity.

Of the above, relevance of curriculum (and 'hidden' curriculum) content and delivery is of special concern. There is an urgent need of appraisal of **Quality** as well as identification of its characteristics. These characteristics need to be framed as flexible and adaptable **Core Principles**, and **NOT** sets of 'tick-list' **Specific Prescriptions** that may not have the inherent propensity to cross 'local' boundaries. An issue in the formulation of Quality PETE Indicators is what constitutes a *Physical Education Teacher*. In recognition of diversity in existing concepts and practices, it will be prudent to adopt principles that distinguish between teacher designations and take into account a number of issues not least of which are Quality PE in school contexts, and acknowledgement of societal needs in evolving *socio-cultural and economic* settings within a constant, dynamic and developmentally changing world.

An over-riding principle in Quality PE and PETE should be an all-embracing **policy to practice infrastructure to support inclusive provision, delivery and quality assurance** within the context of compliance with the 1978 UNESCO Charter for Physical Education and Sport.

Finally, it is imperative that the monitoring of developments in PE is formally maintained. Such a 'watching brief' mechanism has been advocated by inter-governmental agencies such as UNESCO, WHO and the Council of Europe with calls for monitoring systems to be put into place to regularly review the situation of PE in every country. Such regular watching brief monitoring would provide 'reality checks', which would assist in appraising whether policy rhetoric is being implemented in practice.

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Appendix 1.

Keys to Quality PE

1. Quality Physical Education

A curriculum that is formatively/developmentally based and progressively sequenced with clearly defined aims and learning outcomes.

An appropriate amount of compulsory curriculum time allocation required to facilitate Quality Physical Education. An immediate compulsory weekly allocation of 120 minutes and future consideration of a compulsory legal minimum of 180 minutes weekly, with schools endeavouring to go beyond this minimum where this is possible and a call for one hour of daily physical activity in, or out of, school settings would help sustain Quality PE and go some way to meeting scientific evidence that at least 60 minutes daily moderate to vigorous physical activity is necessary to sustain a healthy active lifestyle.

A curriculum in which Inclusion is embedded and which serves diverse needs/suits requirements of all children/students in schools. This implies a well balanced, structured and coherent curriculum, sufficiently challenging to all, delivered by suitably qualified teachers so as to ensure differentiated

learning tasks and teaching styles or interventions appropriate both to the students and to the tasks and foster creativity.

A curriculum that provides opportunities and experiences for enhancement of knowledge, understanding and movement skills in a variety but balanced range of physical activities to include facilitation of integration of traditions, cultures and values through promotion of traditional physical activities and sports.

Development of physical literacy. This encompasses movement competence in a variety of physical activities and includes positive self-concepts and social interaction with appropriate inter-personal skills, a range of psycho-social qualities and morally sound values and behaviours for development as an independent and responsible member of society.

Contribution to health literacy. This comprises the skills needed to obtain, understand and use the information to make good decisions for health and includes the promotion of active healthy lifestyles and lifelong participation in physical activity.

Equal opportunities for all children of school age regardless of sex, ethnicity and ability/disability. This implies inclusion, non-discrimination, understanding of the needs of all students and commitment to developing the needs of those with special requirements through specific programmes of study.

The enhancement of the whole person and the cultivation of the knowledge and ability to self-develop through physical activity.

Remedial interventions where appropriate, so that teachers are able to respond to individual needs.

The promotion of co-operation and competition and the provision of intra- and inter-school opportunities. Co-operative and competitive based activities provide opportunities for students to perform/work both in a group environment and as individuals.

A curriculum which links Physical Education/Physical Activity to the environment/community and promotes learning outside the classroom.

Integration with other areas of the whole school curriculum through cross-curricular links.

A curriculum that recognises and responds to the changing needs of students as they mature, physically, cognitively and emotionally. Such a curriculum encourages/helps students to make informed decisions relating to their future needs/aspirations.

Adequate resources to facilitate Quality Physical Education curriculum provision and delivery. These resources embrace suitably qualified teachers who can provide positive experiences for pupils/students; facilities, equipment, teaching/learning materials; and financial support.

A sustainable ratio of learners to teachers. Overly large class number sizes are likely to negatively impact on pedagogical and didactical processes, to increase risk factors in terms of safety and injury.

Evaluative assessment as an on-going part of the QPE programme. Teachers who are able to plan, present articulately and evaluate both their own performance and that of their pupils. Pupils' progress assessed formatively in reaching goals and not necessarily on whether they achieve prescribed absolute standards. Pupils should contribute to the evaluation process, enabling them to reflect on their own performance and that of others.

Periodic review that involves monitoring/evaluation of programmes of study and the completion of relevant and appropriate documentation.

Provision for enjoyable engagement in a safe well-managed environment, in which there is experience of participation without fear of abuse or exploitation. The intrinsic value of the sheer joy or participation in physical/sporting activity is a significant influence on positive attitudes and behaviours. It is not the activity but the Reason for taking part that sustains participation.

N.B. Additional to such QPE Indicator characteristics are positive **Outcomes** of QPE curricula, which relate directly to the above core principles.

Appendix 2.

Keys to Quality Physical Education Teacher Education: Core Principles

Training Standards, which are accredited or quality assured by the profession/provider institution/ relevant responsible statutory authority. The provision of a Framework of Standards is an opportunity for the use of professional judgement to assess trainee teachers. At a basic level, standards or competencies' include reference to professional attributes, professional knowledge and understanding and professional skills. ***Quality assurance*** comprises all the policies, systems and processes directed to ensuring the quality and standards of the educational provision. *Often this is linked to* ***quality enhancement*** - the process of continuous improvement.

Recruitment of academically capable, motivated and committed trainees, who have positive attitudes and appropriate aptitudes for undertaking teacher education (training) for preparation as professionals responsible for delivery of physical education in schools. It is important to ensure that anyone admitted to a PETE programme is suitable to become a teacher and has the appropriate intellectual and academic capabilities and personal qualities, attitudes and values to meet qualified teacher status (QTS). Those responsible for PETE programmes are also responsible for checking that they do not admit students to PETE who are unsuitable to work with children.

A focus on equity and inclusion and specifically how to support all children. This focus encompasses adequate levels of specialism embracing all stages (i.e. primary or elementary/basic through secondary levels) of the compulsory education framework. PE teachers are expected to operate in schools which include a diverse range of pupils. It is important that they understand the needs of each learner so that they can deploy a range of skills in order to promote achievement. Pupils with special needs or disabilities, learners form minority groups who might be a risk of underachievement depend on teachers to manage their learning and provide support.

A balanced and coherent Programme of Study that embraces development of subject knowledge and application of differentiated teaching interventions, which are typical of an analytically reflective and professionally effective and ensures professional and academic proficiency appropriate in teaching a progressive and sustainable range of physical activities in PE programmes in schools.

A Programme of Study that provides opportunities and experiences for enhancement of (subject) knowledge, understanding and movement skills in the full range of Fields of Study: Fields of Study comprise: Practical Activities including traditional, existing 'local' cultural and 'new' activities, which linking theory and practice and provide an opportunity for students to experience the range of physical education activities which are part of the school PE curriculum; Educational & Teaching Sciences (Pedagogy/Didactics); Natural and Biological Sciences (General and Applied); Social Sciences/Humanities (General and Applied); Scientific Work (PE-related research study: dissertation or project); Teaching Practica (including school-based practice, theory, practice and professional preparation time). The associated skills acquired will include curriculum development, implementation, communication and interaction in a variety of physical activity learning environments, evaluation of student progress, reflective thinking, appropriate decision-making and initiative taking, and adaptive behaviours.

A Programme of Study that is formatively/developmentally based, progressively sequenced and links theory and practice, with clearly defined aims and learning outcomes and key concepts that provide a framework to assist in developing student perspectives on learning to teach and commitment. PE teachers are faced with a variety of tasks, which encompass overt and discrete contributions to young people's learning as well as facilitation, co-ordination and management of experiences available to young people in physical education through sources internal and external to the school. The need for more adaptable teachers is clear and PE teachers must be no less adaptable than others. It is evident that their roles are changing and if they are to be empowered to teach effectively, they will need to develop academic and professional competencies within a range of contexts.

A Programme of Study that leads to acquisition and application in school contexts of a range of pedagogical and didactical processes and management techniques/skills that guarantees differentiation of learning tasks and teaching styles, which are appropriate both to the tasks and to the students. In order to meet the different needs of learners, teachers require a repertoire of teaching approaches which relate to the age and ability of the learners.

A Programme of Study that develops techniques of observing, recording, classifying, analysing, interpreting and presenting information and using them to test the value of scientific, pedagogical and didactical concepts as well as relevant activity principles.

A Programme of Study that increases knowledge of individual development; developing an understanding of the rationale for individualised approaches to teaching and learning and that the activities engaged in provide an amplification of child-centred approaches in PE.

A Programme of Study that recognises the development of personal capacities is a central concern of PE and that a pre-requisite of such an approach is the appreciation of the pupil as an active, evolving individual.

'Outcomes' that relate to generic and specific 'Knowledge' (what teachers should know) and generic and specific 'Competencies' (what teachers should be able to do).

Supervision of teaching practices by appropriately professionally qualified/experienced provider staff and co-operating school teachers/mentors; induction of trainees into the professional cultures of schools is an imperative in teacher education.

A Programme of Study that leads to understanding of the essential role of PE in contributing to personal well-being and to a balanced healthy, active lifestyle.

A Programme of Study that develops ethically and professionally sound values and behaviours.

A Programme of Study that fosters safe behaviours (teaching and learning, physically and socially) and management of risk-taking.

A balance in the time and respect for learning content knowledge, learning about pedagogy, pedagogical knowledge, and experience in learning to teach.

Provision for research and development in teacher education that contributes to development of positive professional attitudes of reflective and research capable practitioners.

A systematic plan in place for Programme evaluation and quality assurance.

A standardized exit qualification (a harmonized qualification structure and system along with a common understanding of the minimum requirements for the award of qualifications). Exit qualifications should encompass the Standards for qualified teacher status. However the routes or pathways to such awards require flexibility in recognition of the diverse range of PETE accreditation practices across the world.

A register of teachers with the relevant statutory authority (e.g. a Teaching Council). Teacher registration recognises the significant role of teaching as a profession. Teachers occupy positions of trust and responsibility within society. Registration ensures that a high standard of preparation, conduct and practice is upheld. Gaining professional registration means the teacher has met the professional standards for entry into the profession and opens the way for continuing professional learning and development in the future.

STUDY ON THE SPECIFIC WORKABILITY OF 20-YEAR-OLD PLAYERS (WOMEN) FROM THE NATIONAL BASKETBALL TEAM OF BULGARIA

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Key words: *basketball, women, physical development, specific workability*

INTRODUCTION

The training and development of young basketball players is a complex and lengthy process. Successful management of this process requires permanent scientific research in order to establish the status of the main indications of physical development and the specific performance of each of the players [2, 6, 7]. It is particularly important when it applies for the national teams of the country [3, 5, 7, 8, 10].

The ***objective*** of the study is to optimize the preparation of the 20-year-old competitors (women), listed in the national basketball team of Bulgaria by analysis of the parameters of their physical development and specific workability.

METHODS

This study is conducted in the period of March 2014 – September 2014.
Subject of the study is the basketball game in between young competitors-girls.
Object of the study is the physical development signs, the special physical and specific technical and tactical preparedness.
Contingent of the study is 12 basketball players (women), listed in the Bulgarian national team for the respective age group under study.
The following methods of research are applied for solving the objective and the tasks of the study: review study, anthropometry and sport-pedagogical testing.
For the needs of the study, data for 20 indicators are registered.
The results of the study are processes mathematically and statistically by: variation analysis, comparative analysis (by t-criterion of Student), sigma deviation method and the index method.

RESULTS AND DISCUSSION

As it is known, the variation V coefficient brings important information to the study. The analysis of the **fig. 1** shows that the physical development indicators are stable and relative stable, respectively the group under study is homogeneous and relatively homogeneous according to the signs about which these indicators bring information. The V values evidence it - they are within the limits between 5,16 % and 18,05 % and correspond to the respective norms of the sports statistics.

The latest indicator from this group (6^{th}) presents the Body Mass Index (BMI) calculated on the base of the weight and height of the girls. The analysis of the **fig. 2** shows that for 4 of them the values of the index are outside of the norm limits (20-25 kg/m^2). That means that ⅓ (33,34 %) of the best Bulgarian 20-year-old young basketball players-women are overweight or underweight.

That fact is rather troublesome. It is necessary to take up the respective measures (appropriate nutrition regime, adequate training impacts, etc.) which shall lead to reduction or increase of the obesity index and reach the norm zone. All that shall correspondingly impact positively the technique-tactic preparedness of each of the young competitors.

The analysis shows that in relation to the physical and technical-tactical preparedness signs the team

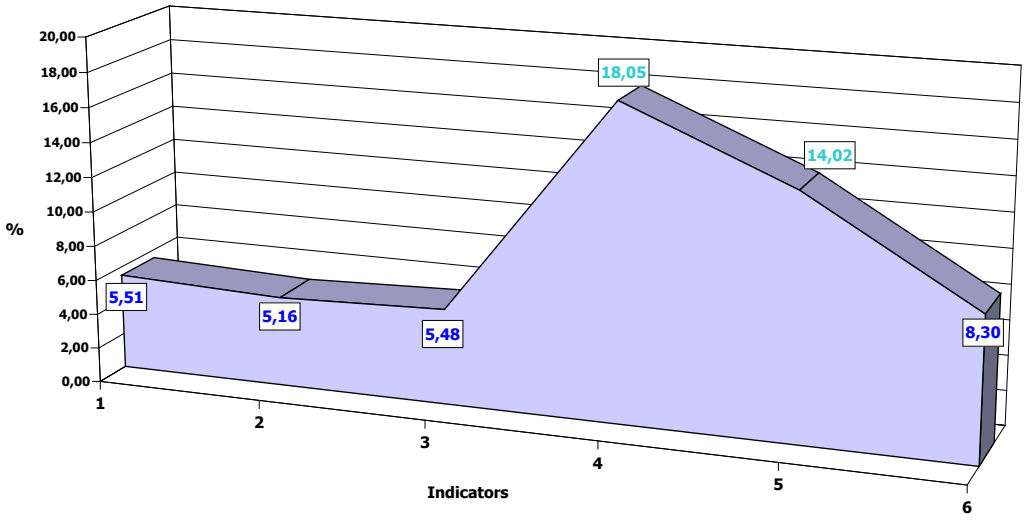

Fig 1. Dispersing of the indicators of the **physical development**

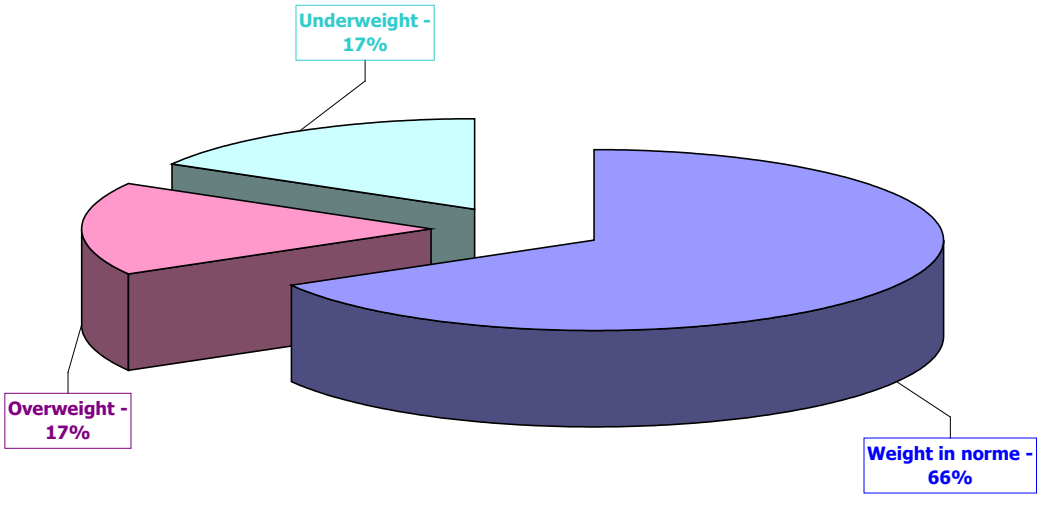

Fig 2. Relative shares of weight range among basketball players under study

under study as well is homogeneous and relatively homogeneous. The only exception is the skillfulness of the players to move along the playground with high speed leading the ball (**fig. 3**). It is seen on the figure (indicator 16) that here the groups is not homogeneous, which means that during the future education-training process, it is necessary to increase the volume of work leading to improving the skill of leading the ball of those players, who have lowest marks for this indicator.

For solving the aim and objectives of the survey, the data concerning national team under study (from 2014 – Bulgaria`14) have undergone a comparative analysis against the results of the national team of Bulgaria (of the same age group), but the composition from 2013 (Bulgaria`13).

The data/result analysis gives grounds for denying, with high guaranteed probability (Pt ≥ 95%), the zero hypothesis regarding the value of chest measurement, and accepting the alternative according which the basketball players from the national team Bulgaria`14 possess considerably poorer developed thorax, compared to the players on the other national team - Bulgaria`13 (**fig 4**).

At the same time, regarding the rest of the features of the physical development, the superiority of the female basketball players on one of the two compositions seems inconsiderable and can be accounted for by random causes.

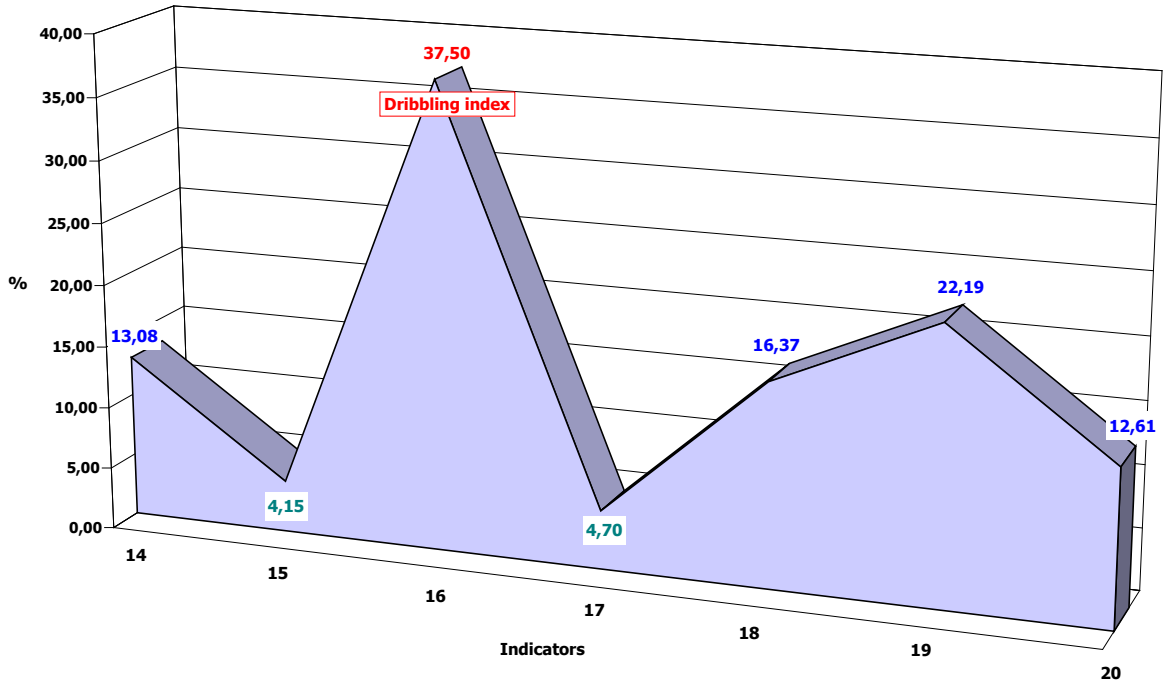

Fig 3. Dispersing of the indicators of the physical **technical-tactical preparedness**

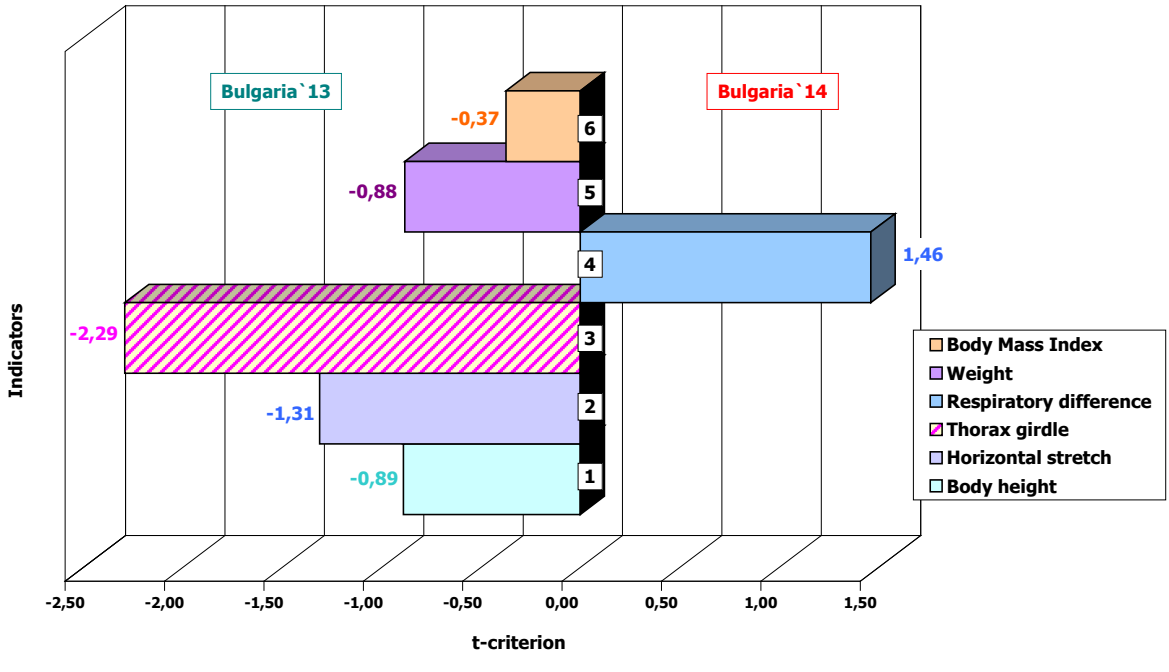

Fig 4. Significance of the differences between mean levels of the surveyed of **physical development** with the national team` 14 and the national team` 13

The analysis shows that, regarding the level attained of the special physical fitness, the basketball players from the surveyed team (Bulgaria`14) are generally more or less on a par with the ones from the national team`13. Proof of that are the values of the comparative t-criterion where 5 of the monitored features are lower than the critical one (**fig. 5**).

Here there are only two exceptions: they refer to the level of development of the explosive power of the abdominal muscles as well as the girls' speed potentialities (indicators 12 and 8).

The comparative analysis concerning the technique-and-tactic preparedness is possible only in 5 out of 7 monitored indicators (***fig. 6***). The data/results show that the advantage of the national team Bulgaria`13 with regard to the skills to dribble through the court in a high speed and to the efficiency of the

moving shoot (indicators 15 and 18) is considerable - the t-criterions are higher than 2.06. It means that the girls from the team of Bugaria`14 in the future have to force on development of dribble through the court in a high speed and on the efficiency of the moving shoot.

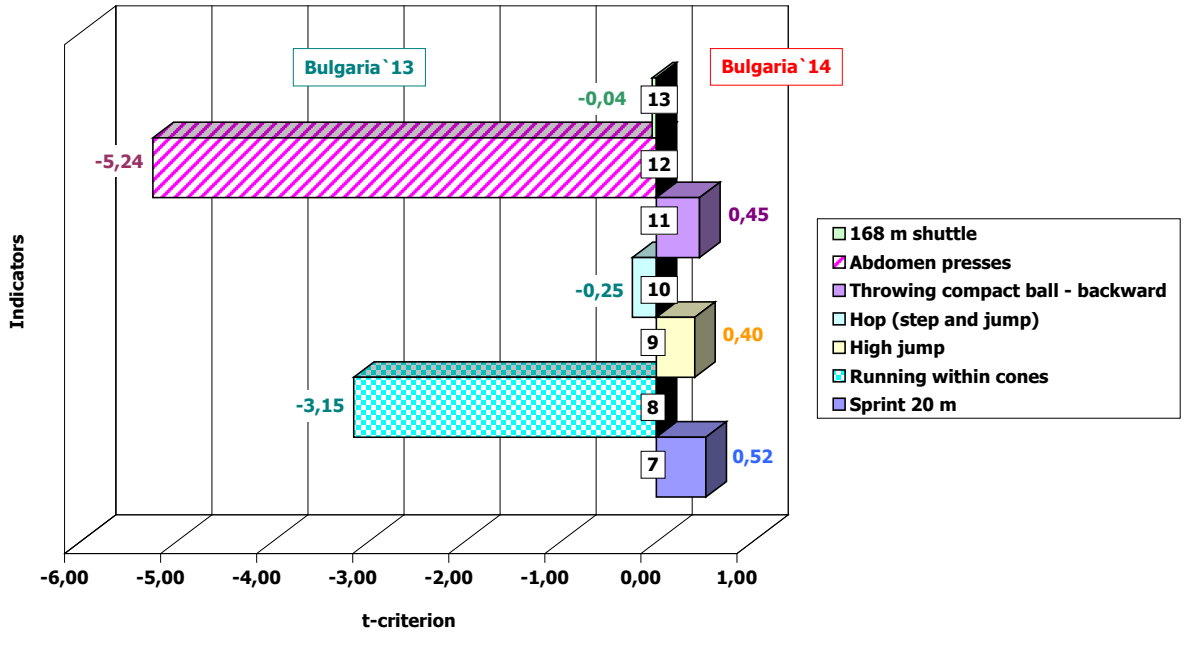

Fig 4. Significance of the differences between the mean levels of the indicators of the special **physical preparedness**

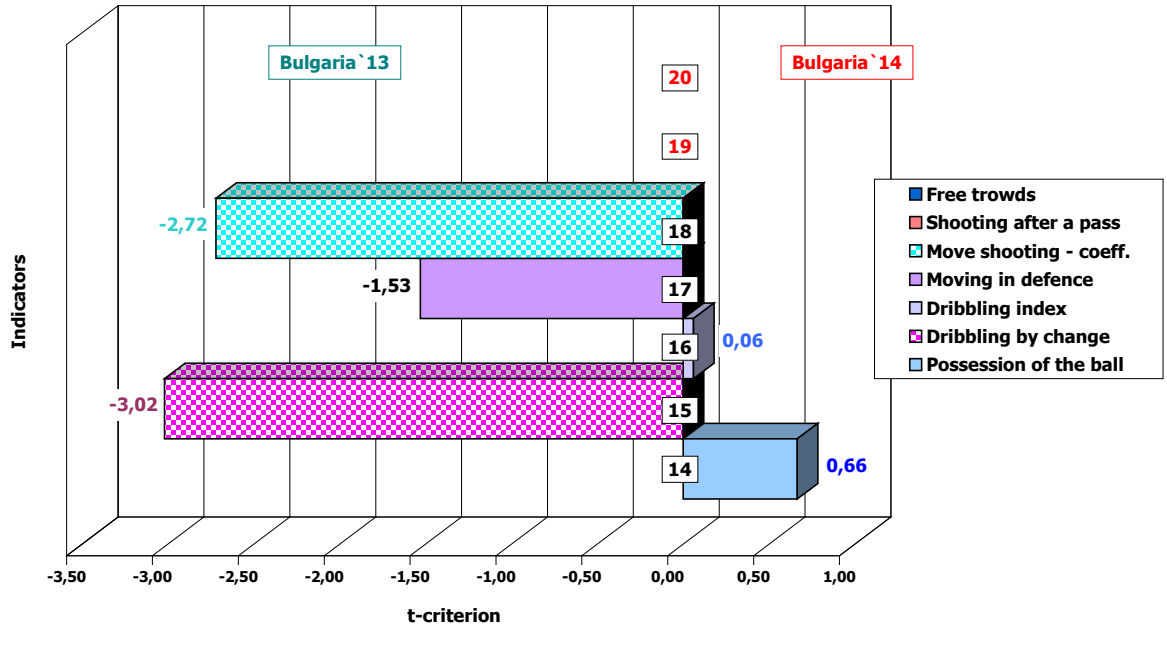

Fig 4. Significance of the differences between the mean levels of the indicators of the special **physical preparedness**

At the same time, the advantage of the national team`13 with regard to the skills to navigate through the court in defensive (indicators 17) is inconsiderable and can be accounted for by random causes.

CONCLUSIONS

The analysis of the results and the summaries made in the paper allow for some ***conclusions*** about the sport preparedness of the national team under study to be formulated:

1. ⅓ of the female players listed in the national team of Bulgaria for 20-years-old, who took part in the European championship in 2014, are out of weigh norm limits.
2. As a whole, this combination is homogeneous and relatively homogeneous in relation to all signs of the physical development and specific workability under study.
3. The female national team under study (Bulgaria`14), compared to the players on the other national team - Bulgaria`13 has considerably lower level of development of the next signs:
   - the measurements of the chest;
   - explosive power of the abdominal muscles;
   - speed potentialities;
   - skills to dribble through the court in a high speed;
   - efficiency of the moving shoot.
4. These are the weak sides in the preparation of the girls and the emphasis in the future education-training work has to be directed on them.

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COMPARATIVE ANALYSIS OF THE TECHNICAL AND TACTICAL ACTIONS OF BULGARIAN GRECO-ROMAN WRESTLING TEAM FROM THE INTERNATIONAL WRESTLING TOURNAMENT „NIKOLA PETROV“, HELD IN 2011. AND 2014

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Key words: wrestling, rules, efficiency

INTRODUCTION

Excellence in modern sports is unthinkable without constant objectification and analysis of the technical actions.

The problem of studying the competitive activities of the fighters in Bulgaria was developed by R. Petrov (1967, 1973, 1977, 1978), F. Kriviralchev (1972, 1981, 1984), I. Stavrev (1980, 1981, 1985), N. Stanchev (1990), O.Makaveev, P. Kirov (2010) R.Makaveev, N.Nikolov (2012) and others.

Traditionally conducted in our international tournament on Greco-Roman wrestling „Nikola Petrov“ is the most recent competition for control of Bulgarian wrestlers before the European Championship [1, 2]. In 2014 in Sofia was held the 52nd edition of this oldest European sports forum. In recent years, the greco-roman fights showed some stability in their development. Losing some of its spectacular and dynamic - and hence the level of viewership. The future of sport wrestling like Olympic discipline (three styles) was questioned as a result of a number of „factors“, mainly subjective nature. To answer one of the biggest challenges in its over hundred year history, the International Wrestling Federation (FILA) has taken swift and appropriate measures in accordance with the new challenges, including some changes in the rules. In its extraordinary congress of 19.05.2013, held in Moscow, FILA discussed and adopted a number of changes in the rules of combat sports, some of the more significant that involve greco-roman style are the following:

- Change of duration from three periods of two minutes in two periods of three minutes.
- Accumulation of points from the two periods (until then any period beginning from 0-0).
- Partial change in scoring - more points for getting down and throws, respectively 2 and 4 technical points for these techniques.
- From the beginning of 2014. were introduced new weights categories - eight in number, six of which are Olympic.
- Attention is drawn to the judgment apparatus to prevent passive struggle by imposing appropriate penalties and more.

The aim of the study was to analyze the technical and tactical actions of the Bulgarian fighters two tournament „Nikola Petrov“, held at the old (2011) and new rules (2014g.) date from the beginning of 2014, and whether the new amendments are in line with the expectations of the sport community to boost the combat and more active fighters.

METHODOLOGY

To achieve the objective were processed videotaped two international tournament „Nikola Petrov“ held in 2011 in Burgas and Sofia in 2014 and data are mapped in advance prepared for the purpose and established practice protocols and the final data is shown in tabular form. The total number of recorded and processed bouts is 105. Number of tested fighters in both Tournament is identical - 22 people, they represent both the first (titular fighters) in their weight categories and other Bulgarian actors. For processing of the data is used software Excel 2010.

RESULTS

The main groups of techniques used by the fighters of these events are:

- Technical and tactical techniques in standing position - takedowns, throws in the chest, back and shoulders; push and touch
- Technical-tactical actions of ground (referee`s position) – standing switch, throws, roll overs and touch.

For trainers and professionals special interest are the quantity and quality of the holds performed by both our fighters and their rivals; ratio of won and lost technical points; won and lost fights; advantage of the fight in the stand or ground etc. (**Table 1 and Table 2**).

Table 1. TT action of the enlarged national team in Greco-Roman Wrestling from IT „N.Petrov" 21–23.02.2014, Sofia

Name/weight	bouts			points			Techniques in standing position																Σ		Techniques in parterre								Σ	
	win	lost	Σ	win	lost	Σ	1	1	1	1	1	2	2	2	2	1	3	3	1	2	3	6	win	lost	4	5	5	4	4	3	4	3	6	win	lost
N.V./59	1	1	2	4	10	14					1_0				0_1	0_3			1_4		0_1		2	9	0_1						1_0			1	1
R.V./59	3	1	4	17	9	26	1_0									3_0	1_0				3_1		8	2			1_0	1_0						2	0
A.K./59	5	0	5	21	4	25		0_1								2_0		0_1	2_0		3_0		7	2	7_0									7	0
K.S./66	3	1	4	17	21	38	1_0				1_0			1_0			1_1				0_2		3	3	3_1	0_2			0_1	1_1		1_1		5	6
O.R./66	0	2	2	6	13	19					0_1	1_0		1_1		1_1	0_1						3	4	0_1		0_1							0	2
S.S./71	0	1	1	0	10	10			0_2			0_1											0	3		0_1								0	1
I.G./75	3	1	4	18	2	20											1_0				3_1		4	1	2_0		3_1							5	1
A.K./75	1	2	3	1	15	16										0_2					1_1		1	3	0_4		0_1							0	5
St.St./75	0	1	1	0	8	8		0_1								0_2	0_1						0	4	0_1									0	1
D.A./80	1	1	2	12	11	23							0_1			0_1		0_1	1_1	1_0			2	4	0_1		2_0							2	1
A.V./80	0	1	1	2	5	7					0_1	1_0		0_1							1_0		2	2										0	0
R.N./85	0	1	1	0	7	7					0_1					0_1		0_1					0	3										0	0
N.D./85	1	2	3	9	5	14								2_0		0_3		0_1				0_1	2	5			0_1							0	1
S.K./85	1	1	2	2	5	7					0_1					2_0					0_1	0_1	2	3										0	0
N.B./85	4	1	5	25	13	38			0_1	0_1	1_0				0_1	7_0		0_1	1_0		2_0		11	4	2_1		1_1							3	2
D.Z./85	0	1	1	1	2	3										0_2					1_0		1	2										0	0
H.M./85	2	2	4	5	11	16							0_1			0_1					0_1		0	3	3_0		0_2							3	2
I.I./98	2	2	4	11	8	19				0_1		1_0		0_1		1_1			1_0		2_1	0_1	5	5	1_0									1	0
E.G../98	0	1	1	0	9	9						0_1				0_1			0_1				0	3	0_1									0	1
V.M./98	1	2	3	9	6	15	0_1									0_1			1_1				1	3	4_1									4	1
M.M./130	3	1	4	10	3	13									0_1	0_1			2_0		3_0		5	2	1_0					0_1				1	1
L.D./130	4	1	5	16	2	18								1_0	1_0	2_2			1_1		2_0		7	3	2_0									2	0
Σ:	35	27	62	186	179	365	2_1	0_2	0_3	0_2	3_4	3_2	0_2	5_3	1_3	18_22	3_3	0_5	10_8	1_0	21_9	0_3	66	73	25_12	0_3	7_7	1_0	0_1	1_2	1_0	1_1		36	25

LEGEND: „1"- takedowns; „2"- throws; „3"- counter attacks; „4"- overthrow; „5"- throws; „6"- touches

The total number of points earned technically in 2011 is 113 to 162 lost, while in 2014 are respectively 186 to 179, in other words, the balance of this indicator is negative in the first tournament tested, and in 2014 is positive (graph 1, graph 1a).

It is also apparent that in total in 2014, under the new rules are marked more points against the previous tournament (2011). This could be due to increased activity of the fighters, as well as of a large number of games, and a modified scoring. From standing position our fighters mostly used in 2011 pushing, takedowns. In 2014. again prevails pushing, but also often applied, souples, shoulder throw, demolition with hold the body. According to the new requirements, we are witnessing relatively frequent warnings passivity that indicator Bulgarian wrestlers have a good result - 21 were alerted our rivals and our wrestlers are cautioned 9 times. The total number of the executed techniques of stand by and to our players in both tournament which tested was 27 to 33 in 2011 and 66 to 73 in 2014 (graph 2, graph 2a).

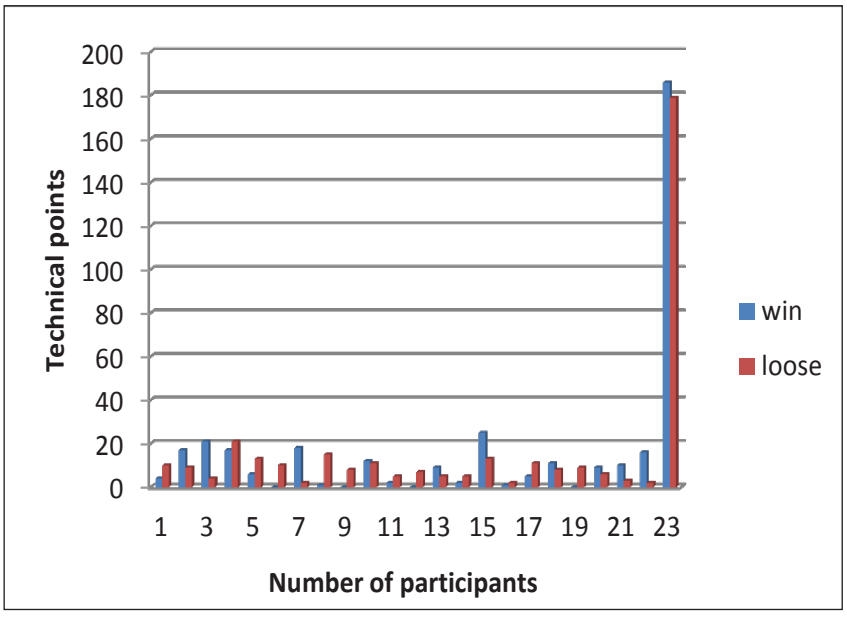
From the ground in 2011 the most common technique of our fighters and to them, of course, is rolling and balance with other techniques is unfavorable to us, as most often we practiced throwing from the ground floor – reverse waist lock and souple. At this year's tournament we provide convincing rolling again and also have improved performance and in terms of throwing back souple - 7 of 7. The total number of holds applied by our fighters was 36 against 25 to them (graf.3 and 3a).

Table 2

Table 2. TT action of the enlarged national team in Greco-Roman Wrestling from IT "N. Petrov,"2011, Burgas

Name/weight	bouts			points			Techniques in standing position											Σ		Techniques in parterre										Σ		
	win	lost	Σ	win	lost	Σ	1	1	2	1	1	2	2	2	3	1	3	win	lost	4	5	4	5	5	4	4	4	4	4	6	win	lost	ranki
N.V./55	0	2	2	2	18	20						1\1						1	1	0\1				0\1			1\1	0\5			1	8	5
R.S./60	1	2	3	7	16	23					1\1			0\1		1\0		2	2				0\1					1\1			1	2	5
A.A./60	1	2	3	3	12	15						1\1				0\2		1	3									0\4			0	4	10
E.T./66	1	1	2	6	8	14			1\0	1\0							1\1	3	1		0\1	0\1						1\0			1	2	12
S.K./66	0	1	1	5	4	9										1\1		1	1									1\1			1	1	14
E.M./66	0	1	1	1	6	7			0\1					0\1				0	2		0\1			0\1							0	2	18
M.D./66	0	1	1	0	2	2					0\1					0\1		0	2												0	0	20
I.M./66	0	1	1	0	7	7										0\3		0	3									0\2			0	2	24
I.G./74	3	1	4	23	5	28									1\0	2\2		3	2									6\0			6	0	3
I.S./74	1	2	3	4	10	14										2\0		2	0				0\1	1\0		0\1		0\3			1	5	11
D.A./74	0	1	1	3	8	11										0\1		0	1	0\1								1\1	0\1		1	3	15
N.K./74	0	1	1	2	4	6												0	0							0\1		2\0			2	1	18
S.N./74	0	1	1	2	7	9		0\1								0\1	1\0	1	2									0\3			0	3	19
R.N./74	0	1	1	0	7	7											0\1	0	1		0\1					0\1					0	2	22
N.B./84	2	2	4	6	8	14					0\1					0\1		0	2				0\1			0\1					0	2	5
S.K./84	1	2	3	3	9	12									0\2	2\0		2	2									1\1	0\1		1	2	5
V.S./84	0	1	1	2	5	7										0\2		0	2				0\1					1\0			1	1	10
B.Z./84	0	1	1	0	2	2					0\1							0	1												0	0	13
P.T./96	0	1	1	5	11	16				0\1				1\0	1\0	0\1		2	2		0\1					0\1		0\1			0	3	9
I.I./120	3	1	4	32	3	35				3\0	1\0				2\0	1\1		7	1						1\0		13\0				14	0	3
M.M./120	1	2	3	7	8	15						0\1				1\1		1	2									3\2			3	2	5
L.D./120	0	1	1	0	2	2										1\0		1	0									0\1			0	1	12
Σ:	14	29	43	113	162	275	0/0	0/1	1_1	4_1	2_4	2_3	0	1_2	4_2	11_17	2_2	27	33	0_2	0_4	0_1	0_4	1_2	0	1_1	1_5	30_25	0_2	0	33	46	0

LEGEND: “1”- takedowns; “2”- throws; “3” - counter attacks; “4”- overthrow; “5”-throws; “6”- touches

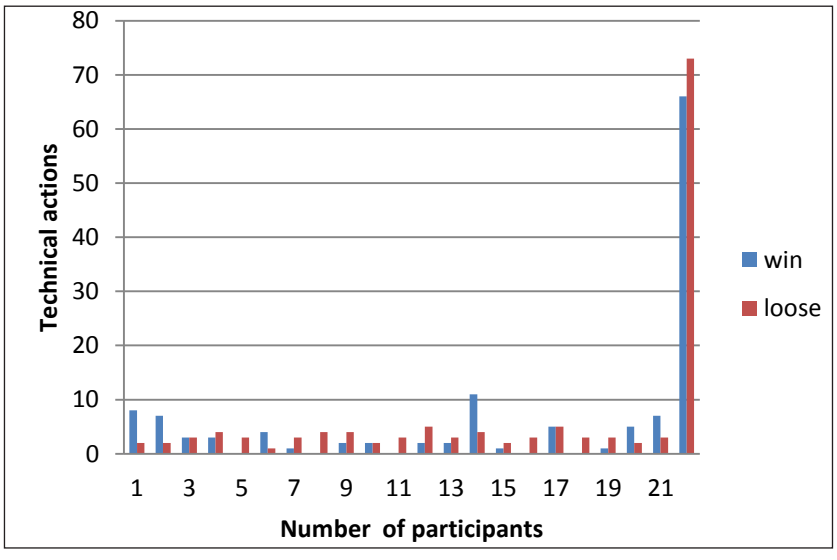


Graph. 1a . The ratio of points won and lost, 2014.

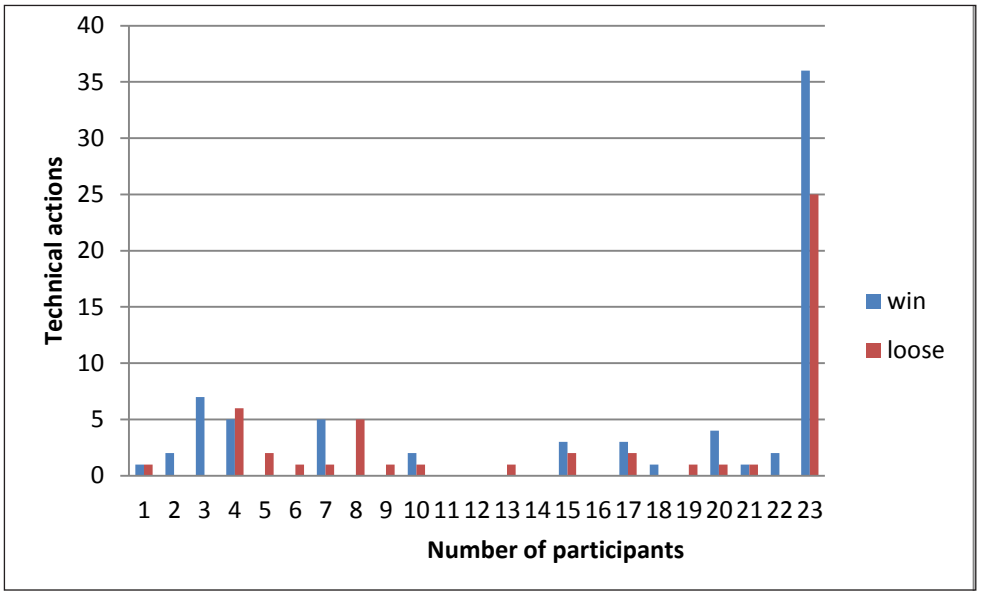
Generally the fight in stand position has intensified and while in first race the ratio of the fight in the stand and ground has the advantage on the ground fighting, the second study competition ratio is almost 2 to 1 in favor of the technique of stand. Important indicator that should make up our wrestlers and coaches is touches success rate. Our fighters are not realizing any touch, while they are to be applied three times.

CONCLUSIONS

1. Analysis of the techniques used by groups holds, marked technical points in stand or ground allows us for timely correcting training process by coaches, and to track trends in the major opponents, national schools, etc.



Graph.2a. Technical-tactical actions in standing, 2014.



Graph.3a Technical-tactical actions in parterre, 2014.

2. Decisions of the International Wrestling Federation FILA contribute to stepping up the fight in the stand, and thus increasing the amount of applied holds, which increases efficiency and point scoring of the wrestlers.
3. To conduct an effective two periods in 3 minutes each of the fight, needs to improve the functional capabilities of the wrestlers to work for the implementation of a diverse repertoire of technical actions in stand and parter, expressed in the application of holds with higher grades.

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STUDY OF THE DYNAMICS OF THE CHANGES IN THE ALKALINE-ACID EQUILIBRIUM OF THE BLOOD UPON INTENSIVE RUN LOAD WITHIN THE CONDITIONS OF 2000 M ABOVE SEE LEVEL

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Key words: *control, training process, alkaline-acid equilibrium*

INTRODUCTION

One of the most discussed issues in the sports theory and practice are related to the effects of the training sessions in elevated conditions (1,2,4,6). Nevertheless a range of proved methodological treatments of that process its optimization to a greater degree depends on the definition of adequate criteria for evaluating the individual reactions of the athletes. The individualization of the evaluations presume the application of control methods which bear correct information about the intimate reactions of the organism in the phases of load and restoration (3,5,7,8). The measurement of the actual changes in the alkaline-acid status of the blood is a method which answers such a requirement to a great degree.

As known, the main factor stimulating a difficult prognosis of the effects on the athletes' organism training at elevated conditions arises from the hypoxia appearing as a consequence of increasing the intensity of the applied training and competition load (4). Hypoxia load provoke serious infringements of the alkaline-acid equilibrium of the blood. Consequently, the training load and its physiological effects can be evaluated on the basis of these changes. It is on that base that we have planed and implemented purposeful studies with the purpose to get an answer of the following questions:

What are the actual infringements in the alkaline-acid equilibrium of the blood as a consequence of the application of run load of various duration and intensity?

How does the re-cooperation of the norm run during the early recovery process?

In order to answer the questions set up hereinabove, we have tested 4 elite women competitors preparing to participate in competitions of 400 and 800 m run. Their personal results for the mentioned disciplines are as follows:

Svetla Koleva 400 m 52,9 sec. 800 m 1:57,21 min

Ivanka Georgieva 400 m 53,53 sec 800 m 1:59,7 min

Biserka Palazova 400 m 56,44 sec 800 m 2:07,1 min

Sonya Bankina 400 m 57,71 sec 800 m 2:19,4 min

METHODOLOGY

The studies have been carried out during one week micro cycle of the special preparatory mezzo cycle during the month of June (the second week of the training camp at a height of 2050 m above sea level – sports complex Belmeken). The changes in the alkaline-acid equilibrium of the blood have been followed up immediately after the following run load:

- directed toward developing the speed abilities – repeated runs with maximum intensity on segments within the range of 20-80 m;
- directed towards developing the speed endurance – multiple runs on segments within the range of 100-200-400 m by 83-95% speed of the maximum;
- directed toward developing the special endurance – repeated runs on a small number of segments within the range of 600 to 1000 m with intensity of 83-95%;

- directed toward developing the base endurance by prolonged runs from 12 up to 60 min at pulse frequency of 150 to 180 strokes/min.

The dynamics of the recovery changes in the early periods (90 min after the load) have been followed too, as well as the primary reactions of the alkaline-acid equilibrium of the blood on the next day (20 hours after the end of the load).

For the purpose samples of capillary blood from the auricle have been taken according to the following schedule:

in the morning prior breakfast;

4 min after the run load and on the 90-ieth minute after it.

The samples have been processes immediately after they have been taken by Asrup device applying standard methodology. Additional to that the value of the pulse frequency has been measured at the first minute after the load. Recorded and analyzed were the results from the changes in the levels of the following hematological indicators:

pH – Actual reaction of the blood – norm from 7,35 to 7,45

pCO2-Partial pressure of the hydrocarbon dioxide (mm-mercury column) norm 35-45

BE-Basis excess as for normal values within the range of -2 to +2 were recorded

SB-Standard bicarbonate at norm of 23-25 mmol/l

BB –Buffer basis. Reflect the sum of the anions of the protein, hemoglobin and bicarbonate buffer of the blood on the condition that hemoglobin is oxidized 90% normal values vary between 46-52 mmol/l

Results and comments

Table 1 presents the dynamics of the changes in the state of the alkaline-acid equilibrium of the blood within the period under study. They are characterized by the following particularities according to the applied load:

Table 1. Generalized results of the average results related to the changes in the alkaline-acid state of the blood within the phases of load and restoration 24 hours after the respective training sessions

Dates	Indicators	pH	BE	SB	pCO2
	norm	7,35 /7,45	(-2)/2	23/25	35/45
10 June	restoration	7,380667	-2,8	22	36,33333
	load	7,34	-9,3	17,7	26
11 June	restoration	7,42125	0,075	24	42,75
	load	7,0625	-19,5	10,8	39,25
12 June	restoration	7,38775	-2,5	22,15	35,75
	load	7,079	-17,9	10,65	28,25
13 June	restoration	7,4025	-1,725	22,75	35,175
	load	7,188333	-17,9667	11,96667	39,25
14 June	restoration	7,41425	-1,2	23,175	34,625
	load	7,10825	-17,2	11,325	28,25
15 June	restoration	7,4025	-1,725	22,75	35,175

The intermittent run load on fragments within the range from 200 to 1000 m performed by speed exceeding 93% of the actual abilities of the competitors have provoked values of the pH within the range of 6,955 to 7,2 and levels of the basis excess within the frames of > -22/-18,8. These values are indication for the deep hypoxia in which the organism is working, i.e., available is a proof about the high extremeness of the training impact at 11.07 and 12.07. This is noticeable from the average values of the basic parameters of alkaline-acid equilibrium - pH(7,0625 -7,079) and BE(-19,5/-17,9).

The intermittent run load on fragments shorter than 200 m and prolonged run of duration above 10 min provoke a state of an average and high hypoxia. This is evident from the registered values at 13 and 14.07.

These values are as follows: pH (7,189 и 7,11); BE (-18/-17). We have to note that considerably more serious difficulty for the energy provision is observed upon prolonged intensive run about which we judge from the increased partial pressure of the hydrocarbon dioxide (39,25), which prompts that the organism copes with hypoxia with difficulty; while for runs below 200 m the values of this indicator are 28,25 which is an indication about an adequate adaptation to the conditions of hypoxia.

The prolonged run load of low intensity (speed of run) is best endured by the organism. That is seen from the values of the alkaline-acid state of the blood immediately after the end of the effort at 10.07 where the values are as follows: pH=7,34 и BE=-9,3. They are as well of most expressed positive reaction within the 24 hours period of restoration where at 11.07 we note the highest levels of the pH =7,42 and BE=-0,075.

The lowest values of the parameters within the 24 hours restoration period are registered at 12.07 after the training session held in a state of deep acidosis. The quantitative values of the indicators have reached their lowest restoration levels as follows: pH=7,388; BE=-2,5 и PCO2=35,75.

Conclusions and recommendations:

Run load in elevated conditions have specific characteristics of the bio-energetic reactions.

The restoration processes resulting from the application of various in structure run load within the conditions of increased sea level pass on strictly specifically within the periods of the everyday restoration.

The intermittent run load of high intensity and duration of 30" to 5' provoke most sharp changes in the alkaline-acid equilibrium of the blood while pH falls down below 7, BE reaches values below -22 which is an indication about a deep hypoxia and high extremity in the general status of the organism. The restoration processes flow slower following such a load.

The prolonged run load of low intensity performed within the conditions of increased sea level appear as highly effective means for accelerating the restoration processes.

The results from the study open the following possibilities:

- objectivization of the training effects
- optimization of the algorhythm of the training load within the conditions of sea level above 2000 m

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RESULTS OF THE SURVEY OF INTERNATIONAL OLYMPIC SPORT FEDERATIONS AND MEMBER NATIONAL ROWING FEDERATIONS ON THE STATUS OF WOMEN'S PARTICIPATION

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Key words: rowing, women's participation,

1. EXECUTIVE SUMMARY

The purpose of this report is to evaluate the current situation of women in international sport and women's rowing worldwide by gathering and analysing statistical information on female participation.

Two surveys were conducted in order to understand the current situation and experts were interviewed to understand best practices in this area with the aim of setting the grounds for the development of a strategic plan. The interviewees were chosen for their expertise on rowing and women´s development projects or due to their specific technical or management skills.

The statistical data show that 40% of rowers worldwide are female, 17% of board members of National Federations are female, 26% of rowing coaches are female, 23% of International umpires are female and 29% of National umpires are female. The female participation in FISA events has slowly progressed in all age categories and the percentage of NFs organising men´s and women´s events is similar. Still there remain differences between the continents regarding all roles.

2. INTRODUCTION

2.1. Project Background

FISA, the International Rowing Federation, is empowered by its 142 member National Rowing Federations, the National Olympic Committees and the International Olympic Committee to govern the sport of rowing.

The goals and objectives of FISA are to: Develop, Promote, Present and Govern the sport of rowing. To encourage the development of the sport of rowing and strengthen the bonds that unite those who practice it. The mission of FISA is to make rowing a universally practiced and globally relevant sport, and to spread the sport in all its forms. In 2012, the FISA Council agreed that FISA should take steps towards increasing the numbers of women in rowing and to ultimately reach equality in numbers of participants and number of events at World Championships and Olympics

2.2 Project Objectives

Accordingly, the Women's Rowing Development Strategy is being created to address how to increase the number of women rowers and raise the standard of women's crews around the world as well as the overall presence of women in all aspects of the sport of rowing.

The review has the following objectives:

a. Research involving other International Sport Federations
   - Design and conduct a survey of key summer Olympic international federations and any other relevant sport bodies on the status of women within their sports as well as within their federation as officials and administrators;
   - From research with International Federations, compile overall data on men's and women's participation in their sports' events (including its progress or decline) and compare it to other Olympic sports;

- Identify examples of best practices from international federations in the area of women in sport and men in sport.

b. Research involving Member National Rowing Federations
   - Design and conduct a survey of the national federations on status of women within their national federation as athletes, coaches, umpires, elected officials and professional administrators;
   - Compile and present membership statistics for men and women in member federations;
   - Compile and present FISA events statistics including levels of male / female participation within teams and overall;
   - Identify key areas of success and weaknesses, barriers and solutions in each member federation.

c. Final Result
   - Identify currently used and possible future strategies for developing women's rowing at all levels, specifically the junior, Under 23 and senior sectors (for example, through club, school, university, scholarship, and age group programmes);
   - Identify current barriers to women in all aspects of rowing including its administration and identify strategies to address each barrier;
   - Identify areas of strength and weakness, threats and opportunities for improving women's rowing within the Olympic and global sport movement;
   - Develop a prioritised list of projects for women's rowing based on the above steps.

2.3 Methodology for developing the plan

To complete the review the following methodology was used:

a. Diagnosis,
b. Analysis
c. Establish Objectives
d. Create Action Plans
e. Implementation
f. Evaluation
g. Measurement

In October 2013 an in-depth analysis on the 2013 Olympic Programme Commission Report were conducted that had been published and distributed to the International Federations, in order to gather comparative data on the 28 summer Olympic International federations.

Also in October 2013 a survey was conducted with the summer Olympic International Federations in order to gather and analyse comparative data, namely the number of registered male and female athletes, coaches, umpires, professional staff and number of men´s and women´s participation in international events, as well as to identify examples of best practices in the area of women and men in sport. As a result data from 15 International federations was analysed.

In September 2013, a questionnaire was sent in electronic format to the most active 100 of the

142 member National Rowing Federations. From September to November 2013 FISA conducted an in-depth analysis on the National Federation´s survey results (with 80 NFs responding which

equals an 80% success rate) in order to gather comparative data about the rowing participation

at a national level.

3. SUMMARY OF -CURRENT FISA POSITION

3.1. Men and Women on the Olympic Programme (Events and quotas)

The Olympic Charter states that it is the IOC role to encourage and support the promotion of women in sport at all levels and in all structures with a view to implementing the principle of equality of men and women. In London 2012 among 310 events, 170 were men´s events and 140 were women´s

events (45%). FISA currently stages eight events for men and six events for women (43%) at the Olympic Games. Rowing is 7th on the women´s events "ranking" and 9th in the men´s events "ranking" among similar sports (Tab.1).

Table 1. Men and Women on The Olympic Programme – London 2012 Events (Olympic Programme Commission Report, September 2013)

Rkg Total Events	IF	Total Events
1	IAAF	47
2	FINA	46
3	FIG	18
3	FILA	18
3	UCI	18
6	ICF	16
7	ISSF	15
7	IWF	15
9	FISA	14
9	IJF	14
11	AIBA	13
12	FEI	12
13	FIE	10
13	ISAF	10
15	WTF	8
16	BWF	6
16	ITF	6
18	FIVB	4
18	ITTF	4
18	WA	4
21	FIBA	2
21	FIFA	2
21	FIH	2
21	IHF	2
21	ITU	2
21	UIP	2

Rkg Women Events	IF	Total W Events
1	FINA	24
2	IAAF	23
3	FIG	9
3	UCI	9
5	IWF	7
5	IJF	7
7	ISSF	6
7	FISA	6
7	FEI	6
10	ICF	5
10	FIE	5
12	FILA	4
12	ISAF	4
12	WTF	4
15	AIBA	3
15	BWF	3
15	ITF	3
18	FIVB	2
18	ITTF	2
18	WA	2
21	FIBA	1
21	FIFA	1
21	FIH	1
21	IHF	1
21	ITU	1
21	UIPM	1

Rkg Men Events	IF	Total M Events
1	IAAF	24
2	FINA	22
3	FILA	14
4	ICF	11
5	AIBA	10
6	FIG	9
6	UCI	9
6	ISSF	9
9	IWF	8
9	FISA	8
11	IJF	7
12	FEI	6
12	ISAF	6
14	FIE	5
15	WTF	4
16	BWF	3
16	ITF	3
18	FIVB	2
18	ITTF	2
18	WA	2
21	FIBA	1
21	FIFA	1
21	FIH	1
21	IHF	1
21	ITU	1
21	UIPM	1

Regarding quotas among the 10,568 athletes that participated in the London 2012 Games, 4,676 were women (40%). Women's participation has had a sustainable increase, especially since the IOC decision in 1991, to only accept new sports that organise events both for men and women.

Considering the athlete quotas for London 2012, FISA ranks third on the overall ranking as well as regarding male participation and fifth on women´s participation, with a global participation of 550 athletes (353 men and 197 women). However, FISA´s leading position is not confirmed when we compare the percentage of women athletes participating in the Olympic Games per sport. FISA had 36% women athletes in the Olympic Events, which positions FISA near the bottom (ranking 22nd, Table 2) among the 25 IFs that responded (please note that FILA did not provide statistics).

3.2. Athlete Participation

FISA position among other International Federations

Fifteen out of the twenty eight summer Olympic IF´s answered the questionnaire. Ten IFs provided sport participation data and four of them presented estimated values. As most of the IFs show different types of information we emphasise the existence of five different groups:

- The IFs that provide the world statistics participation (e.g. FISA and FEI);
- The IFs that do not provide the world athlete statistics but still present estimated values
- (e.g. FIFA and ITTF);
- The IFs that do not specify the world athlete statistics but still present the numbers of the athletes participating in International events like World Championships, Olympic Games and World Games (e.g. FIE, FIG, and maybe FILA);
- The IFs that do not present statistics at all (e.g. FIBA, FIH, IHF, ISAF, WA);
- The IFs that present the world level athlete statistics (men and women) and an estimated value for the worldwide global participation (e.g. UIPM).

Table 2. Percentage of Women on the Olympic Programme per IF (Olympic Programme Commission Report, September 2013)

Rkg % Women	IF	Quotas Women	Quotas Men	Total Quotas	% Women
1	**FIG**	210	114	324	65%
2	**FINA**	803	699	1502	53%
3	**BWF**	86	86	172	50%
3	**FIBA**	144	144	288	50%
3	**FIE**	102	102	204	50%
3	**FIH**	192	192	384	50%
3	**FIVB**	192	192	384	50%
3	**IHF**	168	168	336	50%
3	**ITF**	86	86	172	50%
3	**ITTF**	86	86	172	50%
3	**ITU**	55	55	110	50%
3	**UIPM**	36	36	72	50%
3	**WA**	64	64	128	50%
3	**WTF**	64	64	128	50%
15	**FIFA**	216	288	504	43%
16	**IAAF**	800	1200	2000	40%
16	**IWF**	104	156	260	40%
16	**IJF**	145	221	366	40%
19	**ISSF**	139	218	357	39%
20	**ISAF**	143	237	380	38%
21	**UCI**	197	331	528	37%
22	**FISA**	197	353	550	36%
23	**ICF**	109	219	328	33%
24	**FILA**	72	266	338	21%
25	**AIBA**	36	250	286	13%

To be able to position FISA´s women´s participation among the summer Olympic sports the study does not use the totals, instead the percentage of women participating in the different sports was used to allow for a global view on the percentage of women´s participation in the summer Olympic Sports. There might be some changes if the total worldwide participation is clearly identified by each IF.

Overall the study identified that 13% of global athletes are women. This value is highly influenced by FIFA´s low women's participation rate (10%), as Football presents a huge absolute participation in comparison to the other IFs (30 million female players among 300 million total players worldwide). FIG (67%) and FEI (57%) are the only two IFs that present more women than men athletes, followed by the IAAF (46%), FIE (41%) and FISA (40%, in the fifth position among 10 IFs).

Men and Women´s participation - FISA among other Summer Olympic Federations

(FISA IF Survey, October 2013)

Table 3. Athlete participation

RKG %Women Athletes	IF	Athletes Registration System (ARS)	% ARS	Women	Men	Total	% Women Athletes
1	**FIG**	Yes		11'237	5'514	16'751	67%
2	**FEI**	Yes		18'121	13'790	31'911	57%
3	**IAAF**	No		2'416'054	2'793'989	5'210'043	46%
4	**FIE**	Yes		2'201	3'115	5'316	41%
5	**FISA**	Yes		153'196	232'563	385'825	40%
6	**ITTF**	No		9'000'000	17'000'000	26'000'000	35%
7	**UIPM**	Yes		2'230	4'270	700'000	34%
8	**FILA**	Yes		1'509	5'918	7'427	20%
9	**AIBA**	No answer		2'000'000	8'000'000	10'000'000	20%
10	**FIFA**	No		30'000'000	270'000'000	300'000'000	10%
	FIBA	No					
	FIH	No					
	IHF	No					
	WA	No					
	ISAF	No					
Total	15	6	40%	43'604'548	298'059'159	342'357'273	13%

Member Associations – Women Rowers – analysis by Continent and Country

Of the women rowers worldwide, 50 percent come from four countries (Germany, USA, Great Britain and the Netherlands).

As a result of the rowing participation analysis among continents we can state that North America (53%) and Oceania (46%) are above the 40% average around the world. Europe (37%), Africa (32%), Asia (31%) and Central/Latin America (24%) are below the average. Oceania, Australia and New Zealand present similar statistics, around 46% of all rowers are female. In North America, both Canada and the USA have more women rowers than men.

In Latin and Central America the best-positioned countries on female participation are Mexico (34%), Peru (33%) and Cuba (33%). Uruguay (23%), Brazil (19%), Argentina (19%) and Chile (17%) show lower female participation rates, below the 24% global continental average.

In Europe, Ireland is the only country with a 50/50 balance regarding gender participation. Nevertheless, the Netherlands (48%), Romania (47%), Ukraine (47%), Denmark (46%), Norway (43%), Great Britain (42%), Sweden (40%) and Belgium are the second best positioned group.

Belarus, Portugal, Lithuania, Croatia, Slovenia, Moldova, Monaco and Austria all have women's participation rates below 20 percent.

Table 4. Absolute Participation at World Championships per IF (FISA IF Survey, October 2013)

Ranking Number of athletes	IF	Totals	Total Women	Total Men	% Women
1	**FISA**	5897	1870	4027	32%
2	**IAAF**	4757	2139	2618	45%
3	**ITTF**	4327	1356	2971	31%
4	**FIFA**	2472	1016	1456	41%
5	**FILA**	2320	489	1831	21%
6	**IHF**	2304	1152	1152	50%
7	**FIE**	2041	887	1154	43%
8	**AIBA**	1892	604	1288	32%
9	**ISAF**	1278	441	837	35%
10	**FIBA**	1248	576	672	46%
11	**FIH**	1008	504	504	50%
12	**WA**	1000	425	575	43%
13	**UIPM**	630	270	360	43%
14	**FEI**	568	239	329	42%
15	**FIG**	406	140	266	34%

Africa has an average female participation rate of 32%. Zimbabwe (despite its residual participation), Tunisia, Ivory Coast, Senegal, South Africa and Namibia are the African NFs with the best female participation rates. Still there are four NFs below the 20% (Angola, Nigeria, Algeria, and Morocco).

World Championships Participation – Gender Breakdown per IF

After reviewing the world championships level participation statistics we can conclude that FISA ranks first among all IFs concerning the total number of athletes participating in these events (if we sum the overall participation from all age groups) with a total of 5,897 athletes in the 2013 world championships.

However when it comes to the percentage of women participating at the world championships level FISA ranks 13th within the 15 IFs that have answered, with almost 32% women. IHF and FIH have the exact same number of male and female athletes competing at their world championships and are closely followed by FIBA, IAAF, FIE, UIPM, WA, FEI and FIFA, all of them over- coming the women's participation rate of 40%. FILA ranks last with 21% of women competing at a world level.

After reviewing the statistics by age group we can understand that FISA positioning is largely due to the masters event where it positions 1st regarding the number of athletes, 2nd regarding the number of

female athletes and where the percentage of women equals 29%. FISA is positioned 5th regarding the number of junior women, 3rd regarding Under 23 women and 7th regarding senior women.

Table 5. Absolute Women´s Participation at World Championships per IF (FISA IF Survey, October 2013)

Ranking Number of female athletes	IF	Totals	Total Women	Total Men	% Women
1	**IAAF**	4757	2139	2618	45%
2	**FISA**	5897	1870	4027	32%
3	**ITTF**	4327	1356	2971	31%
4	**IHF**	2304	1152	1152	50%
5	**FIFA**	2472	1016	1456	41%
6	**FIE**	2041	887	1154	43%
7	**AIBA**	1892	604	1288	32%
8	**FIBA**	1248	576	672	46%
9	**FIH**	1008	504	504	50%
10	**FILA**	2320	489	1831	21%
11	**ISAF**	1278	441	837	35%
12	**WA**	1000	425	575	43%
13	**UIPM**	630	270	360	43%
14	**FEI**	568	239	329	42%
15	**FIG**	406	140	266	34%

Table 6. Percentage of Women athletes at World Championships per IF (FISA IF Survey, October 2013)

Ranking Total % Women	IF	Totals	Total Women	Total Men	% Women
1	**IHF**	2304	1152	1152	50.00%
1	**FIH**	1008	504	504	50.00%
3	**FIBA**	1248	576	672	46.15%
4	**IAAF**	4757	2139	2618	44.97%
5	**FIE**	2041	887	1154	43.46%
6	**UIPM**	630	270	360	42.86%
7	**WA**	1000	425	575	42.50%
8	**FEI**	568	239	329	42.08%
9	**FIFA**	2472	1016	1456	41.10%
10	**ISAF**	1278	441	837	34.51%
11	**FIG**	406	140	266	34.48%
12	**AIBA**	1892	604	1288	31.92%
13	**FISA**	5897	1870	4027	31.71%
14	**ITTF**	4327	1356	2971	31.34%
15	**FILA**	2320	489	1831	21.08%

Athlete gender and age breakdown at FISA events

After analysing the percentage of women rowers at FISA World Championships by age group we can state that:

- Juniors: From 1984 to 2013 the percentage of women rowers has fluctuated between
- 26% and 38%. The global average is 34% and the average from the last 5 years is slightly higher (36%).
- Under-23: the % of U-23 Women Rowers at World Rowing Under 23 Championships from 2005 to 2013 (excluding 2012), has fluctuated from 27% to 35%. The global average 31% and the average from the last 5 years is 8% higher (39%).
- Seniors: considering the world championships and Olympic Games' statistics from
- 1975 to 2013 the percentage of women rowers has fluctuated between 22% and 35%. The global average for the last 39 years is 35% and the average from the last 5 years is slightly lower (33%).

After analysing the number of participants, the statistics show that men´s participation in championship level events continuously grew and, in 2013, from juniors to masters (492

Juniors, 533 Under-23, 573 Seniors and 2,429 masters); on the women´s side, there is different evolution between age groups, with a decrease from junior to U-23 and then a progressive increase from U-23 to senior (305 Junior Women – 284 U-23 Women - 311 senior women).

Women´s participation in top-level events still does not reflect the percentage of women rowers worldwide (40%). Still it is important to acknowledge that there is unbalanced women's participation between the countries. 50% of the women rowers worldwide come from 4 countries (Germany, USA, Great Britain and the Netherlands).

DIFFERENCES IN THE RELATIONS OF ACTIVE BODY MASS AND PASSIVE BODY MASS BETWEEN FOOTBALL AND BASKETBALL PLAYERS

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Key words: *football players, basketball players, morphological variables, fat body mass, non-fat body mass.*

INTRODUCTION

Different sports are marked by authentic kinesiology structures and specific anthropological significances. The success of an individual in a specific sport activity depends largely on the compatibility of their anthropological significances a.k.a. anthropological model for given sport (Katić et. all, 2005). The need to have in sport a scientific or anthropological field and the development of scientific field asks for continuous review and consideration all aspects of its development. The desire for a better sport result, growth and right development requires monitoring of the anthropometric characteristics and motoric skills of children and adults. The significance of any research lies in the verification so that it demonstrates what are the current practice and the results. When it comes to different sports such as football and basketball, always in the eyes of trainers and experts in these two sports is question if the best criteria is used in the course of selection, if the criteria is in line with requirements of specific sport from the morphological and constitution aspect.

As there are specifics of individual sports that have been developed from various competition structures, there is also a continuous need for constant theoretical research and practical check of the said specifics. In football and basketball this means check and control of individual anthropologic abilities and characteristics. If there would have been no difference in the competition structure of sports and difference in the structure of anthropological abilities and characteristics between sport players, research on the training resources, methods and burden, and their influence on the anthropological abilities and characteristics would be unnecessary (Malacko i Rađo, 2004.158).

Main goal of this research is the determination of relation between football and basketball players in active body mass (non-fat) and passive mass (fat mass) and the body mass index of team sports such as football and basketball.

METHODOLOGY

Population that formed a sample in this research has been defined as population of sport players of two sports (football and basketball), participating in the League of Kosova in calendar year 2010/11. Teams that have taken part in the research are: football club F.C. “Prishtina” from the city of Prishtina and basketball club B.C. ”Bashkimi” from the city of Prizren. A total of 40 players, 20 from each team have taken part in this research.

Variables included in the research were:

Body height (ALARTE)
Body weight (APESHA)
Under skin fat connective tissue of back (AIDHSH)
Under skin fat connective tissue of arm (AIDHKR)
Under skin fat connective tissue of stomach (AIDHBA)
Under skin fat connective tissue of shin bone (under knee – triceps muscle) (AIDHKË)
Non-fat body mass (AMJOYN)
Fat body mass (AMYNDY)

Body mass index (AINDMT)

For each anthropometric variable we have counted the following values: 1 central base parameters and distribution. 2 bending curve of distribution was tested using coefficient of asymmetry ("skewness"), and the peak of distribution using the coefficient of extension ("kurtosis"). 3. In order to determine if there were differences in the mean values between two groups of sport players, for football players for the anthropometric parameters T-test has been used for independent variables. The analysis has been carried out using SPSS 17.0.

RESULTS AND DISCUSSION

Results of the basic central parameters and statistical dispersion parameters are presented in table 1. Overview of basic statistical parameters of the football players of F.C. "Prishtina" indicates that anthropometric variables used in this research, connective fat tissue of arm (AIDHKR) and connective fat tissue of shin bone (AIDHKE) have strong positive asymmetry results. In these two variables that have asymmetry values and with two other (fat connective tissues of back and of stomach) the results are epikurtic and tend toward higher values. In majority of other anthropometric variables the results are negative, meaning that their asymmetric values are negative (hipokurtic) indicating that the results tend toward lower values. The analysis of the the level of bending curve of the peak of curve representing the graphic of distribution of frequencies, namely the analysis of extension or flatness (kurtosis - Kurt) it can be seen that majority of the variables have distribution of results close to normal, namely mezokurtic distribution.

Table 1. Basic statistical parameters and of distribution of anthropometric variables of football players F.C.

	N	Minimum	Maximum	Mean	Std. Dev.	Skewness	Kurtosis
ALARTE	20	169.00	187.00	179.5500	6.2532	-.517	-1.238
v	20	64.00	84.00	75.2000	5.0845	-.565	-.187
AIDHSH	20	6.00	10.60	7.9000	1.4209	.387	-.737
AIDHKR	20	3.20	13.00	6.0900	1.9910	2.118	7.521
AIDHBA	20	3.20	8.20	5.6000	1.5134	.335	-.927
AIDHKE	20	3.00	12.40	5.6400	2.4534	1.284	1.624
INDMTR	20	21.45	24.57	23.3205	.9577	-.709	-.336
MJOYND	20	58.05	75.30	67.8125	4.2154	-.576	.080
MYNDYR	20	5.54	9.06	7.3875	1.0502	-.163	-1.088

"Prishtina"

Table 2. Basic statistical parameters and of distribution of anthropometric variables of basketball players B.C.

	N	Min	Max	Ma	Ds.	Skew	Kurt
ALARTE	20	175	206	192.15	9.5657	-0.558	-0.687
APESHA	20	66	120	88.4	15.44566	0.283	-0.803
AIDHSH	20	6.8	9.4	8.01	0.8693	0.035	-1.529
AIDHKR	20	5.8	8.2	7.14	0.75978	-0.152	-1.082
AIDHBA	19	6.2	8.8	7.5684	0.72805	-0.113	-0.83
AIDHKE	20	5.2	7.4	6.26	0.53153	0.463	0.117
INDMTR	20	19.39	29.23	23.7912	2.62609	0.414	-0.513
MJOYND	20	59.86	102.37	77.5336	12.1376	0.273	-0.806
MYNDYR	20	6.12	17.63	10.8664	3.3202	0.316	-0.783

"Bashkimi"

Overview of basic statistical parameters of basketball players of B.C. "Bashkimi" (table 2) indicates that from anthropometric variables used in this research are very close to mean values and have no strong

asymmetric values. With majority of variables tested the results are epikurtic and tend to higher values. Only two of the anthropometric variables have negative signs and their results tend to lower ones, namely they are hipokurtic. The analysis of the bending level of the peak of curve that represents the graphic of distribution functions of frequencies, namely the analysis of extension and flatness (kurtosis - Kurt) and this means that the distribution is mesokurtic.

In order to determine if there is significant statistical difference in mean and morphological parameters between football players of F.C. "Prishtina" and basketball players of B.C. "Bashkimi" we have applied T-test for two independent groups. Below results indicate that the difference between two groups of football players of F.C. "Prishtina" and basketball players of B.C. "Bashkimi" exists in majority of morphological variables such as: body height (ALARTË): (Mean Diff.-12.6; t-4.931; df-38; sig-.000), body weight (APESHA): (Mean Diff. -13.2; t-3.63; df-38; sig-.001), connective fat tissue of arm (AIDHKR): (Mean Diff.-1.05; t-2.20; df-38; sig-.034), connective fat tissue of stomach (AIDHBA): (Mean Diff.-1.99; t-5.32; df-38; sig-.000),

Non-fat body mass (active mass) (MJOYND): (Mean Diff.-9.72; t-3.38; df-38; sig-.002) and fat body mass (passive mass) (MYNDYR) (Mean Diff.-3.48; t-4.47; df-38; sig-.000).

Differences in the mean values indicate that there are higher values in favour of basketball players of B.C. "Bashkimi". Results of T-test are presented in table number 3, that in the freedom scale (df) 38 majority of variables are significant at the level from $p < 0.05$ (Sig. (2-tailed).

Table 3. Differences in the mean of the anthropometric variables between football players of F.C. "Prishtina" and basketball players of B.C. "Bashkimi"

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.
ALARTE	2.596	0.115	-4.931	38	0.000	-12.6	2.55544
			-4.931	32.731	0.000	-12.6	2.55544
APESHA	20.431	0.000	-3.63	38	0.001	-13.2	3.63608
			-3.63	23.07	0.001	-13.2	3.63608
AIDHSH	4.389	0.043	-0.212	38	0.833	-0.08	0.37662
			-0.212	31.191	0.833	-0.08	0.37662
AIDHKR	2.765	0.105	-2.203	38	0.034	-1.05	0.47652
			-2.203	24.419	0.037	-1.05	0.47652
AIDHBA	11.729	0.001	-5.317	38	0.000	-1.99	0.3743
			-5.317	27.082	0.000	-1.99	0.3743
AIDHKE	19.424	0.000	-1.105	38	0.276	-0.62	0.56133
			-1.105	20.78	0.282	-0.62	0.56133
INDMTR	19.017	0.000	-0.753	38	0.456	-0.47	0.62504
			-0.753	23.966	0.459	-0.47	0.62504
MJOYND	19.633	0.000	-3.384	38	0.002	-9.72	2.87307
			-3.384	23.518	0.003	-9.72	2.87307
MYNDYR	19.409	0.000	-4.468	38	0.000	-3.48	0.77867
			-4.468	22.764	0.000	-3.48	0.77867

The results are anticipated when taking into account fact that basketball players from all other sports are characterized with body height and strong body mass. Morphological characteristics in sport have to be viewed from the function of growth and development of body in a given sport. Growth must be

viewed in the first instance as a mean of body/organism adjustment to the external conditions. The borders of this adjustment are genetically conditioned. For some anthropometric characteristics the possibility for manipulation with the body volume is higher.

From all kinesiology activities, basketball requires harsher selection because the body height needs to be dominant value (but not by all means). The applied research indicates that the percentage of fat mass and non-fat body mass has values almost identical with results of sport players of football and basketball (Wilmorit , 1979., according to Medved, 1980).

CONCLUSION

The research was carried out for the purpose of determining the difference of the mean values between football and basketball players in certain anthropometric characteristics, especially as regards the fat and non-fat body mass.

The results demonstrate that basketball players in all anthropometric measures have higher results. The relation between fat and non-fat body mass is influenced at a high rate by kinesiology treatments of aerobic nature. Kinesiology treatment in each sport is specific, thus it affects in specific way the organism of sport players adjusting to conditions of the game and training processes.

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ALTERNATIVE OPTIONS OF DOWNHILL SKI RUN "STREIF" IN KITZBÜHEL

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Downhill is the only discipline in which it can be said that there is a relative standards when setting the course of the respective slope. This is because the idea of downhill is to follow the profile and the line of the slope. Control gates must mark the desired racing line on the course. Before jumps and difficult sections, the speed must be corrected by appropriate arrangement of the gates. In areas that are steep and long are placed more short distance and rhythmic gates to control the speed. For conducting racing slopes must be homologated by the FIS.

Downhill slopes in most standard classical variants have alternatives that are directly dependent on main influencing factors. Such factors should draw attention to the weather, slope preparation and variable factors requiring a change to the starting position or trajectory of the track. In the requirements of the rules mentioned in what range can be those alternatives that are largely determined by changing start position, because as we know the track remained relatively in its standard version. The change in most cases is the position of the start, which can be moved to a specified altitude, which allows carrying out normal downhill race. Specifically for the slope in Kitzbühel is known of experts and lovers of speed disciplines as a traditional race which is taking a part of World Cup since 1930 until nowadays. It is well known as its difficulty and critical areas.

Kitzbühel is one of the most famous and luxurious ski resorts in Austria. It is situated between the mountains Hahnenkamm (1712 m) and Kitzbühler Horn (1996 m). Hahnenkamm is home of the annual ski World Cup races, including the most atractive event of the rounds of the World Cup, downhill race on the famous track "Streiff." [1] The competitions are held in three days, it is a classic downhill, super giant slalom and slalom. This race is one of the few races which has remained the classic combination which is the official downhill and both runs of the slalom. Downhill has become a traditional event held and arguably the most spectacular discipline. Seting of the track is according to the profile of the slope and the change of direction is one of the most difficult track on the calendar for the World Cup. It includes long flat parts, turns, jumps, sleepers and more.

The thesis of our study is defining the zones of the spole and knowing its specific, such as terrain shapes and applying appropriate techniques in a specific sequence at the downhill slope Streiff and to review the alternative options of the slope is potential for improvement and managing proper training process for the downhill race in Kitzbühel.

The aim of the study is to show the possibilities of making competition for World Cup in alternative variant in downhill slope in Kitzbühel.

Objectives are to analyze the downhill course in separate zones, to describe the technical characteristics of the slope and analyze the alternative version of the course.

Figure 1 shows the configuration of the track. Building the slope is consistent with the profile of the mountain. The individual areas are consistent that along with the extreme character of the discipline, they should be maximum safe and passing through them to be consistent with the speed. Along with difficult and extreme passages slopes have flat areas. More detailed examination of the track would give us, a clear picture of that what kind of slope is „Streiff" and its critical points. Analysis is needed on the slope to make a summary feature on which to determine the critical slope areas, and areas includ-

ing relevant downhill elements and their chronological sequence. For the analysis of slope has been used video recording of the last season 2013-14. The video material is processed with the software program „Dartfish“

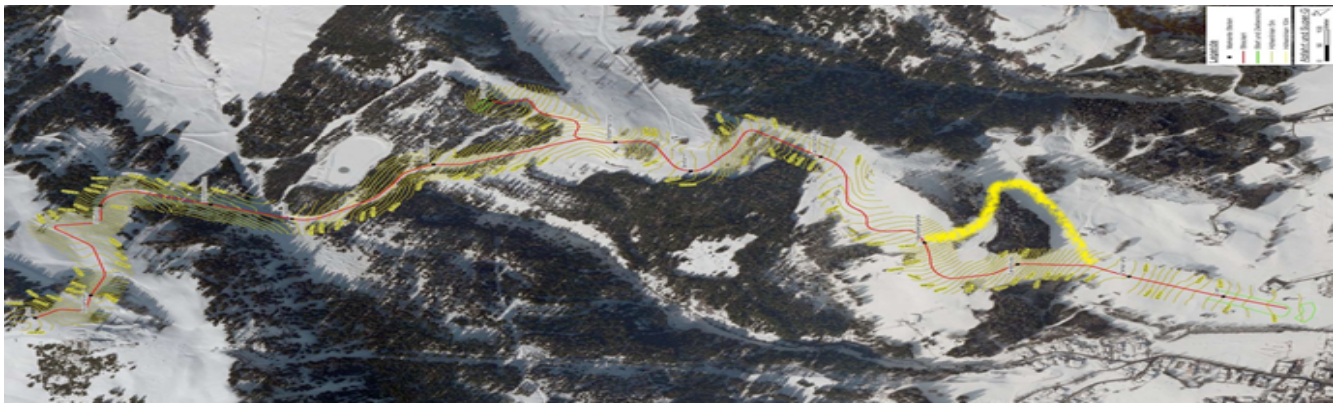

Fig. 1

On **figure** 2 is shown the profile of the slope, also the altitude of the individual points. Twelve points are pointed to separate the slope in different parts, which are: Start, Mausefalle, Steilhang, Gschößwiese, Alte Schneise, Seidlalmsprung, Seidlalm, Lärchenschuss, Hausbergkante, Zielschuss, Zielsprung, Ziel.

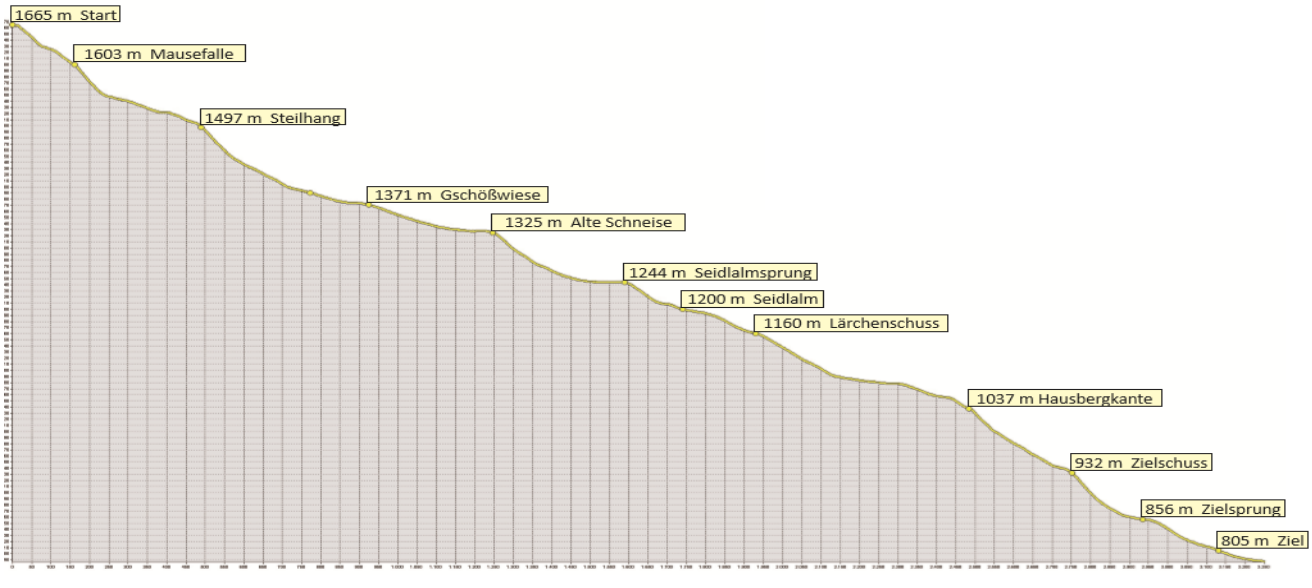

Fig. 2

DESCRIPTION OF THE SEPARATE ZONES:

1. Start

This section contains the start and the area after the start. This is straight section with a big gradient. Steep gradient immediately after the start of the competitor assumes to reach high speed. This section includes the start of the competitor and pushing after it. Despite the steepness of the slope competitor do not save the push using the catapult start to reach higher speed, and then goes in to „aerodynamic position,“ and prepare for „slight right turn.“

2. Startschuss, Mausefalle

Begin with slight right turn, and a sharp left turn, which ends with a jump. This setting of the course is consistent with the profile of the track. The aim of the setting is achieving optimal speed and to control it before change of the inclination, as a result of which there is a jump. Through the radius of the turns, is controlled speed when entering the jump.

3. Mausefalle, Boden

This section includes the jump which reaches up to 60 m. Section after it, which is steep and straight. Following the sudden change of slope racer get a long jump. The competitor must focus well in the jump and prepare in time for attacking the jump. He has to be able to overcome the jump maximum grouped. In this part racer reaches high speeds. After the straight part the track continues with a slight left turn, and then the course continues with right turn. The width of the slope expanded significantly. The setting of the course follows the turns of the slope. The long right turn set on the left side of the slope is designed to guide the competitor in the direction of the next turn. The turn is performed at high speed, the competitor goes into a high position in order to keep balance and precise control and direction of the next turn. The right turn is long and placed in the widest part of the slope. Setting the gates after the middle of the turn to its end, crosses the gradient perpendicular to the slope, the turn get a side inclination, which we can call „traverse".

Fig.3

4. Steilhang

This section is the steepest on the race track. The inclination is 72 degrees. Immediately after the short traverse left turn is directing competitor down in the line of the slope. After finishing the turn immediately follows entry into the long right turn, which ends with traverse. Directing into the right turn is the key to this part of the course, because of it depends on how fast the competitor will enter in the next section.

5. Brueckenschuss, Gschoess

This part of the course is 550 meters long. The competitors enter this area at about 110 km / h. The slope in this area is narrow and the course follows the line and the turn of the slope. In this section except the proper preparation of the ski, play an important role in the position of the competitor. Low aerodynamic position and sliding the skis plane are important. Distribution of weight and pressure evenly over the entire ski area also affects the sliding of skis and hence the speed of movement. Turning must also be very precise to be able to keep the speed. The flat part ends with a slight right turn preparing for jump.

6. Alte Schneise

Beginning of this section is the end of the flat section. The section starts with a jump which reaches 30-40 m. After landing, follows two little bumps that the competitor overcome without lifting the ski from

the terrain, through absorbing. Light left and right turns are overcome in the aerodynamic position. In the area between the turns the gradient changes from steep to flat. After the right turn competitor has about a hundred meters straight part the end of which is a jump. In this straight competitor is preparing for the jump.

7. Seidlalm

Section includes jump and three turns. Jump length is up to 40 meters. In overcoming some athletes prefer to attack the jump by prior rebound to shorten the flight phase. After landing the racer goes into "aerodynamic position" and prepare for a slight right turn. Followed by a little bump which overcomes by absorbing in medium position, immediately after it he has prepared for left turn. Once a competitor has entered the turn in the right trajectory once again he is grouped into aerodynamic position and ends the turn in it. In the straight section competitor remains low in aerodynamic position. Slight left turn directs competitor in the next section.

8. Laerchenschuss Oberhausberg

The beginning of this section gives a long right turn. The competitor aim is to turn clean on the edge to be able to keep his speed because the gradient of the slope is small. He placed as far as hi can away the skis and dosed pressure made the turn. Once a competitor felt that he is in the correct trajectory of the turn and directed skis early into next, he goes in "aerodynamic position" and ends the turn in it. Immediately after complete it performs slight left turn in the aerodynamic position and continues to glide the skis. Follow a right turn which is overcome in the aerodynamic position. After completing the turn, competitor directs skiing to the next turn and put them on flat. The next left turn has a travers. Competitors enters at the beginning of the turn in the aerodynamic position, but with increasing lateral tilt in the middle of the turn, racers go in low aerodynamic position for greater stability and to be accurate in the turn. Gradient of the track is small and turning the skis on the edge is required. The distances and settings between the next two doors are similar to super giant slalom. Right and left turns with a slight gradient and the short distance between the gates force athletes to turn more dynamic. Turns are made in average skiing posture. Left turn is marked with two control gates. While turning racer go into aerodynamic position and complete the turn. After completing the turn should prepare for the next right turn which directs competitors to a jump.

9. Hausbergkante

This section is one of the most complex and technical. Start with sharp change of the slope and then jump. The jump is about 40 meters. Jump is overcome with maximum grouping flight phase. After landing competitors prepare for long left turn. Turn is continuous and has a traverse. After finishing the turn competitor goes diagonally across the line of the slope, so-called traverse. At the beginning of the traverse has bump which hinders racer to keep a high line of movement. Passing on the bumps competitor must work a lot with his legs, so they can absorb the bumps and keep moving on the best line. The section ends with preparing to jump and change the line of movement to the right.

10. Zielschuss, Zielsprung, Ziel

This is the last final section of the track „Hahnenkamm". The beginning starts with a slight jump with a slight turn which directs competitor to the finish „schuss". After landing racer get into low aerodynamic position in order to reach maximum speed. The terrain goes from steep passes to flat from which racer have to deal with compression in maximal compact position. Just before the finish is the final jump, which is about 30 meters, passing the jump is mainly in aerodynamic position.

The difference between the normal course and the alternative is that the second passage bypassing „Hausbergkante". The combination of a big jump and overcoming traverse makes this area one of the most difficult in the course. The alternative variant begins with a change of the line to the left and enters a narrow section that continued throughout with left turn. Turning is in high "aerodynamic position". At the end of the narrow section slope changed its line on the right. The slope is getting wider and allows the course to continue with right turn. Immediately after completing the turn and have right direction, racer takes low aerodynamic position. The course continues with a slight long left and right turn

and then directed to the final section, where is the end of an alternative variant. Another difference of the alternative variant is the speed with which enter the final section. On the original track speed in the final section reach more than 140 km / h, and in the alternative speed is about 120 km / h.

There are three options that are approved by the FIS for hosting World Cup race. Homologation includes all details concerning organization of the race. We will focus mainly on the technical characteristics of the different options for conducting the race in Kitzbühel.

❖First variant:

This is a classic variant for conducting downhill race which is only for men. The start is located at 1665 meters altitude and the finish 805 meters with 860 m height difference. The length of the course is 3315 m and the average inclination is of the slope is 28%. The steepest section of slope has 85% inclination, and the flattest part is only 2%.

❖Second variant:

This variant is an alternative option for conducting race. The start is at the same altitude as the first version of 1655 m, finish area is located at the same place 805 m, respectively, with a displacement of 860 m. The difference in this version is the passing of the track in the alternative section "Ganslern", due to the length of the track is increased to 3520 m and average inclination which is 26%. The maximum and minimum inclination does not change because they are in the same areas compared to the classic variant 85% and 2%. In this version the competition is held only for men.

❖Third variant:

This option is the shortest and with the smallest different in heights, the track passes through the alternative section "Ganslern". This option held competitions for men and women. The start is located at 1525 meters altitude, the finish area is the same as in the previous two variants of 805 meters altitude, height different is 720 m. Length of the course is 3185 meters and an average inclination of 25%. The maximum inclination of 69%, is significantly smaller than the preceding variants, the minimum is again 2%.

The alternative opition applies when it is impossible passing the main race track, and when in bad weather conditions or inability to prepare this passage. On figure 1 and 3 in red is shown the classic course, with yellow is the alternative section "Ganslern". Last season 2013/14 in the preparation of the track due to lack of snow, the organizers were not able to prepare the passage „Hausberg", and were forced to use the alternative version of the track "Ganslern".

CONCLUSIONS:

- The slope for downhill in Kitzbühel has three options for conducting a race for the World Cup for men.
- The classic variant of the slope is conditionally divided into 10 separate zones.
- For overcoming the course are used following downhill techniques: aerodynamic position, turn at high speed, jump, traverse, overcoming little bumps.
- There is a significant difference in the alternative options in the final part of the course.

RECOMMENDATIONS:

- Establish specifics and a characteristic of the course is a potential for management of the training process for downhill skiers for the race in Kizbuhel.
- Pre explore alternative options for the competition is determinant of sports result.

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EFFECTS OF APPLIED EXERCISE PROGRAMMES ON THE VERTICAL JUMP PERFORMANCE OF PERFORMANCE DANCERS

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This study has been carried out in order to increase the vertical jump performances of performance dancers.

12 volunteer female and male dancers with the age average of 22, height average 170cm, and weight average 66 attended the study. Before the study dancers were informed about the purpose and the content of the study. To avoid any negative effects first and final measurement were done in the same environment, at the same time of the day, after the same stretching programme. None of the attendants participated any physical activity prior to the and on the day of the measurement.

The measurement was done by using the Newtest Powertimer Vertical Jump equipment. Dancers were told to jump as high as possible taking power from their knees, in a half squat position with a 90 º knee angle, hands on the waist and a total stationary position and they were also asked to touch down on their heels with straight knees. Subjects who could not perform were not recorded. The best performance of two jumps of each participant was recorded.

In the time between pre and final-tests subjects were given 3*10 sets of abdominal and back sit-ups and push-ups to be performed at least three times a week. Obtained data were evaluated via SSPS 16.00 package programme nonparametric Wilcoxon test.

At the end of the evaluation, due to the overtraining no meaningful change was seen.

Dancers are performers who use their emotions as well as their bodies. In our study it is believed that additional workouts have negative effects on performance dancers who have busy stage performances. It is thought that special exercise programmes done prior to busy stage performances would help to maintain their both mental and physical health as well as decreasing the possibility of injuries and increasing their performances.

Key Words: *Dance, dancers, strength, vertical jump*

INTRODUCTION

Dance is the combination of movements used by nations in order to express their thoughts and feelings through their social lives.

The dance figures used today changed countless times due to the changes of social life through the ages and became a combination of old and new.

Dance, which used to be performed only in weddings, ceremonies, recreational activities and as a part of daily life, today has gained an importance in art and sports

People have always leaned to some novelties and quests in all parts of their lives within their social necessities. Naturally, dance has also evolved in every era according to the needs of each era.

Dance has a systematic and wide range of movement form. It has a number of physical and physiological benefits on the organism. The main factor defining the sportive features are the scientific studies showing the physical and physiological effects. These definitions are obtained through physical and physiological measurements and evaluation of the results. The most important features of physical ac-

tivities are to maintain necessary physical compatibility and physical condition of the individual. Using individual physical and physiological features as the basis of scientific studies is an important factor in the comparison of the groups. The studies show that the success of the individual depends on his/her physical compatibility.

For the dissemination of regular exercise which is an irrevocable part of a healthy life and in order to maintain the attendance of people from every walk of life, it is necessary to expose the sportive feature of dance.

Therefore, pointing out the sportive dimension and hence the positive effects of dance on human health, ensures the educational programmes to be performed in accordance with the principals of training science (GEREK Z. 2008)

MATERIAL AND METHOD

12 volunteer female and male dancers with the age average of 22, height average 170cm, and weight average 66 attended the study. Before the study dancers were informed about the purpose and the content of the study. To avoid any negative effects first and final measurement were done in the same environment, at the same time of the day, after the same stretching programme. None of the attendants participated any physical activity prior to the and on the day of the measurement.

Table 1. Age, height and weight of the subjects

AGE	WEIGHT	HEIGHT
23.0	55.0	170.0
28.0	57.0	171.0
23.0	75.0	174.0
25.0	93.0	196.0
18.0	83.0	180.0
24.0	85.0	182.0
22.0	96.0	180.0
25.0	100.0	180.0
21.0	54.0	172.0
18.0	56.0	173.0
21.0	76.0	174.0
21.0	63.0	176.0
22.0	67.0	175.0
21.0	88.0	189.0
25.0	55.0	170.0
21.0	57.0	171.0
21.0	75.0	174.0
22.0	93.0	196.0
25.0	83.0	180.0
21.0	85.0	182.0
25.0	96.0	180.0
23.0	100.0	180.0
20.0	54.0	172.0
25.0	56.0	173.0

Table 2. SPSS 16.0 nonparametric test Wilcoxon result pre-test and Post-test Findings of the subjects

Ranks

		N	Mean Rank	Sum of Ranks
jump2 - jump1	Negative Ranks	5[a]	12,50	62,50
	Positive Ranks	19[b]	12,50	237,50
	Ties	0[c]		
	Total	24		

a. jump2 < jump1

b. jump2 > jump1

c. jump2 = jump1

The measurement was done by using the Newtest Powertimer Vertical Jump equipment. Dancers were told to jump as high as possible taking power from their knees, in a half squat position with a 90 º knee angle, hands on the waist and a total stationary position and they were also asked to touch down on their heels with straight knees. Subjects who could not perform were not recorded. The best performance of two jumps of each participant was recorded.

In the time between pre and final-tests subjects were given 3*10 sets of abdominal and back sit-ups and push-ups to be performed at least three times a week. Obtained data were evaluated via SSPS 16.00 package programme nonparametric Wilcoxon test.

DISCUSSION RESULT

Strength is the ability to withstand to an outer resistance by using skeletal muscles (Koutedakis and et.al, 1996) In other words, it can be defined as the capacity of producing power against certain biomechanical conditions (Koutedakis and Sharp, 2004) Nonetheless, providing the improvement in dance through the increase in muscle power (Twitchett and et.al., 2009). and although, muscle power is an indispensable physical compatibility component for top athletic skills, exercises for the improvement of muscle power are not included into the conventional dance workout. The main reason for this is the idea of meeting all the physical needs of dancers through technical and class workouts; however, class workouts are only consisted of exercises peculiar to dance. Traditional dance workouts fail to provide necessary muscle power needed for the performance in choreography since they are composed of routine exercises using the weight of the dancer and typical dance moves. (Vetter and Dorgo, 2009).

Another reason for not including workouts depending on power to dancers' exercise programmes is the "hypertrophy" resulting from power workouts (Twitchett and et.al., 2009).and the fear of this condition damaging the artistic and aesthetic appearances of the dancers. (Koutedakis and et.al., 2007-2; Koutedakis and Jamurtas, 2004). However, in the process of learning and training of folk dance, dance moves and body flexibility need to be combined, so psychophysical workouts must be carried out on the nerve system controlling the nerve system. These factors are known as affecting the flexibility and jump performance (S.yaralı2012). Another study shows that via weight lifting exercises muscle power can be increased without causing hypertrophy due to the adaptation of nerve and muscle systems (Twitchett and et.al., 2009). These results demonstrate, the increase in muscle power is not only related with the increase in muscle mass but also with the nerve system playing an active role in strength development (Koutedakis and Jamurtas, 2004). Also in studies about the relation between strength workouts and flexibility show that strength workouts directly affect the flexibility of young females and males (Koutedaki and et.al, 2007). For that reason, we can say that routine dance workouts are not

enough for the muscle power development for dancers and additional weight lifting or resistance workouts should be added to their programmes. In order to eliminate the physical inadequacies additional exercise are needed through literature browsing, albeit, the ongoing discussions of these workouts affecting the aesthetics of the dancers.

The carried out research showed us that without interfering the artistic and aesthetic necessities with the support of additional exercises and various techniques, aerobic and anaerobic inabilities could be eliminated.

In this completed study no effect of the power workout specially designed for dancers has been seen. From this result it can be concluded that the improvement of dancers were affected negatively by their heavy dance rehearsals, uncontrolled workouts or overtraining. Therefore, it is strongly recommended that, exercises besides studio workouts, which became very popular among dancers in order to cope with their physical compatibility inadequacies, must be done under the supervision of a trainer. Stretching and plates can be recommended as special strength workouts. On the other hand we can clearly say that few studies have been carried out about the scientific validity of mentioned exercises.

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INCLUSION OF RESPIRATORY MUSCLE TRAINING IN THE TRAINING OF YOUTH FIN SWIMMERS

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Keywords: ventilator parameters, fin swimming, performance, youth

INTRODUCTION

Fin swimming is a speed competition sport practised at the surface or underwater, by using mono-fins or two fins (they are called bi-fins) [1]. In the Czech Republic, normal swimming is one the most popular and preferred physical activity for leisure time in young boys and girls [2]. But fin swimming as a competitive sport is not so popular and widespread. There are only few fin swimming clubs in the Czech Republic although their fin swimmers are very good in the world-wide comparison.

Training of this sport discipline is mainly focused on water exercises e.g. training of technique skills with mono-fin and bi-fins, technique of start and turn and also underwater swimming for one inspiration, but it contains also some stretching of strained muscles and compensation exercises. They need also some pre seasonal preparation in form of summer or winter camp with including also other physical activities like cycling, running or cross-country skiing etc. depending of the season to develop physical fitness which includes strength, speed, persistence, flexibility and so on.

To our knowledge, only few researches publishing in scientific journal aimed at fin swimming from some perspectives. For example, following studies investigated the effect of the type of fins on diver performance in women [3] and also in male divers [4], and Oshita et al. [1] compared the gender differences in the aerobic contribution to surface events in fin swimming. Endurance of respiratory muscles is very important as they can fatigue during prolonged and maximal exercises, thus reducing performance [5]. Respiratory muscle training is quite largely used not only for rehabilitation purpose [6, 7] but also for other competitive sport to improve endurance exercise capacity [8, 9].

To help Olomouc group of young fin swimmers we decided in cooperation with our physiotherapist to prepare experiment for improving respiratory muscle strength to increase their performance.

We anticipate that even if fin swimmers use during their swimming snorkel for breathing their maximal lung capacity is very important for performance and thus can be improved by using additional respiratory muscle training.

Hypothesis: Experiment of one month of additional breathing training will improve the strength of respiratory muscles in experimental group of fin swimmers.

Aim of this pilot study was to verify the effect of including additional respiratory muscle training into the training of young fin swimmers.

METHODOLOGY

A group of fin swimmers obtained basic information about the experimental procedure and the purpose of the present study beforehand. We obtained signed approval from children's parents and the study was approved by Faculty Ethical Committee (No. 5/2014). This was a randomized-controlled trial that compared the effects of fin swimming training programme in one group and fin swimming training programme with respiratory muscle training in another group.

The mixed gender group of youth swimmers was randomly divided into an experimental (n=12; Age: 12±1.7 years; Height: 158.1±11.0 cm; Weight: 47.4±10.5 kg) and control group (n=8; Age: 10.2±2.5 years; Height: 136.3±17.7 cm; Weight: 44.0±17.0 kg). The experimental group of fin swimmers used daily for one month endurance (2x15 minutes) and strength (10+10 breaths with maximal inspiratory and expiratory effort) respiratory muscle training with inspiratory (Threshold IMT) and expiratory (Threshold PEP) device (Philips Respironics) at home. The resistance on the devices were adjusted according to their initial values.

Respiratory muscle strength were assessed one week before the experiment started and one week after it finished with use of spirometer Zan 100 Handy USB. Maximal inspiratory and expiratory mouth pressures were used for respiratory muscle strength evaluation. In the present pilot study, a 50m long indoor pool was used. In the same interval (pre and post), coach measured time for 50 meters and 200 meters distance swimming with mono-fin, and the length of underwater swimming for one inspiration. The length was measured with use of signs in meters on the edge of swimming pool. In experimental group we obtained data from swimming only from 11 fin swimmers because one girl did not attend Wednesday training (when the measurement of swimming happened) due to her saxophone class. During the one month of training both groups practised the same amount of training loads three-to-five times per week (three for younger swimmers and five for older ones) in 50-meter swimming pool. We also did the evidence of their attendance on training sessions.

DATA ANALYSIS

We obtained data from pre-testing and post-testing of maximal inspiratory and expiratory mouth pressures and analysed average values. Data was expressed as a percentage of the norm. For assessment of swimming we analysed time in seconds and for underwater swimming we analysed meters (mean values and standard deviation). For comparison of the values from the same group (repeated) we used Wilcoxon Signed Ranks Test and effect size coefficient *d* [d≥0.80 – large effect; d <0.50-0.80) – moderate effect; d<0.20-0.50) – small effect][10].

RESULTS

Table 1 describes the mean values of maximal inspiratory and expiratory mouth pressures in both groups and differences between pre and post testing. In experimental and control groups inspiratory and expiratory mouth pressures reached normal values (>80% of predicted) so no decrease of the respiratory muscle strength was found out although the inspiratory muscle strength was higher than expiratory muscle strength in both groups. In experimental group we found out statistically significant differences both for inspiratory and expiratory muscle strength. It was also confirmed by coefficient effect size which showed small effect also for control group due to small number of participants. But we do not regard this difference as logically significant.

Table 2 contains information for swimming performance in both groups. For 50 m distance with mono-fin both groups improved significantly their results; the difference was also confirmed by effect size coefficients. For 200 m distance with mono-fin their results were not better after one month of training regardless of additional breathing training.

A significant increase was observed in underwater swimming for one inspiration (E-group: p≤0.05; C-group: p=0.92).

DISCUSSION AND CONCLUSIONS

In our study, we confirmed our hypothesis that additional respiratory muscle training can influence the strength of respiratory muscles in the fin swimming performance especially in underwater swimming on one inspiration. Similar results were found out in Wylegala et al. [5] study who used similar respiratory muscle training programme for male divers (23.4±4.3 years) and found out the increase in inspiratory and expiratory pressures after respiratory muscle training (12% and 15% respectively). In

our study, we observed the increase in inspiratory pressure by 20% and in expiratory pressure by 10.5%.

We can say that for underwater swimming on one inspiration the effect of additional respiratory muscle training had greater effect than for swimming for certain distance (50m and 200m). Although underwater swimming length was improved in both groups that can be attributed to normal training loads the more significant improvement was confirmed in experimental group (27.3%; $p<0.001$; $d=1.77$) than in control group (22.4%; $p<0.05$; $d=1.44$).

Strength of the study is the unique experiment carried out in young fin swimmers that to our knowl-

Table 1. Differences in experimental and control group pre and post testing respiratory muscles strength

	Experimental group (n=12)				Control group (n=8)			
	M	SD	Z (p)	d	M	SD	Z (p)	d
MIP % pre	137.73	34.0	2.59 (0.01)	1.45	140.69	32.86	0.28 (0.78)	0.20
MIP % post	166.39	40.74			142.81	22.32		
MEP % pre	102.46	23.62	1.96 (0.05)	1.18	100.14	18.26	0.56 (0.58)	0.39
MEP % post	113.30	30.85			94.98	22.41		

Note:

MIP – maximal inspiratory mouth pressure

MEP – maximal expiratory mouth pressure

% pre – percentage of predicted values at the beginning

% post – percentage of predicted values at the follow-up assessment

Z – Wilcoxon Signed Ranked Test

p – statistically significant level

d – effect size coefficient (Cohen d [10])

Table 2. Differences in experimental and control group pre and post testing swimming distances

	Experimental group (n=11)				Control group (n=8)			
	M	SD	Z (p)	d	M	SD	Z (p)	d
50m pre [s]	29.42	5.40	1.48 (0.14)	0.89	31.89	9.61	0.84 (0.40)	0.59
50m post [s]	28.60	4.09			30.31	7.26		
200m pre [s]	142.46	23.18	1.33 (0.18)	0.80	151.05	33.10	0.28 (0.78)	0.20
200m post [s]	144.35	23.26			152.00	35.00		
RP pre [m]	41.55	13.20	2.93 (0.00)	1.77	40.63	18.31	2.03 (0.04)	1.44
RP post [m]	52.91	16.32			49.75	13.59		

Note:

RP – underwater swimming for one inspiration (in meters)

pre –values at the beginning

post – values at the follow-up assessment

Z – Wilcoxon Signed Ranked Test

p – statistically significant level

d – effect size coefficient (Cohen d [10])

edge has not been done yet in any country. Applied inspiratory and expiratory devices are simple for using in training process (for strength and endurance training) and also quite cheap. We can recommend them to improve effectivity of fin swimming performance in underwater competitions.

One of the limits of the study is small number of participants but this cannot be enlarged or influenced. There might be some future repetition or prolong period of respiratory muscle training to see possible effects. Many other factors can also influence the strength of respiratory muscle, mainly natural development and growth of youth that is sometimes extensive.

Results from this study indicate that targeted respiratory muscle training improves respiratory muscle strength and underwater swimming performance. For constant improvement it is important to verify long-term effects.

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ACKNOWLEDGMENT

This paper was supported by the ECOP projects „Strengthening scientific potential of the research teams in promoting physical activity at Palacky University" [Reg. No. CZ.1.07/2.3.00/20.0171] and „Support for the creation of excellent research teams and intersectoral mobility at Palacky University in Olomouc" [Reg. No. CZ.1.07/2.3.00/30.0004]

MEDICO-BIOLOGICAL ASPECTS OF SPORT – MED

Q-ANGLE APPROBATION OF DIAGNOSTIC POTENTIALITIES IN BASKETBALL PLAYERS

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INTRODUCTION

Q–angle, or quadriceps angle defines "bow-effect" of quadriceps patellar traction. Usually, the normal male's angle is less (around 12°) than female's (around 15°). Differences between genders are due to the wider female pelvis. The bigger angle is associated with formation of valgus-stress in dynamics, which is a prerequisite for anterior cruciate ligament (ACL) traumatic injuries [9, 10].

The increased angle means excessive lateral thrust on the patella, which increases retropatellar pressure. In result pain syndrome may occurs, and damages to the articular cartilage afterwards. Furthermore, the risks of patellar subluxation and luxation grow. Lots of researches show, that these factors influence on neuromuscular response to the quadriceps, which retard its reaction time [11].

Basketball is a sport, which hides risks from knee injuries. Sudden-stop running, lateral movements, sudden change of direction, jumping and contact with the opponent player are game situations, which predispose ACL or meniscus injuries, because of valgus-stress and muscle imbalance of the knee. These injuries can be heavy with operative treatment afterwards, which often ends the training process or an athlete's career [4].

THE AIM OF RESEARCH is improving functional diagnostic possibilities and traumatic prevention in basketball players using Q-angle.

THE OBJECTS OF RESEARCH are 32 healthy men middle-aged of 22,6 active basketball players in BC "Rilski sportist" – Samokov and Bulgarian National youth basketball team (U18) 2014. 11 of them are professional basketball players, the others 10 are growing up players from club-academy and the last 10 are national players. All of them were examined voluntarily from the period of 01.09.2013 to 01.07.2014.

METHODS

Literary research on the problem incites Q-angle applying for both of legs in joint resting and joint acting position. Anthropometric data for growth, weight, relative and absolute length of the legs, and elasticity of m. rectus femoris are also explored.

The Q-angle measurement was done in joint resting and joint acting position, respectively – supine position and standing position. In supine position measurement the center of patella and catching place of quadriceps – tuberositas tibiae, were ink marked. The patient put his forefingers upon spina iliaca anterior superior. The quadriceps was relaxed. The angle between the straight line tuberositas tibiae – center of patella from one side, and spina iliaca anterior superior – center of patella from the other side, was measured by standard goniometer [8].

In standing position measurement, the patient's feet were in neutral position, the angle was measured by standard goniometer and the forefingers were upon spina iliaca anterior superior again. The quadriceps was relaxed [3].

To study m. rectus femoris elasticity, Duncan-Ely test was used. The patient was lying prone with relaxed legs. The knee was passively flexed till hip compensatory flexion at the same side. The test is positive when the heel cannot touch the buttocks. We modified this test by goniometric measurement of the final flexion to find some asymmetry in bilateral muscle elasticity [7].

Anthropometric data for growth, weight, relative and absolute length of the legs are explored for all patients.

Relative length of the legs was measured from spina iliaca anterior superior to top of malleolus medialis and absolute length – from trochanter major to top of malleolus medialis again [2].

	n	R	Xmin	Xmax	X	S	As	Ex
Age	32	20	15	35	20,6	5,1	0,67	0,43
Growth	32	39,5	173	212,5	192	8,8	-0,06	0,2
Weight	32	44	70	114	86,4	12,1	0,79	-0,33
Left Q-angle in supine position	32	11	7	18	11,7	3	0,27	-0,74
Right Q-angle in supine position	32	9	8	17	11,9	2,8	0,39	-1,01
Left Q-angle standing position	32	13	7	20	12,4	3,6	0,31	-0,88
Right Q-angle standing position	32	11	7	18	11,8	2,9	0,45	-0,56
Left relative length	32	28,5	87,5	116	101,2	6,8	-0,11	-0,03
Right relative length	32	29	87,5	116,5	101,3	6,8	-0,11	0,03
Left absolute length	32	26,5	79	105,5	91,9	6,7	-0,02	-0,21
Right absolute length	32	26,5	79	105,5	91,9	6,7	0	-0,19
Left m. rectus fem.	32	35	110	145	125,8	7,4	0,16	0,29
Right m. rectus fem.	32	30	110	140	123,1	7,4	0,45	-0,5

RESULTS

The results were processed through IBMSPSS Statistics 19 program, using: variation analysis, statistical hypothesis testing, which includes Student's t-distribution for *unrelated* groups, correlation analysis, which includes Pearson product-moment correlation coefficient, biserial correlation coefficient [1].

Table 1. Variation analysis

Table 1 shows a variation analysis of researching results. The middle-age of our patients was 20,6 as the youngest was 15 years old and the oldest had 35 years. The *average* growth of the group was 192 cm and the mean weight was 86,4 kg. The mean Q-angle degrees (11,7º and 11,9º at joint resting position, and 12,4º - 11,8º at joint acting position) (Diagram 1) were comparable to male norm - 12º. The relative length average values of the legs (101,2cm from the left and 101,3cm from the right side) had a minimum difference, which exclude strongly expressed asymmetry. We didn't monitor any asymmetry in the absolute length of the legs (91,9cm) in regard to the whole group. The average values of our m. rectus femoris test showed an asymmetry of 3º (125,8º from the left and 123,1º from the right side)

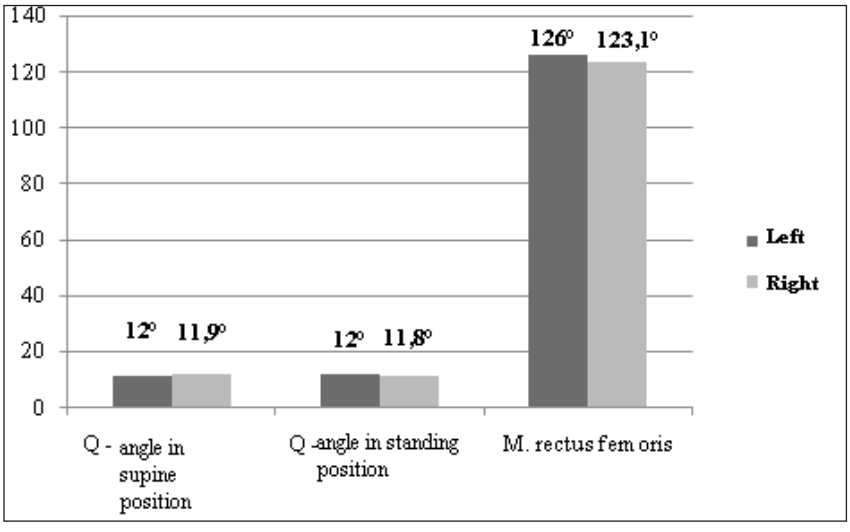

Diagram 1. Q-angle averages and Duncan-Ely test

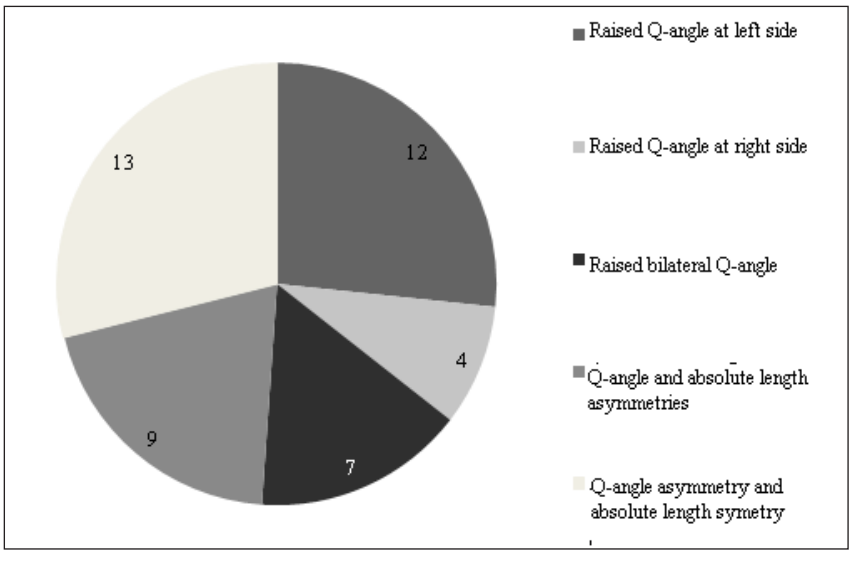

Diagram 2. Rate of Q-angle and asymmetry increases

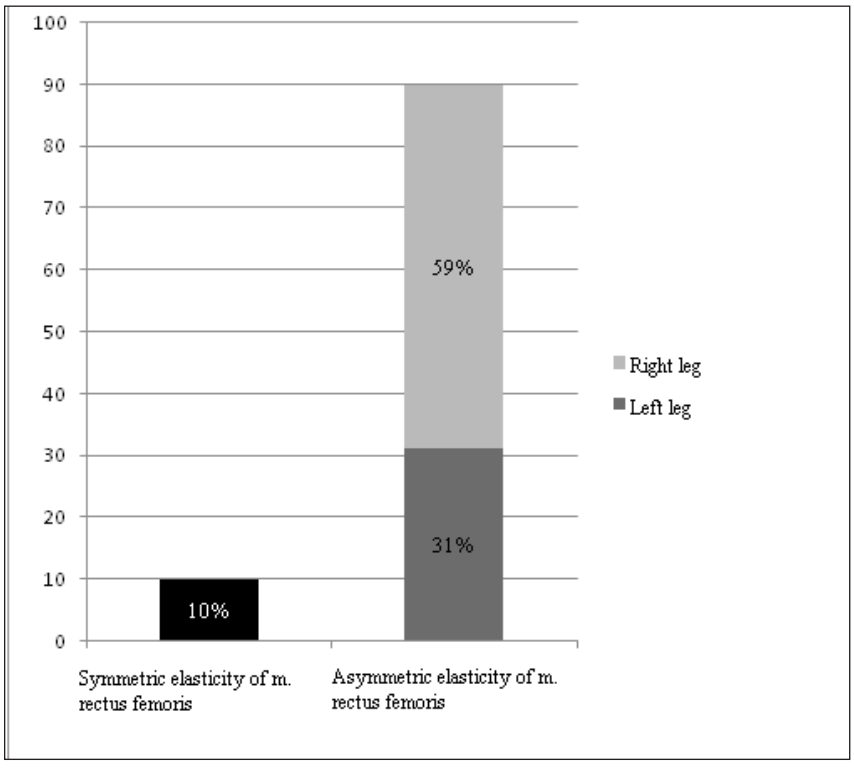

Diagram 3. Elasticity of m. rectus femoris

(**Diagram 1**).

69% of researching people had a Q-angle asymmetry at joint resting position, but the measurement at joint acting position (standing position) showed 66% of patients with an asymmetry. The left Q-angle

Table 2. Correlation analysis between tests indices

	Left supine Q-angle	Right supine Q-angle	Left standin Q-angle	Right standind Q-angle	Left relative length	Right relative length	Left absolute length	Right absolute length	Left Rectus fem.	Right Rectus fem.
Left supine Q-angle	1									
Right supine Q-angle	0,657	1								
Left standing Q-angle	0,802	0,61	1							
Right standing Q-angle	0,486	0,778	0,688	1						
Left relative length	-0,037	0,031	-0,128	-0,004	1					
Right relative length	-0,039	0,015	-0,134	-0,021	0,999	1				
Left absolute length	-0,064	-0,033	-0,12	-0,069	0,977	0,978	1			
Right absolute length	-0,074	-0,036	-0,131	-0,073	0,977	0,978	0,998	1		
Left Rectus fem.	0,025	0,283	-0,097	0,15	0,261	0,271	0,224	0,221	1	
Right Rectus fem.	0,304	0,385	0,064	0,266	-0,005	0,003	-0,058	-0,046	0,676	1

Note: Critical values for Pearson product-moment correlation coefficient at n=32: $r_{0.05}$*=0,35 and* $r_{0.01}$*=0,45.*

in 12 of patients had a value above the norm and 7 of them had bilaterally higher values. The other 4 of researching people had an abnormal right Q-angle increase. The Q-angle asymmetry in 8 of patients was combined with a relative length asymmetry of 0,5cm. 9 of the athletes had also an absolute length asymmetry, but 13 of patients had a Q-angle asymmetry combined with symmetric absolute length (Diagram 2). These with asymmetric elasticity of m. rectus femoris are 90% of the whole, but 31% had a retrenchment at the left side and 59% - from the right (Diagram 3). The asymmetries of m. rectus femoris elasticity and Q-angle were observed at 20 of patients.

Table 2 shows a correlation analysis of tests indices for Q-angle, legs length and m. rectus femoris elasticity. The relation between tests “Left and Right supine Q-angle” (0,657 – considerable); “Left Q-angle standing” and “Left and Right supine Q-angle” (0,802 – large and 0,610 - considerable); “Right Q-angle standing” and “Left, Right supine Q-angle and Left standing Q-angle” (0,486 – moderate, 0,778 – large, 0,688 - considerable) are statistically significant. There are almost functional relations between indices of legs length – Left with right relative lengths and Left with right absolute lengths, resp. - 0,999; 0,977; 0,977 - much greater dependence.

There is statistically significant dependence between the indices “Right m. rectus femoris” and “Right supine Q-angle” (0,385 – moderate), such as between “Right m. rectus femoris” and “Left m. rectus femoris” (0,676 – considerable).

DISCUSSION:

Normal anatomical and biomechanical characteristics of patellofemoral joint are essential for each functional knee assessment. Q-angle is one of the major factors for normal function of the knee. Determining lateral patellar traction from the quadriceps, it potentiates some infractions like chondromalacia or recurrent subluxations, in case of Q-angle abnormally increase [5]. Basketball is an athletic and dynamic game, requiring the matching of speed, power, accuracy and precision. The game intensity and great actions variety could affect as risk factor for traumatic injuries [6]. The applying functional tests show Q-angle asymmetry, combined with asymmetry of m. rectus femoris elasticity in a large percentage of professionals and adolescents. The combination of relative and absolute legs length asymmetries and Q-angle asymmetry could be a prerequisite for dysfunction. Because of basketball specificity and basketball season workloads, these deviations from the norm are ignored and the processes could become into chronic. The following complaints violate the sports form and achievements.

CONCLUSION

The results show a variance of the Q-angle in healthy basketball players. Received deviations and their relations with asymmetric elasticity of m. rectus femoris are risk factors for traumatic injuries during basketball game. This requires physiotherapeutic program developing for traumatic prevention of the knee, based on results and adapted to specifics of basketball trainings.

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STANDARD ERROR OF MEASUREMENT AND RELIABILITY OF YO-YO INTERMITTENT RECOVERY TEST

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Key words: *Yo-Yo field test, measurement error, reliability*

INTRODUCTION

Soccer is an intermittent sport characterized by low-intensity activity and periods of high-intensity actions [24]. High levels of aerobic endurance are crucial for the success in the game [22] and the improvement in endurance is an important component of soccer training [13]. The well-developed endurance allows players to cover greater overall distance and to perform more sprints during match play [12]. The assessment of aerobic fitness is important for monitoring the effectiveness of the soccer training [18].

In recent years, the popularity of the Yo-Yo intermittent recovery tests is increasing and these field tests are recommended as a standard tool for assessment of aerobic capabilities of soccer players [2, 7]. The Yo-Yo tests have high reproducibility and are sensitive in discriminating players' performance at various competitive levels, between different playing positions, and after periods of different types of training [5].

An important characteristic of different tests is their reliability [1, 4]. There are several recommended methods to describe reliability [4], but regarding Yo-Yo intermittent recovery test the most used parameters are correlation coefficient and coefficient of variation [5, 19]. Data about other reliability measures of Yo-Yo tests such as standard error of measurement and minimal detectable change are scarce which can hinder the use of these tests for physiological and performance evaluation of soccer players.

The aim of the study was to determine standard error of measurement and reliability of Yo-Yo intermittent recovery tests level 1(YYIRTL1) by application of current guidelines for reliability assessment. The hypothesis of the study is that the YYIRTL1 has good reliability.

METHODS

In the study participated 13 subjects with experience in soccer training and competitive match-play (age, 20.2±0.7 years; height, 176.77±5.98 cm; body mass, 71.05±5.38 kg). Four of the participants were from non-elite clubs and the other nine were former players, who continued to play soccer for educational and/or recreational purposes.

The Yo-Yo test consisted of 2x20-m shuttle runs performed at increasing velocities, with 10 seconds of active recovery between runs, until exhaustion [5]. The test began at a speed of 10 $km.h^{-1}$ (YYIRTL1) and was controlled by audio cues, generated by a new software program „YoBeSPORT". The test was considered ended when the participant twice failed to reach the front line in time (objective evaluation) or the participant felt unable to complete another shuttle (subjective evaluation) [8]. The performance measure was the total distance in meters (m) covered during the test, presented as mean±standard deviation (Mean±SD).

The participants completed YYIRTL1 in two sessions (test and retest) with a one week period in between.

The data from the two tests and the differences (d) in test score (retest-test) were tested for normality using the Shapiro-Wilk's test. Paired t-test was used to check for significant differences between test and retest data. Heteroscedasticity was assessed by calculating Pearson's correlation coefficient between the absolute difference and the average of the test trials [4].

According to published recommendations two sets of reliability measures were calculated – relative and absolute [4]. To determine relative reliability Pearson's correlation coefficient (r) and intraclass correlation coefficient ($ICC_{2,1}$) were calculated. $ICC_{2,1}$ was determined using a 2-way random-effects ANOVA [16, 28]. For ICC, 95% confidence intervals (CI) were given to take the sampling distribution into account. Absolute reliability was assessed by established statistical measures, which included: the standard error of measurement (SEM), defined by SEM=√MSE, where MSE is mean square error from ANOVA table; the coefficient of variation (CV%) and measurement error, expressed as a percentage of the mean (SEM%) [23]. From SEM minimal detectable change (MDC) was calculated and was also expressed as a percentage (MDC%). The statistical tests were carried out with the program Past3 [11] and Microsoft Excel. Significance for all tests was accepted at $p \leq 0.05$.

RESULTS

The distance covered in the first YYIRTL1 averaged 1229.23±318.39 m (Mean±SD), between 800 and 1740 m. The distance covered in the retest was 1295.38±294.18 m (Mean±SD), between 900 and 1900 m. The difference (d) between test and retest was 66.15±147.28 m (Mean±SD). The data from the two tests and the differences between the two test occasions were normally distributed. The paired t-test showed no significant difference between test and retest score ($p= 0.13$). The correlation coefficient between the mean and the absolute difference from test to retest was -0.17 ($p=0.58$), which showed a uniform variability of the data and absence of heteroscedasticity.

Correlation coefficient (r) was high ($r=0.89$, $P<0.01$). $ICC_{2,1}$ was 0.87 (CI=0.63-0.96), which indicates good to excellent reliability [9, 26]. SEM was 104.145 m, SEM% - 8.25 %, MDC - 288.68 m, MDC% - 22.87 % and CV% - 8.25%

DISCUSSION AND CONCLUSIONS

The distance covered in the first test was 1229.23 m and in the retest - 1295.38 m. These results are lower than the result of amateur soccer players (2138 m) [8], and the result of top-class soccer players (2260 m) [21]. YYIRTL1 elicits maximal aerobic response while significantly activating anaerobic system and can be regarded as soccer-specific field test [5, 8]. On the basis of these data, it can be concluded that the players, who participated in this study have insufficient soccer-specific endurance, which confirms the results for non-elite players from previous study [3].

The difference (d) between test and retest is positive, which means that the distance covered in the retest is greater. Systematic change in the mean between two trials of a test may be due to learning or training effect [15]. In the present study the t-test showed no significant difference between test and retest ($p>0.05$), indicating that there is no systematic bias.

The statistical analysis revealed that our data were not heteroscedastic – there is no relation between measurement error and the size of the distance, covered in the YYIRTL1 [4].

Relative reliability is defined as the degree to which individuals maintain their position in a sample with repeated measures [17]. Pearson's correlation coefficient is the most common method for assessing relative reliability [4]. In the current study Pearson's r was 0.89, which suggest that the YYIRTL1 is highly reliable. This result supports the studies of other authors, which found correlation coefficient of 0.93 for the same test [5]. It must be noted that the use of Pearson's correlation coefficient as a measure of reliability is questionable, since it cannot assess systematic errors inherent in the measurement and it depends on the range of values in the sample [6, 26]. In recent years the use of ICC has become a preferred method when assessing test-retest reliability [4]. ICC accounts for both consistency of per-

formance from test to retest, as well as systematic bias [4, 26]. We found that in our study $ICC_{2,1}$ was 0.87 (CI=0.63-0.96), which indicates good to excellent reliability of YYIRTL1 [9, 26]. This result confirms the data of other authors who have found ICC for Yo-Yo tests (levels 1 and 2) between 0.86 and 0.95 [25]. The values of (r) and ICC are very similar, which is often the case when measurements of the same subjects on two occasions are analyzed [14].

The parameters of relative reliability are used for cross-sectional assessment to discriminate among individuals [17], while measures of absolute reliability describe how the individual's observed score vary with repeated tests, allowing longitudinal assessment [4].

One indicator of absolute reliability is the standard error of measurement which is not affected by the range of the measured values (SEM) [4, 29]. This parameter allows assessment of the measurement error in the actual units of measurement which is useful since the smaller the SEM the more reliable the measurements [4]. SEM represents the absolute error of measurement and denotes the limits for the smallest change that indicates a real improvement for a group of subjects [10]. In our study SEM of YYIRTL1 was 104.145 m, but there is no available reference data for comparison. The SEM% is independent of the units of measurement and is more easily interpreted. Lower SEM% value indicates lower measurement error than does higher SEM% value [27]. There is lack of data on SEM% from reliability studies of Yo-Yo tests. SEM% in our study was 8.25% which can be regarded as low, taking into account that SEM% from 6.9 to 12.7% was considered low in test-retest study of Schwenk et al. (2012) [23].

The main application of SEM is to calculate the minimal detectable change (MDC) also known as smallest real difference [20]. MDC represents the limits for smallest change that indicates a real change for a single subject [10]. MDC expressed as percentage (MDC%) is independent of units of measurement. When a change in score is greater than the MDC, a true change can be ascertained with 95% CI [28]. Based on our results, a non-elite soccer player would need to demonstrate an increase of at least 288.68 m of the YYIRTL1 distance to be confident at 95% level that this change is real and not a result of inherent measurement error of the test. In such a way MDC can help assess the effect of training on the test outcome.

The coefficient of variation (CV%=8.25) can be used as a descriptive tool and for comparison with data from other reliability studies of Yo-Yo tests.

In conclusion, the results from the present investigation suggest that the YYIRTL1 has a good relative reliability and confirm his suitability for field testing in soccer players. Our data establish a range of values for standard error of measurement and minimal detectable change of YYIRTL1 which can be useful for the evaluation of aerobic capacity in soccer players.

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A STUDY OF CERTAIN PSYCHOPHYSICAL QUALITIES IN STUNTMEN IN EXTREME SITUATIONS

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Keywords*: psychophysical qualities, extreme situations, stuntmen, reaction time, time perception*

Stuntmen are primarily people with specific psychological attitude to risk-taking. However, taking a risk is still causing them to experience stress similar to that experienced by other people facing a similar situation.

Our aim was to compare the psychophysiological effects of practicing stunts in a standard and in an extreme situation.

As a subject of the study, we chose the following psychophysical qualities: time perception, reaction time, movement accuracy and speed when performing in an extreme situation 11 meters above ground.

The working hypothesis was that the stress in the extreme situation causes a change in time perception, shortening the reaction time, increasing the action speed, and reducing accuracy.

The study included members from almost all existing stunt groups in Bulgaria: "Alpha Stunts Team", "StuntBG", the "Bagatur" stunt group, "Eudaimonia", as well as freelance stuntmen. The total number of participants was 27 (25 men and 2 women).

The aim of the study was to identify any changes occurring in the participants' time perception, reaction time, movement accuracy and speed when performing stunts in extreme situations.

TASKS

1. Creating and testing an experimental test battery for time perception, reaction time, movement accuracy and speed at a height of 11 m.
2. Investigating the stuntmen's time perception in in both normal and extreme situations.
3. Investigating the stuntmen's reaction time, movement accuracy and speed in both normal and extreme situations.
4. Investigating the effect of the position of the subject's active or passive hand on the side of the abyss on movement accuracy.

METHODS

The study included members from almost all existing stunt groups in Bulgaria: "Alpha Stunts Team", "StuntBG", the "Bagatur" stunt group, "Eudaimonia", as well as freelance stuntmen. The total number of participants was 27 (25 men and 2 women).

The study took place on two consecutive days at NSA "Vassil Levski", Sofia. Testing in a standard situation was conducted in one of the gyms of the NSA, and the testing in an extreme situation – on a platform at the edge of a flat concrete rooftop at a height of 11 m. The location of the experiment was pre-selected to ensure maximum safety. The area under the experimental platform was cleared of hazardous objects and secured with an airbag, specially designed for such proposes, measuring 6 x 6 x 1.5 m, as well as special foam blocks. On the edge of the rooftop, 11 m above ground, an experimental platform measuring 2.5 x 1.25 m was built on the edge of the abyss. Two electronic targets were attached at both ends of the platform. Between the targets, a rubber path was installed to prevent slipping. A

similar platform of only 50 cm in height was built inside the gym.

All subjects were informed in detail about the existing risks, about the safety measures in place, as well as the possibility for them to quit at any time and each participant signed a statement of informed consent.

For the purposes of the study, a specialized device for psychophysical study was designed which enables the measurement of reaction time following a light (red or green LED) or sound signal (2500 Hz). The targets had a metal surface measuring 20 x 20 cm, a size which was specified during a preliminary pilot experiment. They consisted of a center (circle of 4 cm in diameter) and seven concentric circles with successive increments in radius of 1 cm and a constant distance of 1 mm between them. Each target was divided into four sectors: top-left, bottom-left, top-right and bottom-right. This formed a total of 32 sectors. A direct hit in any of them, as well as in the area outside the outermost circle, were recorded with the help of purpose-designed hardware and software. The design of the targets allowed for height adjustment - at chest level of the respective subject.

The targets were attacked with a standard foil sword (total length of 82 cm) with a modified cushioned tip. The foils' guard was attached via a 135 cm metal cord to an electric switch mounted onto the target stands and thus the starting distance was fixed at 65 cm (from the tip of the foil to the center of the target). The attacks were carried out with a lunge which is the traditional way of executing similar actions in the movies. The signal to attack (green LED or a sound with 2500 Hz frequency) was given by the circuit board which was attached to the target and managed by PC software.

The signal to attack was given only on condition that the metal cord was tight enough to pull the switch thus disrupting the electric signal to the circuit board. Following an audio or visual signal, the subject would attack the target as swiftly as possible. At the beginning of the attack the tension of the cord would drop and the switch would be released. At this time, the software would measure the reaction time of the subject. The time measured from this point up to the moment of impact (the foil hitting the target) is the "action time".

The participants' time perception was measured using two tests. During the first (Time test 1), the subjects were timed in between two audio signals given by a computer.

During the second (Time test 2), following the audio signal, the subject was required to count for a preset number of seconds, then jump on to the mat near the platform inside the gym, or on to the airbag from the rooftop platform. The other option was for the subject to step back, if he considered that he would not be able to take the jump. The duration of each test ranged from 7 to 16 seconds.

The subjects who were not able to take the jump from the maximum height (11 m) would climb onto an aerial lift that would raise them to the highest point at which they felt confident and from there, they would repeat "Time test 2" and jump on to the airbag.

The temporal error (dt) in "Time test 1" was calculated by subtracting the preset time from the time estimated by the subject. In "Time test 2", the reverse method of calculation was applied (subtracting the time estimated by the subject from the preset time). Therefore, the negative dt always indicated a slower time perception. In order to avoid the influence of the durations of the preset time intervals (longer preset intervals accumulate a larger error), we adopted as a more appropriate index (dt/s), the error of the brain's internal *clock* (dt) per one second of preset time. This index is calculated by dividing the time error (dt) by the preset time.

Processing the results was done using Spreadsheet Excel 2007. Statistics included analysis of variance and hypothesis testing for the difference in the mean values of two samples using the Student t-test for dependent and for independent samples. The significance of the deviations from the center in motor tasks was confirmed using one sample t-test. Mean values in this article are presented with their standard deviations and in the graphs - with standard error.

RESULTS

In this publication, in some cases, we divided the participants into two subgroups: the stuntmen who took the 11-meter jump (Rooftop jumpers) and the stuntmen who jumped from a lower height using the aerial lift (Aerial lift jumpers).

Reaction time, movement accuracy and speed

In seven of the eight tests the average reaction time (the latency period after a sound or light signal) shows lower values (faster response) with the Rooftop jumpers compared to the Aerial lift jumpers (Fig. 1). Statistically significant difference between the two groups was established only for the reaction time to light signals with the right side out in the gym setting (283 ± 31.5 vs 335 ± 86.7 ms; p<0.05).

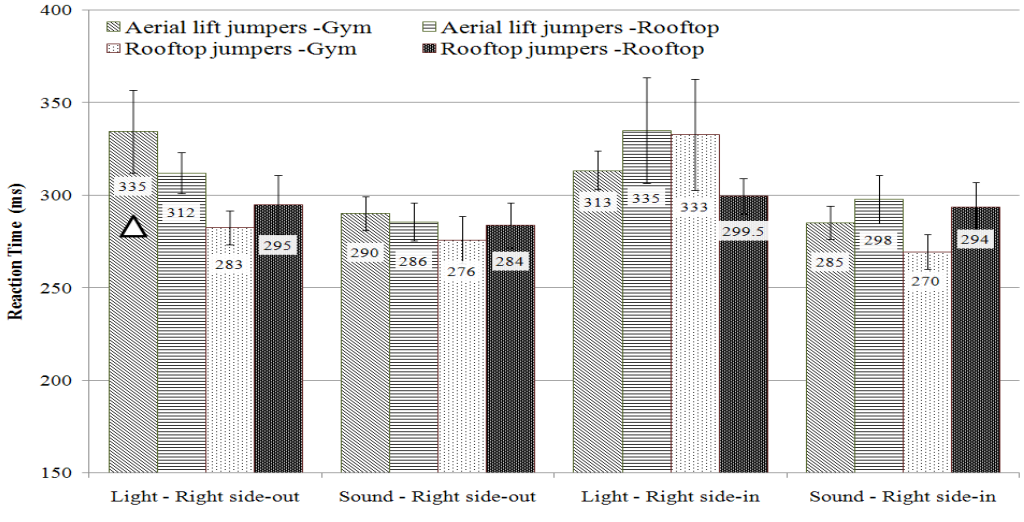

Fig. 1 Reaction time when testing at the gym and at the rooftop (11 m), depending on body position – Comparison between the Rooftop jumpers and the Aerial lift jumpers.
(Δ – p<0.05 significance vs Rooftop jumpers)

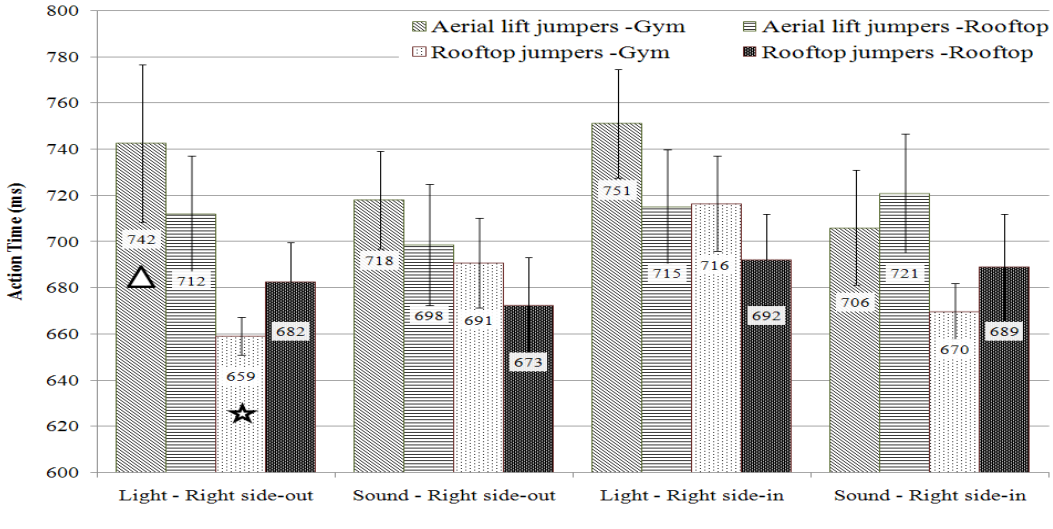

Fig. 2 Action time when testing at the gym and at the rooftop (11 m), depending on body position – Comparison between the Rooftop jumpers and the Aerial lift jumpers.
(Δ – p<0.05 significance vs Rooftop jumpers; * - p<0.05 vs right side-in)

The execution time of the motor task (action time) is shorter, in all tests, with the Rooftop jumpers, compared to the Aerial lift jumpers (**Fig. 2**). Significant is only the difference between the two groups in the performance of the task in the gym with the right side out fowling a light signal (659 ± 28.5 vs 742 ± 132.2 ms; p <0.05). With the Rooftop jumpers, significant is the difference in the average action time

between the right side-out and the right side - in, following a light signal, in the gym setting (659 ± 28.5 vs 716 ± 71.4 ms; p <0.05).

In all of the four variations of this test, there was significant average deviation from the target center ranging from 1.59 to 2.34 cm (**Fig. 3**). The average deviation in response to light signals was significantly greater in the gym, with the right side - in, compared to the same test at the rooftop (2.34 ± 0.97 cm vs 1.59 ± 0.92 cm; p<0.001). The average deviation in response to light signals was significantly greater at the rooftop when comparing the tests with right side - out and the tests with right side-in (2.19 ± 0.78 cm vs 1.59 ± 0.92 cm; p<0.01).

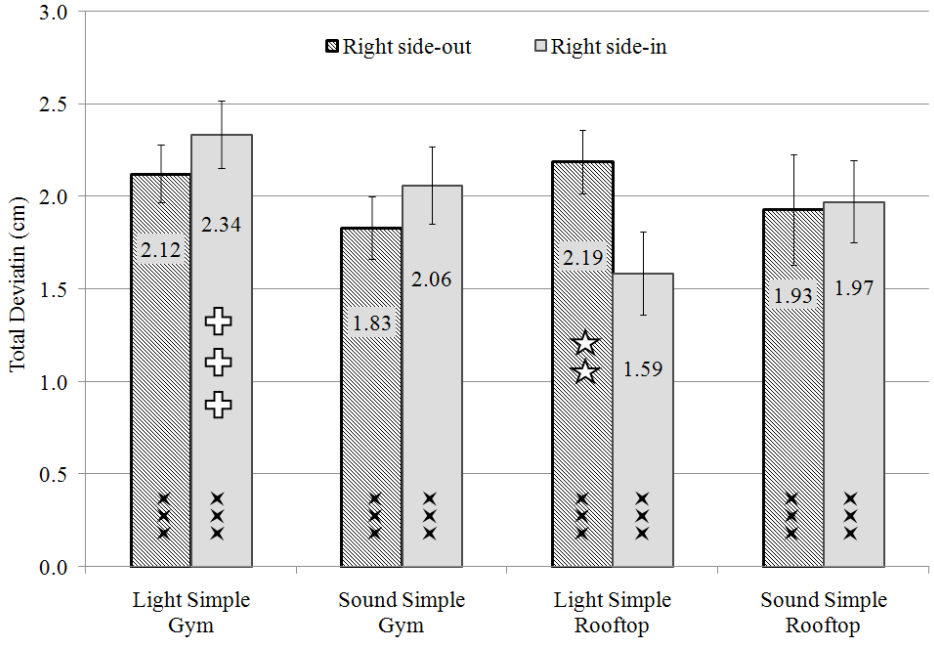

Fig. 3. Total deviation from target center when testing at the gym and at the rooftop (11 m), depending on body position.

(xxx – p<0.001 significance of the total deviation from target center; +++ - p<0.001 vs Rooftop jumpers; ** - p<0.01 vs right side - in)

The average total deviation of the hits from the center of the target in all experiments is significantly greater than zero (p <0.001) (**Fig. 4**).

The average deviation in response to light signals was significantly greater at the gym – with the right side - in – when compared to the rooftop test results of the Rooftop jumpers (2.26±0.94 cm vs 1.71±1.02 cm; p<0.01), and of the Aerial lift jumpers (2.43±1.03 cm vs 1.45± 0.81cm; p<0.05).

The average total deviation in response to light signals during the rooftop tests, with the subjects' right side - out, was significantly greater compared to the results with their right side - in, in both the Aerial lift jumpers (2.27±0.95 cm vs 1.71 ± 1.02 cm; p <0.05) and in the Rooftop jumpers (2.11±0.58 cm vs 1.45±0.81cm; p <0.05).

One of our tasks was to investigate the existence of systematic deviation of hits to the target, inwards and outwards from the edge of the platform, during the tests at the gym and at the rooftop. For this purpose, we calculated the total deviation of the center of the hits clusters from the geometric center of the target in the horizontal plane (left - right) (**Fig. 5**). In seven of the eight tests, an inward deviation was found; and the deviation in four of the tests significantly differs from zero.

TIME PERCEPTION

The average values from the tests for "time perception" are presented in Table 1. In "Time test 1", when conducted at the gym, the subjects perceived the preset time to be 1.722 s longer whereas, at the roof-

top, the difference from the preset time was only 0.120 s ($p<0.05$). This suggests that the subjects' internal *clock* had perceived an average of 0.142 s more every second, during the experiments conducted at the gym, and only 0.018 s/s more at the rooftop ($p<0.05$).

During "Time test 2" the brain's internal *clock* of the Aerial lift jumpers had perceived on average 0.047 s more every second, in experiments at the gym, and -0.088 s/s less at the rooftop ($p<0.05$).

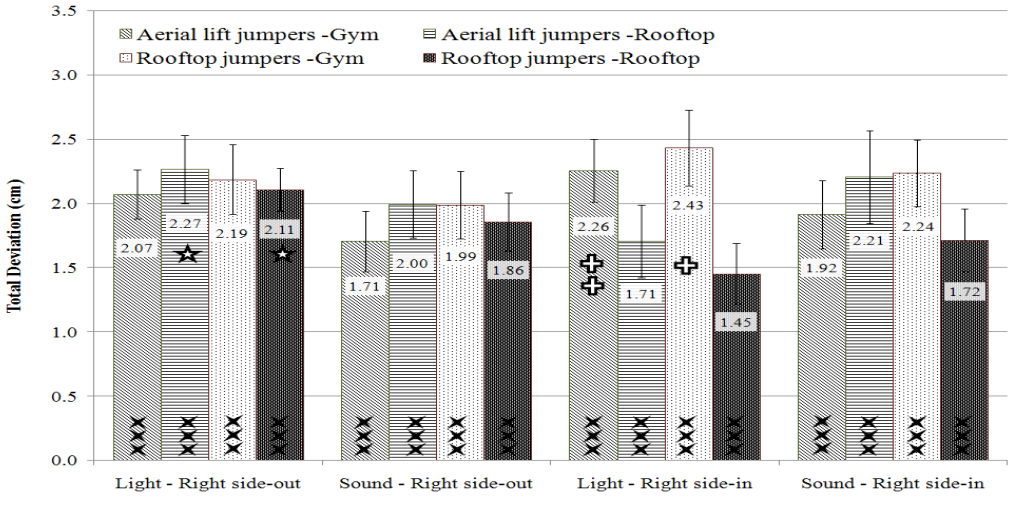

Fig. 4. Total deviation from target center when testing at the gym and at the rooftop (11 m), depending on body position – Comparison between the Rooftop jumpers and the Aerial lift jumpers.

(xxx – $p<0.001$ significance of total deviation from target center; + - 0.05, ++ - $p<0.01$ significance vs Rooftop jumpers; * - $p<0.05$ vs right side-in)

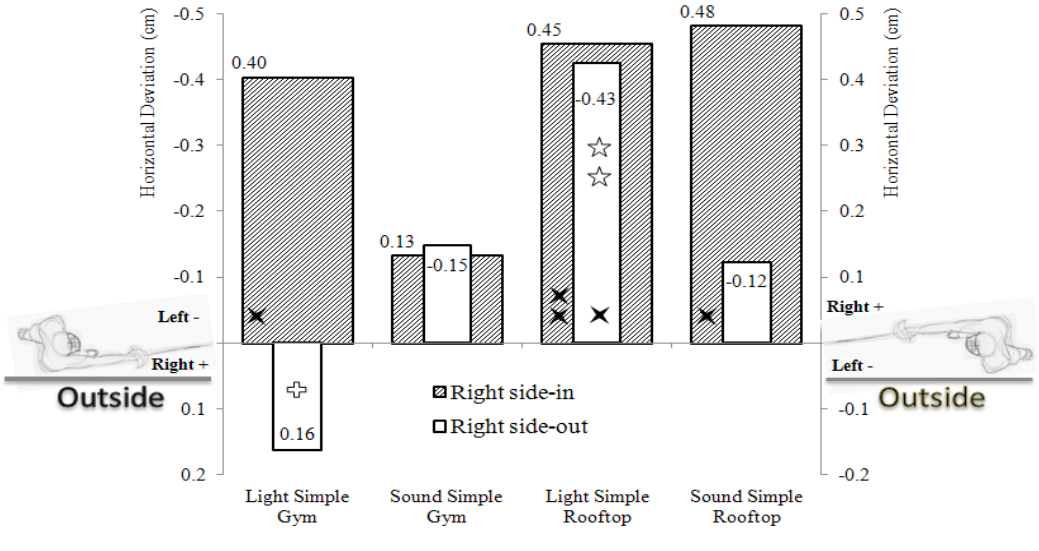

Fig. 5 Horizontal deviation from target center when testing at the gym and at the rooftop (11 m), depending on body position.

(x – $p<0.05$, xx – $p<0.01$ significance of horizontal deviation from target center)

DISCUSSION

The shorter reaction time and greater movement speed in the Rooftop jumpers suggest better psychophysical characteristics in this subgroup.

The Rooftop jumpers exhibited better accuracy in the extreme situation than in the standard one in all tests (although this is statistically significant in only one test) (Fig. 4). This could be regarded as a mani-

Table 1. Test results for time perception (Time test 1 and Time test 2)

	Gym				Rooftop jumpers (11 m)				Aerial lift jumpers	
	Time test 1		Time test 2		Time test 1		Time test 2		Time test 2	
All subjects	dt (s)	dt/s (s/s)	dt (s)	dt/s (s/s)	dt (s)	dt/s (s/s)	dt (s)	dt/s (s/s)	dt (s)	dt/s (s/s)
Average	1.722	0.142	0.359	0.016	0.120	0.018	-0.260	-0.035		
SD	3.437	0.282	2.986	0.235	1.900	0.160	1.877	0.174		
SE	0.661	0.054	0.575	0.045	0.380	0.032	0.375	0.035		
n	27	27	27	27	25	25	25	25		
p	< 0.05	<0.05	> 0.05	> 0.05						
Aerial lift jumpers										
Average	2.269	0.194	0.731	0.047	0.385	0.029	-0.731	-0.088	0.592	0.060
SD	3.930	0.307	2.651	0.246	1.895	0.161	2.279	0.216	1.406	0.164
SE	1.090	0.085	0.735	0.068	0.525	0.045	0.632	0.060	0.390	0.045
	15	15	15	15	13	13	13	13	13	13
P	> 0.05	> 0.05	> 0.05	<0.05						
Rooftop jumpers										
Average	0.917	0.070	0.017	-0.014	-0.167	0.006	0.250	0.023		
SD	2.999	0.266	3.619	0.249	1.946	0.164	1.215	0.092		
SE	0.866	0.077	1.045	0.072	0.562	0.047	0.351	0.026		
n	12	12	12	12						
p	> 0.05	> 0.05	> 0.05	> 0.05						

p – Statistical significance using the Student mean comparison test for dependent samples when comparing the results from the two tests carried out at the gym and at the rooftop

festation of increased concentration and composure at risk. For the Aerial lift jumpers we can say rather the opposite because, in three of the four tests, their accuracy in the risk situation decreased.

The center of the hits cluster in most tests was shifted away from target center towards its inner side (**Fig. 5**). This effect was particularly pronounced in tests conducted at the rooftop and suggests that, when lunging the stuntmen strived to avoid the precarious edge of the rooftop platform.

The slowing down of the subjects' internal *clock* in the experiment at the rooftop is likely to be related to their assessment of the situation as extreme. After they have decided to carry out a high-risk action, in this case jumping from a great height, the subjects' internal clock speeds up again. This assumption is affirmed by the decelerating of the Aerial lift jumpers' internal clock when they refused to jump from the 11 m and its acceleration in both groups right before they take the jump (Table 1).

CONCLUSIONS

1. Rooftop jumpers probably have better psychophysical characteristics than Aerial lift jumpers.
2. Movement accuracy is adversely affected to a larger extent in stuntmen who experience anxiety when performing at a great height.
3. In the rooftop tests, the "Right side - in" body position leads to a greater deviation of the center of the hits clusters towards the inner side of the target.
4. he stuntmen's internal clock slows down when performing in an extreme situation at a high altitude, when they are hesitant to undertake risky actions, and speeds up when they have already decided to jump.

COMPARISON OF PREDICTED VO_{2MAX} IN VOLLEYBALL AND FOOTBALL PLAYERS FROM MARGARIA AEROBIC STEP TEST

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Keywords: VO_{2max}, aerobic step test, lactate

INTRODUCTION

The advantage of direct measurement of VO2 max as an accurate method is well known. However, it is not always possible to overcome the limitations of the application of the maximal test until exhaustion. This requires extensive laboratory and specialized equipment and as well as considerable subject motivation. Alternative for the study of aerobic capacity of a wide range of subjects are submaximal tests [1, 3, 6, 8, 14, 20, 21, 23]. The predictive VO2max tests make the use of the essentially linear relationship between HR and VO2 during various intensities of light to moderately heavy aerobic exercise [10]. The advantages of submaximal testing are: being safer, controlled pace, and quick assessment. The main disadvantages refer to not measuring VO2max directly and true maximal HR. By comparative analysis of the predicted VO2max from various submaximal tests are established differences with directly measured VO2 max [15, 17, 18]. Although there are many predictive tests available the focus is on those applied most easily in any conditions - submaximal step tests. One of the widely used popular tests is the Queen's College step test for predicting VO2max on the base of post-exercise HR [2, 4, 5, 11, 13, 16]. There are many citations for Margaria in various scientific sources, but almost are no data for predicted VO2max by his nomogram [10]. Margaria aerobic step test theoretically takes precedence over Queens College step test for two reasons: VO2 max is predicted based on the exercise HR and HR data in submaximal load through the actual slope of the heart rate depending on the exercise power. Of particular interest is the study of the aerobic capacity of athletes from sports with mixed energy supply. The aim of this study is to predict indirectly the relative VO2max and compare its values in volleyball and soccer players from Margaria aerobic step test.

METHODS

Two groups of 10 volleyball and 10 soccer players (Mean±SD) age 20.3±1.42, 20.7±1.6; weight 78.25±6.94, 78.6 ±6.81; height 184.58±5.55, 182.96±5.86; BMI 23±1.6, 23±2.2 participate in the research. Investigated persons are familiar with the requirements of the study and possible risks. All participants gave written informed consent. The athletes performed submaximal Margaria aerobic step test (MAST). The test consists of two 5-minute loads. It is executed on a platform of 0.40 m. The frequency is 15 steps per minute for the first load and thereafter 25 steps per minute for the second load. The pace is controlled by a metronome. Heart rate is registered with Suunto t6c HR monitor at rest in a sitting position, during the test and in 5 minute recovery period (seated). VO2max was predicted from monitored HR via the Nomogram of Margaria [10]. Blood samples were taken from the ear lobe for determination of blood lactate concentration using portable lactate test analyzer (Lactate Scout, SensLab GmbH, Leipzig, Germany). Blood lactate concentration measurements were done in arterialized capillary blood before (at rest) and the end of 1st, 3rd and 5th minutes after the tests. All parameters of two

groups were compared. The statistical analysis was done by using Microsoft Excel and SPSS Statistics 19. Shapiro–Wilk Test was applied for the distribution normality verification of the data. The experimental results were statistically processed by means of Descriptive Statistics, Repeated Measures ANOVA and Two-Independent Samples Test (Mann-Whitney U). The alpha level was set at $p<0.05$ for all analyses.

RESULTS

Differences of variables age, weight, height and BMI between both groups are insignificant ($p>0.05$).

Heart rate values (Mean±SD) for both groups at rest, the end of first and second test load and in 5-minute recovery period are presented in **Table 1** and **Figure 1**.

Table 1. Margaria aerobic step test - HR [bpm] in volleyball and soccer players

N=10	Volleyball players	Soccer players
Variable	Mean ± SD	Mean ± SD
HR rest	71.0±9.56	65.6±6.73
HR - I load MAST	123.4±10.53	130.2±12.62
HR - II load MAST	155.8±13.31	159.9±7.71
HR recovery 1 min	135.5±13.31	140.5±10.61
HR recovery 2 min	104.0±11.45	102.4±10.81
HR recovery 3 min	98.4±7.58	92.3±10.30
HR recovery 4 min	92.1±8.77	89.0±8.47
HR recovery 5 min	90.8±8.92	85.20±8.09

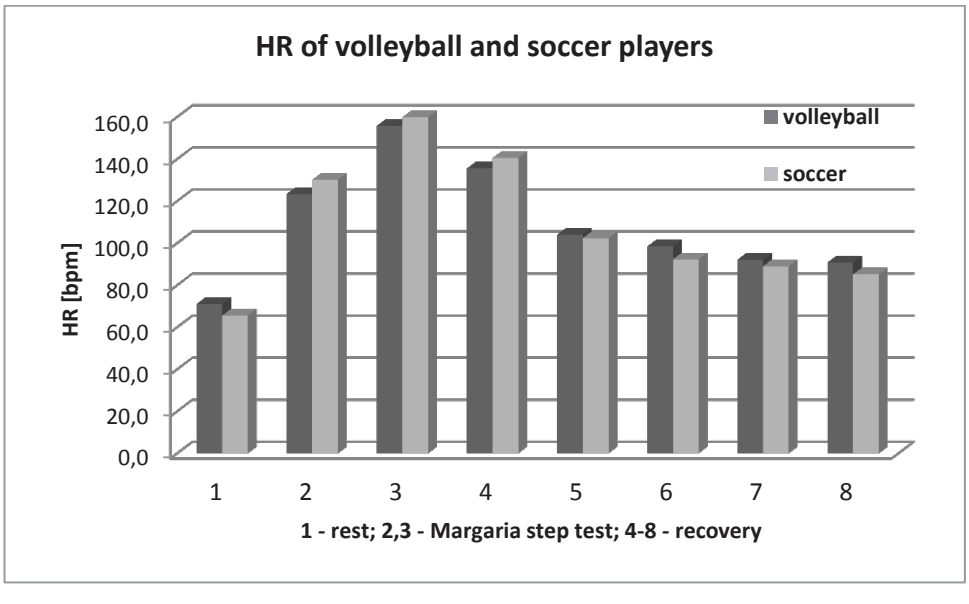

Fig. 1. HR in rest (1), Margaria aerobic step test first and second load (2, 3) and at each minute of the test recovery (4 - 8).

Mean and standard deviations of variables relative VO2max [$ml.kg^{-1}.min^{-1}$] and blood lactate concentration [$mmol.l^{-1}$] pre- and post-test in 1st, 3rd and 5th minute for volleyball and soccer players are given in **Table 2.**

Five minutes after the step test blood lactate has decreased to 2.58±0.838 $mmol.l^{-1}$ in volleyball players and 2.40±0.839 $mmol.l^{-1}$ in soccer players respectively.

Figure 2 illustrates blood lactate measurements in volleyball and soccer players.

Table 2. Margaria aerobic step test - VO2 max [ml.kg^{-1}.min^{-1}] and blood lactate concentration [mmol.l^{-1}] in volleyball and soccer players (Mean ± SD).

Group	N	VO2max [ml. kg^{-1}.min^{-1}]	Blood La pre-test	Blood La 1' post-test	Blood La 3' post-test	Blood La 5' post-test
volleyball	10	43.85±8.121	1.19 ±0.366	2.81±0.911	2.92±1.845	2.58±0.838
soccer	10	44.65±4.808	1.50±0.686	2.79±0.712	2.74±0.799	2.40±0.839

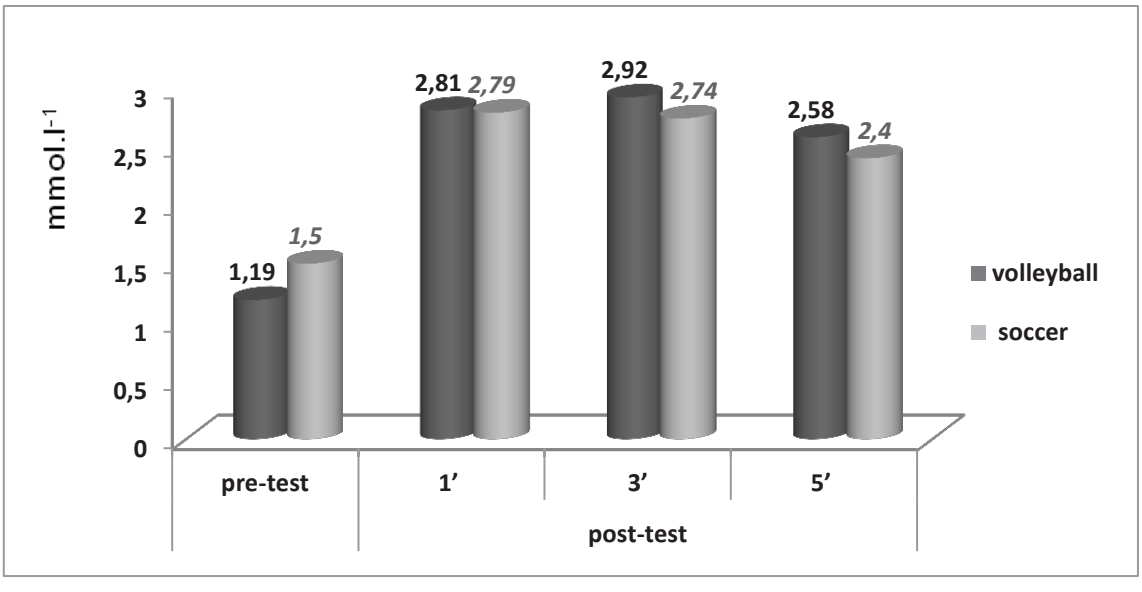

Figure 2. Blood lactate measurements (mmol.l^{-1}) pre- and post-MAST

Comparison data from Repeated Measures ANOVA (Adjustment for multiple comparisons: Bonferroni) for blood La values in each group showed statistical differences between rest and recovery ($p<0.05$) but not between the 1st, 3rd and 5th minute.

It was found from comparison ((Mann-Whitney U) insignificant differences in HR, predicted VO2max and blood La between the two groups ($p>0.05$).

DISCUSSION

Outcomes of the comparison analysis give the reason to accept that both groups were homogeneous in terms of physiometric characteristics. In these findings we could consider that the level of basic training influences the aerobic capacity of studied volleyball and soccer players.

We did not find data in available sources for comparison the aerobic capacity of volleyball and soccer players. Although in most scientific research related to the application of submaximal tests for prediction VO2 max the publication of Margaria (1965) is cited, data for the implementation of his aerobic step test are scarce [22].

Despite the difference in technics of volleyball and football both groups of athletes have the same aerobic capacity, assessed by relative oxygen uptake.

The VO2max results of soccer players in this study are significantly lower than those of Brazilian indoor soccer players obtained in direct and indirect measurements (62.8 ± 10.1 vs. 58.5 ± 8.5 ml.kg^{-1}min^{-1}, respectively) [9]. It could be assumed that used nomogram of Margaria where still not accounted for some factors underestimated the aerobic capacity of the studied by us athletes.

The data about blood lactate concentration in male volleyball and soccer players after Margaria aerobic step test are not available in the searched literature. Blood lactate changes have been analyzed during

soccer games in male players. Post-halves concentrations have been reported to vary between 5.0 - 7.0 mlol.l^{-1} [19]. We only found that our results of La_{max} of 2.79 mmol.l^{-1} are similar to those measured at the end of second half of the match in male soccer players – League/Denmark [19].

OBLA is defined as the exercise load during which lactate concentration in blood attains 4 mmol.l^{-1} [7]. In elite volleyball players during a game the highest blood lactate level about 1.7 mmol l^{-1} (maximal individual blood lactate concentration was 3.2 mmol.l^{-1}) was found and did not reach OBLA [12]. In our study in volleyball players La_{max} 2.92 mmol.l^{-1} was found at 3 of recovery (minimal and maximal individual blood lactate concentration was 1.7 and 7.9 mmol.l^{-1} respectively), which indicates that all players except one did not reach OBLA after the test. The low LA_{max} values in our study are effect of the test nature which is submaximal aerobic by intensity and biochemical criterion proves this.

In the fifth minute of the recovery period heart rate in both groups decreased to values of 90.80±8.917 bpm in volleyball players and 85.20±8.094 bpm in soccer players, but did not reach baseline ($p<0.05$).

CONCLUSION

From these findings it can be concluded that the application of predictive Margaria aerobic step test combined with the study of post-exercise heart rate and blood lactate enhanced functional control by the assessing of aerobic capacity and recovery.

Margaria aerobic step test requires no equipment, is easily applicable in practice and well suited for comparative studies in team sports.

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HIGH PEAK OXYGEN CONSUMPTION IN ROCK CLIMBING?

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Peak oxygen consumption ($VO_{2peak\text{-}climb}$) during rock climbing which involves sustained intermittent isometric contractions may represent a low percentage (38-51 %) of maximal oxygen consumption determined through the normally used incremental cycle ergometer tests ($VO_{2peak\text{-}cycle}$). Purpose: To perform a climbing test to exhaustion in standardized conditions, which should lead to $VO_{2peak\text{-}climb}$ close to $VO_{2peak\text{-}cycle}$, and to observe the induced physiological responses. Methods: Six advanced climbers performed an incremental climbing test to exhaustion on an indoor climbing wall with big identical holds, situated at equal distances. Climbing pace was steady while climbing difficulty was increased through changes in wall inclination on each stage. In a separate occasion a maximal cycle ergometry was conducted. Cardiorespiratory parameters were registered using a portable gas analyzer. Results: $VO_{2peak\text{-}climb}$ and $VO_{2peak\text{-}cycle}$ were significantly different ($p = 0.03$): 41.7±2.4 and 50.7±5.2 ml/min/kg, respectively. Oxygen pulse and minute ventilation maximal values were also significantly lower in the climbing trial ($p < 0.05$). Maximal heart rates were similar ($p = 0.14$): 181±7 bpm in the climbing trial and 184±5 bpm in the cycling test. Oxygen consumption varied highly with respect to its general trend of increase and oxygen pulse rose slightly during the specific test. Conclusion: climbing to exhaustion using big holds avoiding prolonged immobilized positions can induce high $VO_{2peak\text{-}climb}$ representing 82 % of $VO_{2peak\text{-}cycle}$.

Key words: Sport climbing, maximal incremental exercise, cardiorespiratory responses, climbing at different angles

INTRODUCTION

Rock climbing is a physical activity with a variable character of the workload, demanding a complex development of the motor abilities, various and at the same time stable skills and highly mobile metabolic processes [18]. A performance limiting factor of major importance in rock climbing is the sport-specific strength endurance [9,19]. Rock climbing involves strenuous intermittent isometric contractions with unfavorably short relaxation periods (contact time-relaxation time ratio 4:1), which induce arterial occlusion of the forearm muscles and limit cell oxygen and fuel regeneration [8,10,15,22]. Major muscle groups of the upper extremity, trunk, and lower extremity actively contribute during climbing [21]. Nevertheless, the forearm muscles have the highest exertion rate [13] and generally fatigue in rock climbing is considered not to be systemic and predominantly aerobic but localized in the forearm muscles [14]. Thus, low average oxygen consumption (VO_2) has been reported when climbing a single route (20.6 – 31.9 ml/min/kg) [5,16,24,25]. Peak oxygen consumption ($VO_{2peak\text{-}climb}$) during rock climbing may represent a low percentage (38-51%) of maximal oxygen consumption determined through the normally used incremental ergometer tests [24]. VO_2 peak values (VO_{2peak}) can be considerably higher during difficult climbing or in climbing tests performed until exhaustion (up to 44.1 ml/min/kg) [4,7] as well as in specialized incremental tests with increasing climbing velocity (up to 53.6 ml/min/kg) [3,6,9]. These results suggest that in some climbing situations aerobic metabolism plays an important role. One study showed that aerobic capacity measured through a sport-specific upper-body test correlates strongly with sport performance [20].

It can be hypothesized that climbers can reach high VO_{2peak} values when climbing in curtain conditions, i.e., maximal workload, sufficient effort's time, big handholds, lack of prolonged static positions and holding of breathing. The aim of the present study was to perform a climbing test to exhaustion with standardized workload parameters, which should lead to $VO_{2peak\text{-}climb}$ close to cycling VO_{2peak} ($VO_{2peak\text{-}cycle}$), and to observe the induced physiological responses.

METHODS

Subjects

Six advanced climbers aged 36 ± 8 years volunteered to participate in the study. Their average best ever climbing grades in the on-sight and red-point styles were: 7a+/7b (range: 6c – 7c+) and 7c+ (range: 7a+ - 8b), respectively. The average current climbing grades in the on-sight and red-point styles were: 7a+ (range: 6c – 7c) and 7b+ (range: 7a+ - 8a/8a+), respectively.

Study design

The subjects undertook two tests in two sessions 48 hours apart to ensure adequate recovery. The study sought to analyze the specific cardiorespiratory responses to an incremental climbing test. Therefore, the subjects performed also a standardly used maximal cycle ergometer test to compare the results.

Incremental climbing exercise test

The sport-specific test was performed climbing up and down until exhaustion (until the subjects were not able to continue to climb which resulted in a landing on a safety mattress) on an indoor climbing wall which inclination could be changed. Climbing pace was steady (two hand moves per 5 seconds) while climbing difficulty was increased through changing wall inclination. The climbers started with the climbing wall inclined 5 degrees from vertical to overhanging direction and after each 90 seconds the overhang was increased by another 5 degrees. The climbing wall was equipped with big identical holds (for the distal, middle and partly for the proximal phalanges), which formed two longitudinal and several transverse parallel lines (fig.1). The distances between the longitudinal and transverse lines (the lines formed by the bolts used for mounting the climbing holds) were: 60 cm and 40 cm, respectively. The left hand grasped holds only from the longitudinal line situated on the left side of the climber and the right hand grasped only holds from the right longitudinal line, respectively. With each consecutive hand move the climbers grasped a hold placed one level further from the hold used as support from the other longitudinal line. The subjects were allowed to step with both feet on holds from each transverse line.

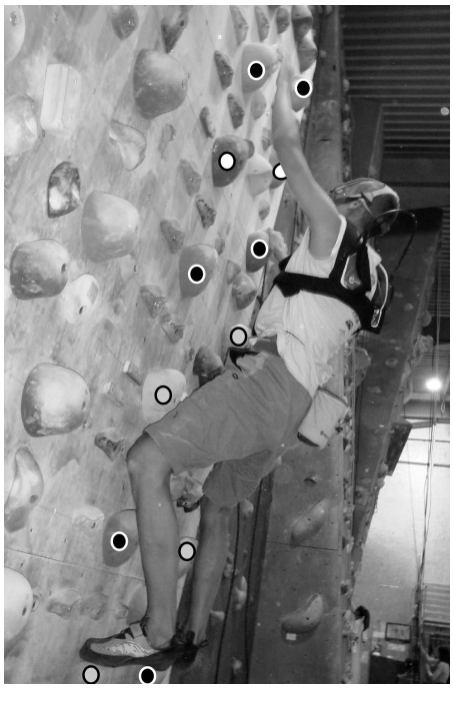

Fig. 1 Performing the incremental climbing exercise test. The marks are showing the hand moves pattern. The climbers had to grasp only holds marked with one color and were allowed to step on all marked holds (white and black).

Cycle ergometer test

The maximal cycle ergometer tests was conducted using the protocol of Iliev [12]. The initial power output was 60 watts. After each stage (90 seconds) the resistance was increased by 30 watts until exhaustion.

Analyzed variables

The following parameters from the two tests were taken into consideration for analysis: VO_2 relative to body mass, pulmonary ventilation (VE), oxygen puls (VO_2/HR), metabolic rate of task (MET) and time to exhaustion. For registering cardiorespiratory parameters a portable gas analyzer (Cortex Biophysik, model: Meta-Max 3B-R2, Leipzig, Germany) and a Polar heart rate belt (model: H7, Kemplete, Finland) were used. Measured values were averaged on fifteen seconds. Mean peak values, standard deviations and confidence intervals of the physiological variables and time to exhaustion were calculated. VO_2, HR, oxygen puls and VE kinetics were analyzed. Paired Student's t-test was used to compare the peak values from both tests. Regretion analysis was performed to investigate the VO_2-HR relationship. For the statistical analysis SPSS 19 software was used.

Results

VO_2, HR, VO_2/HR, VE and MET peak values as well as time to exhaustion are listed in table 1. VO_2, VO_2/HR and VE peak values were significantly lower in the climbing test ($p < 0.01$). Nevertheless, VO_2 climbing peak ($VO_{2peak\text{-}climb}$) represents 82 % of the $VO_{2peak\text{-}cycling}$ and the differences between HR peak values (HR_{peak}) were small (3 bpm) and insignificant ($p = 0.136$).

Table 1 Peak values, standard deviations and confidence intervals of physiological parameters and time to exhaustion in the climbing and cycle incremental tests

Variable	Incremental climbing test		Cycle ergometer test		P-value
	Mean ± SD	Confidence interval	Mean ± SD	Confidence interval	
VO_{2peak} (ml/min/kg)	41.7 ± 2.4	39.1 – 44.2	50.7 ± 5.2	45.2 – 56.1	0.004
HR_{peak} (bpm)	181 ± 7	174 - 189	184 ± 5	179 – 189	0.136
VO_2/HR_{peak}	17.2 ± 2.1	14.9 – 19.4	20.3 ± 2.3	18.0 – 22.7	0.006
VE_{peak} (l/min)	101.4 ± 12.7	88.1 – 114.8	149.4 ± 22.2	126.1 – 172.7	0.000
MET	11.9 ± 0.7	11.2 – 12.6	14.5 ± 1.5	12.9 – 16.0	0.004
Time to exhaustion (sec)	505 ± 113	386 – 623	793 ± 86	703 – 882	0.003

VO_2, HR, VO_2/HR and VE kinetics are shown in figure 2 and 3. These figures illustrate existing differences between the two tests. The parameters varied stronger in the climbing test with respect to their general trend of increase. The general trend of climbing VO_2 time curve was characterized by: reduced increases at the middle of the tests and sharp increases at the end (fig. 4). VO_2-HR relationship appears to be linear in both tests (fig. 5). Nevertheless, during the climbing test HR increases were disproportionally higher compared to VO_2 increases, with respect to HR and VO_2 increases during the cycle ergometry (i.e. similar HR values correspond to significantly smaller VO_2 values in the climbing test compared with VO_2 values in the cycling test). Table 1 and figure 5 illustrate this.

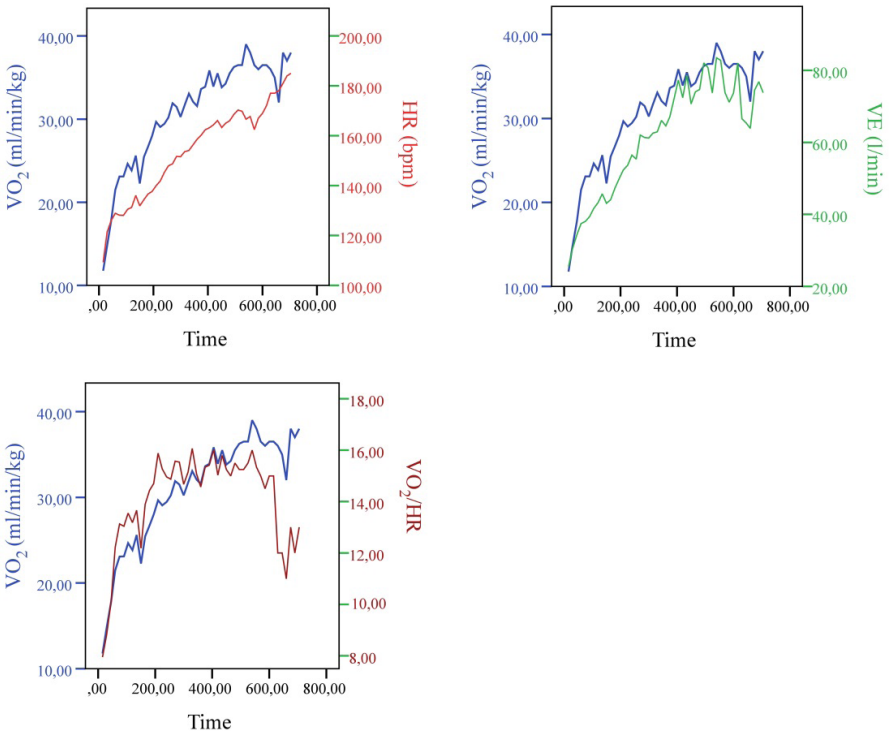

Fig. 2 Oxygen consumption (VO_2), heart rate (HR), pulmonary ventilation (VE) and oxygen puls (VO_2/HR) kinetics in the incremental climbing test. Subjects number: first 450 sec (n = 6), 450-540 sec (n = 3), 540-630 sec (n = 2), > 630 sec (n = 1). Note that due to the smaller subjects' number at the last three stages the end parts of the curves are less representative with respect to the individual responses during the end of the test.

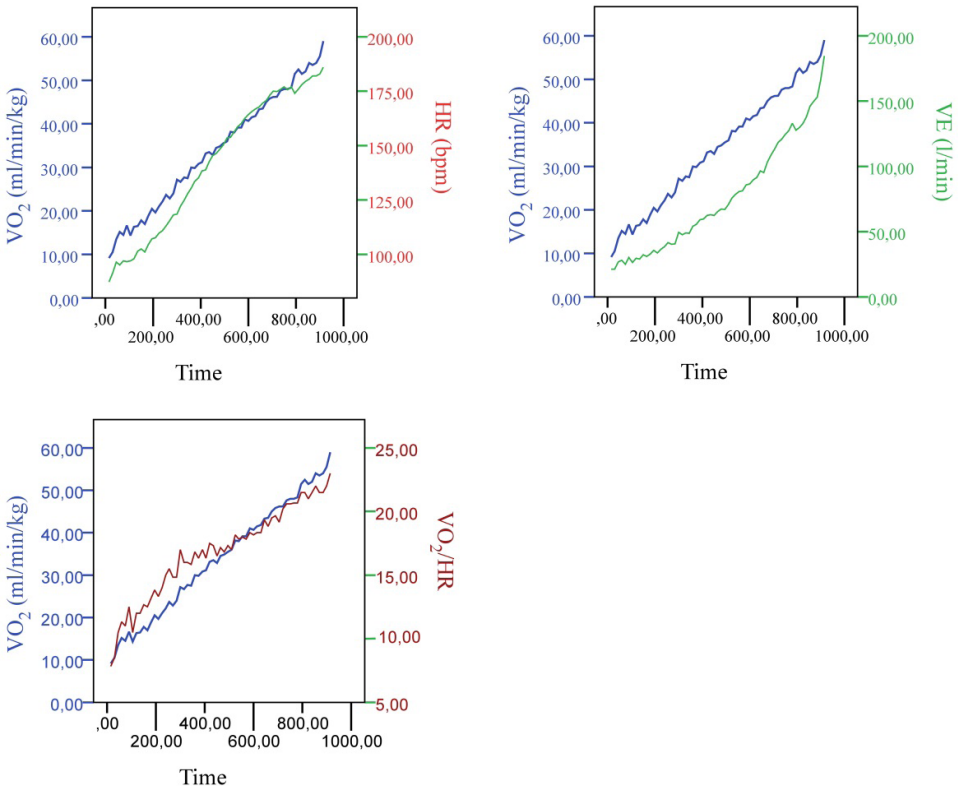

Fig. 3 Oxygen consumption (VO_2), heart rate (HR), pulmonary ventilation (VE) and oxygen puls (VO_2/HR) kinetics in the cycle ergometer test. Subjects number: first 810 sec (n = 6), 810-900 sec (n = 5), > 900 seconds (n = 2). Note that due to the smaller subjects' number at the last two stages the end parts of the curves are less representative with respect to the individual responses during the end of the test.

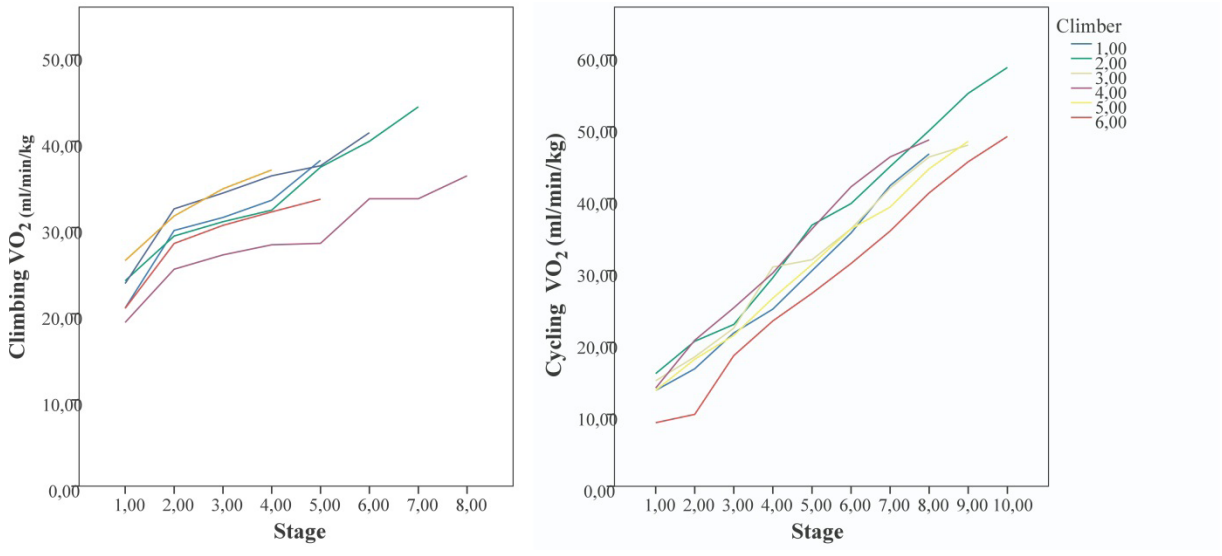

Fig. 4 Oxygen consumption (VO_2) kinetics. Curves are created using averaged data points corresponding to each stage of the climbing and cycling incremental test.

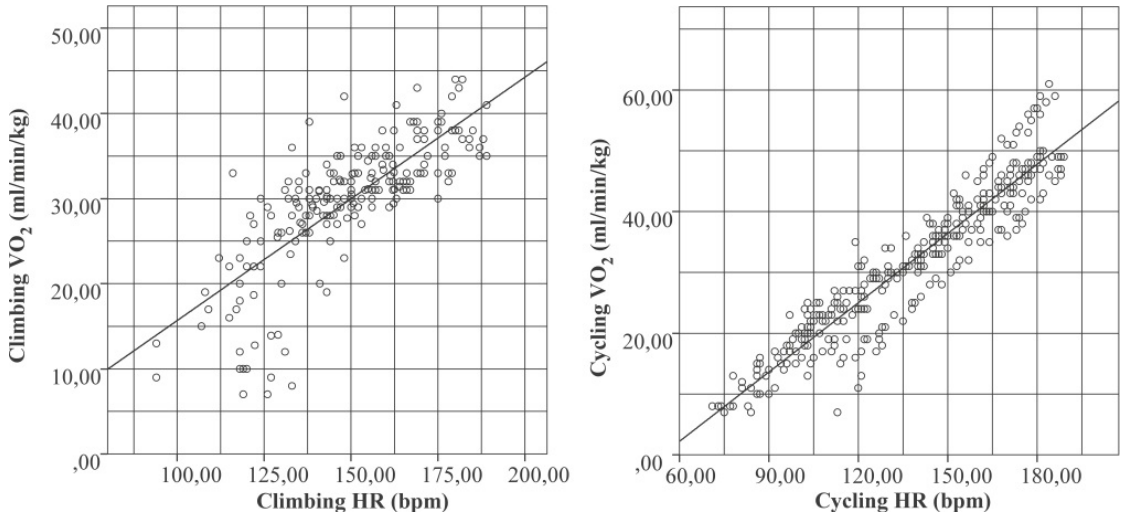

Fig. 5 Scatter plot of VO_2 and HR values from the climbing and cycling incremental tests. An F-test suggested that the linear regression model is adequate for the climbing ($R^2 = 0.63$, $F = 339$, $p < 0.01$) and cycling ($R^2 = 0.88$, $F = 2343$, $p < 0.01$) tests.

DISCUSSION

The assumption that VO_2 during climbing can be relatively high appears to be correct. $VO_{2peak\text{-}climb}$ represented a big portion of $VO_{2peak\text{-}cycle}$ (82 %). This percentage is considerably higher than the percentages reported by Sheel et al., which were: 51 % and 45 % for harder and easier climbing, respectively [24]. The relatively high $VO_{2peak\text{-}climb}$ in the present study can be explained with the fact that the climbing test was standardized, led to exhaustion and did not allow holding of static positions due to the fixed climbing pace. This pace (2 hand moves per 5 seconds) increased intensity because it did not allow the typical for route climbing resting on easier sections of a wall. Moreover, forearm muscles' work relief frequency and the common continuous contact times with the handholds (eight seconds long in average) [11] was largely reduced in the present test. The big size of the climbing holds was another factor which increased the duration of the test and contributed to the higher $VO_{2peak\text{-}climb}$.

The work challenge at the end of the climbing test (11.9 MET) can be characterized as "very heavy" and was bigger than previously mentioned in the literature (8.4 – 9 MET) [26]. The similar HR during the

climbing and cycling tests suggest that the climbing test protocol induced not only deep peripheral fatigue but was a maximal or near maximal overall exercise. Nevertheless, de Geus et al. measured even higher than the present $VO_{2peak\text{-}climb}$ (44.1 ml/min/kg) as a response to round four minutes in duration difficult vertical route climbing [7]. This finding along with the present results show that very difficult routes for one's climbing ability or sport-specific maximal workload are factors inducing high $VO_{2peak\text{-}climb}$. Nevertheless, further research is needed to determine whether $VO_{2peak\text{-}climb}$ measured through climbing tests correlates with sport performance. Despite the reduction in the static time during the climbing efforts in the present study it is possible the most proper way of evaluating climbers' aerobic and work capacity to be the use of upper-body maximal dynamic exercises such as the test developed by Michailov et al. who used a vertically mounted rowing ergometer [20].

VO_2, VO_2/HR and VE fluctuations in the climbing test existed most likely due to the intermittent isometric contractions during climbing which are accompanied by arterial occlusion and holding of breathing [10,17]. The fact that the test involved alternating up and down climbing might also influenced the results. Down climbing should require less energy expenditure. Traversing for example was physiologically less demanding compared to vertical, overhanging and roof climbing [7]. Another phenomenon in the present study was the small inclination of the middle part of climbing VO_2 time curve. Early studies in the field of rock climbing observed a disproportional rise of HR in comparison to VO_2 [23]. When difficulty is increased by changing the steepness HR progressively increased but VO_2 remained relatively constant and the VO_2-HR relationship was considered not to be linear [16,26]. Watts et al. observed a plateau in VO_2 as a response to ascending a difficult 20 m long route [25]. This plateau was neither a physiological steady state or a typical for a maximal exercise VO_2 leveling at the end of a test. This unique VO_2-HR dissociation could be explained with: 1) the muscle metaboreflex (consisting of increased HR, cardiac output, central blood volume, systemic arterial blood pressure and vasoconstriction of renal and inactive muscles); 2) the fact that the arms are often above the level of the heart during climbing which causes a greater increase in HR than exercise with arms at waist level; 3) the reliance on both aerobic and anaerobic type of energy supply; 4) the smaller size of the most exerting upper-body muscles; 5) the restricting effect of the isometric contractions on local blood circulation and the holding of breathing the hold of breathing, which stabilize the pectoral arch [1,2,13,16,17,20,23]. The small increases in oxygen puls in the present study suggest that cardiac output as a main factor influencing VO_2 is most likely determined by increased HR rather than stroke volume. Moreover, it is plausible that the strongest VO_2 limiting factor during climbing is the oxygen utilization in the skeletal muscles.

Our study confirms the VO_2 leveling and the disproportional rise of HR in comparison to VO_2 observed in previous research. Nevertheless, the VO_2-HR relationship proved to be linear in the present incremental climbing test. The practical application of this estimation is that during climbing in similar to the performed test conditions (for example when training for developing specific aerobic capabilities) HR could serve as an intensity indicator and will be informative for the energy expenditure.

CONCLUSION

Climbing to exhaustion using big holds which does not involve prolonged immobilized positions can induce $VO_{2peak\text{-}climb}$ representing a very high portion of $VO_{2peak\text{-}cycle}$. This suggests that aerobic metabolism may play an important role in this otherwise strength demanding sport. VO_2-HR relationship may be linear in some climbing situations. This new finding can be applied in the sport practice.

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PERFORMANCE-ENHANCING DRUGS: A NEW REALITY IN SPORT AND A REAL SHOWGROUND FOR PHARMACISTS

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Key words: Performance Enhancing Drugs (PED), World Anti-Doping Agency (WADA), sport pharmacist

INTRODUCTION

What Are Performance Enhancing Drugs?

Performance enhancing drugs (PED) are substances that increase a person's physical abilities and stamina. These drugs are taken for a variety of reasons, including to build muscle mass, dull pain, lower stress, and reduce weight[1].

The objectives to use for the athletes are mostly for:

- increase strength and endurance
- aid workout and injury recovery
- to alter intensity and aggression
- sharpen focus and concentration
- combat exhaustion and fatigue
- reduce weight and body fat
- relieve aches and pains
- increase muscle mass and oxygenation

Abusing them can cause severe side effects, however, so most drugs are available only by prescription if at all.

The use of enhancements dates as far back as ancient period, where writings refer to "performance potions" and "performance elixirs." These were given to athletes in preparation for major games. It was not until the latter part of the 20th century that technology advanced enough to screen athletes regularly and enforce bans on the unfair use of steroids and other substances.

Performance enhancing drugs have a variety of uses, each intended to improve a specific physical attribute, such as strength or endurance [2,3]. Some can even cover the traces of other drugs that are in an athlete's system. It is not uncommon for a person using performance enhancements to take a daily "cocktail" of different drugs.

Most performance enhancing drugs are taken orally as tablets or capsules. Others may be injected, applied as a cream, or taken in powder form mixed with health shakes.

Increasing oxygen delivery to active muscles, especially by increasing the number of red blood cells is the most effective way to increase aerobic performance [3]. For this reason, blood doping and using erythropoietin products are common among cyclists and other endurance athletes.

The Table 1 describes the drugs and techniques that athletes use illicitly most often. Anabolic steroids are the most commonly abused substances, and many athletes receive dosing recommendations from coaches, other athletes, online discussion groups, and Internet vendors [1]. Some receive the drugs without their knowledge or consent; coaches may give athletes supplements without revealing that they contain drugs [4]. Many websites imply that steroids are safe, often claiming that unskilled physicians, biased researchers, and government bureaucrats inflate their dangers.

AIM OF THE PAPER

The aim of this paper is to show the increasing need of the pharmacists for supporting athletes in maintaining their health, aiding recovery and providing essential information about the quality use of medicines in the context of their engagement with sport.

To know that athletes who are required to use medicines for selected medical conditions are able to obtain a therapeutic use exemption under certain circumstances and also be able to examine how medicines literacy is a critical aspect for athletes including an understanding of the nature, safety, quality and status of supplements and substances purchased from a variety of sources.

CONTROVERSY ABOUT PERFORMANCE ENHANCING DRUGS

There are a number of significant questions that accompany the use of performance enhancing drugs (PED). Many people feel that the drugs give an unfair advantage to their users. Others point to the potential side effects, and claim that overuse may cause significant health problems. In addition, some point out the role model factor: young people often look to professional athletes as role models, and, if an athlete uses enhancements, the young people may be more likely to follow.

On the other hand, many people are willing to risk the possible side effects in order to obtain peak performance. The use of performance enhancing drugs is so widespread, it has been argued, that it would be impossible to regulate them effectively. Still others raise the point that other forms of technology, the use of high-tech materials in shoes, for example, already give certain athletes an edge, so performance enhancing drugs should enjoy the same allowance[6].

Doping is controversial mainly because the medical community has not defined where restoration of normative function ends and performance enhancement begins. Those opposed to doping contend that it undermines the traditional principle of a level playing field and creates unnecessary health risks. Supporters maintain that medical practitioners' concerns about long-term health effects are unwarranted and that athletes who are informed about possible adverse effects should be able to make an informed decision [2].

Doping control (drug testing) and drug education of athletes have two primary objectives, one to protect the health and safety of athletes and second to preserve the dignity and integrity of sports by providing an environment for fair and equitable competition.

The first objective is intended not only to prevent athletes from harming themselves, but also to protect the safety of competitors. The second objective aims to "level the playing field." Both objectives embrace the virtue of ethics in sport.

NOT CONTROLLED USAGE, SERIOUS CONSEQUENCES

PED have many harmful consequences that many athletes experience. Pharmacists must keep in mind that athletes may use these drugs at doses well beyond those used in therapeutic settings. Some serious consequences can result, including irreversible androgenic/anabolic effects, toxic hepatitis, withdrawal, dependence, body dysmorphic disorders, depression, aggression, the unmasking or acceleration of cancer growth, diabetes mellitus, dyslipidemias, cardiomyopathy, and nephrotoxicity.

Steroids are associated with recurrent hepatitis, cholestasis, hemorrhage, or hepatoma in some individuals. Additionally, products obtained from illicit sources may contain toxic contaminants [3].

Health care professionals, including pharmacist, need to fully understand the complexity of PED (eg, their physiologic and psychotropic properties, individual characteristics, different drugs and doses), acknowledging that each athlete's biology is unique. Pharmacists should be aware that Internet information can strongly influence vulnerable athletes decisions. PED offer temporary glory or improved appearance, but their long-term effects are considerable and dangerous.

For the reason to have traceability and control of usage of PED and due to the consistency and conflicts

of interest of the International Olympic Committee (IOC) and the national Olympic committees, WADA (World Anti-Doping Agency) was established in 1999, led by the IOC and supported by governments and various sports federations [5]. The World Anti-Doping Agency was founded with the aim of bringing consistency to anti-doping policies and regulations within sport organizations and government's right across the world

Following the creation of the World Anti-Doping Code (Code) in 2004, WADA was tasked with oversee-

Table 1. Frequently Abused Performance-Enhancing Drug

All sports	Amphetamines (intensify alertness, concentration, and self-confidence)	Long-term administration associated with growth retardation in adolescents and myocardial pathology
		High chronic doses may lead to persistent personality changes (eg, amphetamine psychosis)
All sports	Cannabinoids (recreational relaxation, stress relief)	Marijuana, hashish
All sports	Eugeroics (arousal)	Modafinal and adrafinil
		Marketed as having low abuse liability and fewer side effects (eg, insomnia, anxiety, agitation)
All sports	Stimulants (eg, amphetamines, ephedrine, cocaine)	Stimulants are often used by student athletes in high-contact sports to boost energy for handling academic commitments and remaining eligible for competition
Archery, billiards, pistol shooting	Beta-blockers (reduce tremor)	In endurance sports, beta-blockers adversely affect performance
		Clenbuterol is also used as an anorectic
		Inhaled beta-blockers may be allowed
Endurance sports, especially track and field and cycling	Oxygen enhancement (eg, blood doping, erythropoiesis stimulating agents)	Traditionally, athletes saved and reinfused their own red blood cells
		Sleep chambers that mimic high–altitude environments are used to stimulate red blood cell production
		Erythropoietin is abused
Endurance sports, weight lifting	Glucocorticosteroids (allowed externally, but not internally; generally called steroids) and anabolic–androgenic steroids	Help decrease inflammation
		Increase muscle mass and alter appearance
		Needle sharing of injectable steroids increases risk for infection with HIV or hepatitis
		A new trend to avoid apprehension is to purchase cattle implants that contain anabolic drugs and estrogen, and then extract the estrogen using directions available on the Internet
Wrestling, gymnastics, horse racing (for the jockey)	Diuretics (weight loss or fluid retention)	Used to meet weight-class limits
		Modify urine excretion rate of prohibited drugs
		Overcome fluid retention as a consequence of anabolic steroid use

ing activities in a number of key areas:

- Code Compliance Monitoring – including overseeing acceptance, implementation and compliance of the Code, the core document the glues together anti-doping policies, rules and regulations worldwide.
- Science and Medicine - scientific research, publishing the annual List of Prohibited Substances and Methods, and managing laboratory accreditation, Therapeutic Use Exemptions (TUEs) and the Athlete Biological Passport (ABP).
- Anti-Doping Coordination - coordinating anti-doping activities globally through the central clearinghouse Anti-Doping Administration and Management System (ADAMS).
- Global Anti-Doping Development - through its Regional Anti-Doping Organization (RADO) program, WADA is developing a clean sport culture in parts of the world previously untouched by anti-doping programs.
- Education - preventative methods such as values-based education programs targeted at young athletes, coaches, doctors, training and parents on the dangers and consequences of doping, as well as the legal and social ramifications, are increasingly prevalent in anti-doping programs.
- Athlete Outreach - engaging with athletes, their entourage and all those involved in sport on the world stage, WADA's Athlete Outreach program aims to raise awareness while ensuring athletes are involved and part of the solution.
- Cooperation with Law Enforcement - working closely with government, law enforcement and Anti-Doping Organizations (ADOs) in order to facilitate evidence gathering and information sharing.
- Other Initiatives - conducting a wide range of other activities including Independent Observer Missions at major sports events.

Despite the existence of the WADA, there is no universal program and institution to pay attention of the education of young athletes, that oversees drug education and prevention programs in high school sports, whereas professional sports are governed by their specific sports-governing organizations.

Moreover, there is currently no universal list of banned, restricted, and permitted substances that applies to all athletes or all sports-governing agencies.

Table 2. Prohibited list of the substances and by the methods of identification according to WADA

Substances Prohibited At All Times	
S0. Non-Approved Substances	Any pharmacological substance which is not addressed by any of the subsequent sections of the List and with no current approval by any governmental regulatory health authority for human therapeutic use (drugs under pre-clinical or clinical development or discontinued, designer drugs, substances approved only for veterinary use) is prohibited
S1. Anabolic Agents	1. Anabolic Androgenic Steroids (AAS)
	a. Exogenous* AAS and other substances with a similar chemical structure or similar biological effect(s).
	(* "exogenous" refers to a substance which is not ordinarily produced by the body naturally)
	b. Endogenous** AAS when administered exogenously:
	(** "endogenous" refers to a substance which is ordinarily produced by the body naturally)
	2. Other Anabolic Agents
	Erythropoiesis-Stimulating Agents [e.g. erythropoietin (EPO), darbepoetin (dEPO), hypoxia-inducible factor (HIF) stabilizers and activators (e.g. xenon, argon), methoxy polyethylene glycol-epoetin beta (CERA), peginesatide (Hematide)].

	Chorionic Gonadotrophin (CG) and Luteinizing Hormone (LH) and their releasing factors, in males
	Corticotrophins and their releasing factors
	Growth Hormone (GH) and its releasing factors and Insulin-like Growth Factor-1 (IGF-1).
	In addition, the following growth factors are prohibited
	Fibroblast Growth Factors (FGFs), Hepatocyte Growth Factor (HGF), Mechano Growth Factors (MGFs), Platelet-Derived Growth Factor (PDGF), Vascular-Endothelial Growth Factor (VEGF) as well as any other growth factor affecting muscle, tendon or ligament protein synthesis/degradation, vascularisation, energy utilization, regenerative capacity or fibre type switching;
	and other substances with similar chemical structure or similar biological effect(s).
S3. Beta-2 Agonists	All beta-2 agonists, including all optical isomers (e.g. d- and l-) where relevant, are prohibited except:
	inhaled salbutamol (maximum 1600 micrograms over 24 hours),
	inhaled formoterol (maximum delivered dose 54 micrograms over 24 hours)
	salmeterol when taken by inhalation in accordance with the manufacturers' recommended therapeutic regimen.
S4. Hormone and Metabolic Modulators	1. Aromatase inhibitors
	2. Selective estrogen receptor modulators (SERMs)
	3. Other anti-estrogenic substances
	4. Agents modifying myostatin function(s) including, but not limited, to:
	myostatin inhibitors.
	5. Metabolic modulators:
	Insulins
	Peroxisome Proliferator Activated Receptor δ (PPARδ) agonists, PPARδ-AMP-activated protein kinase (AMPK) axis agonists)
S5. Diuretics and Other Masking Agents	1. Masking agents are prohibited. They include:
	diuretics, desmopressin, plasma expanders (e.g. glycerol; intravenous administration of albumin, dextran, hydroxyethyl starch and mannitol), probenecid and other substances with similar biological effect(s).
	Local administration of felypressin in dental anaesthesia is not prohibited.
	Diuretics and other substances with a similar chemical structure or similar biological effect(s) (except drospirenone, pamabrom and topical dorzolamide and brinzolamide, which are not prohibited).
Methods Prohibited At All Times	
M1. Manipulation of Blood and Blood Components	The administration or reintroduction of any quantity of autologous, allogenic (homologous) or heterologous blood or red blood cell products of any origin into the circulatory system.
	Artificially enhancing the uptake, transport or delivery of oxygen, including, but not limited to, perfluorochemicals, efaproxiral (RSR13) and modified haemoglobin products (e.g. haemoglobin-based blood substitutes, microencapsulated haemoglobin products), excluding supplemental oxygen.
	Any form of intravascular manipulation of the blood or blood components by physical or chemical means.

M2. Chemical and Physical Manipulation	Tampering, or attempting to tamper, in order to alter the integrity and validity of Samples collected during Doping Control. These include but are not limited to urine substitution and/or adulteration (e.g. proteases).
	Intravenous infusions and/or injections of more than 50 mL per 6 hour period except for those legitimately received in the course of hospital admissions or clinical investigations.
M3. Gene Doping	The transfer of polymers of nucleic acids or nucleic acid analogues;
	The use of normal or genetically modified cells.

Table 3. Prohibited list of the Substances Prohibited In Particular Sports and Substances Prohibited In-Competition according to WADA

Substances Prohibited In Particular Sports	Substances Prohibited In-Competition
P1. Alcohol (ethanol)	S0. Non-Approved Substances
P2. Beta-Blockers	S2. Peptide Hormones, Growth Factors and Related Substances
S0. Non-Approved Substances	S3. Beta-2 Agonists
S1. Anabolic Agents	S4. Hormone and Metabolic Modulators
S2. Peptide Hormones, Growth Factors and Related Substances	S5. Diuretics and Other Masking Agents
S3. Beta-2 Agonists	S6. Stimulants
S4. Hormone and Metabolic Modulators	S7. Narcotics
S5. Diuretics and Other Masking Agents	S8. Cannabinoids
S6. Stimulants	S9. Glucocortisteroids
S7. Narcotics	
S8. Cannabinoids	
S9. Glucocortisteroids	

Since the list of banned substances for athletes can be extensive, athletes must be careful of consuming all drugs (prescribed and nonprescribed) as well as all dietary supplements. Inadvertent use of a banned substance can have devastating consequences for a class athlete, and pharmacists can help them avoid such problems [7,8].

The Prohibited List is a cornerstone of the World Anti-Doping Code and a key component of harmonization. The List is updated annually following an extensive consultation process facilitated by WADA [5]. The 2014 List is valid from January 1 to December 31, 2014 Table (2).

The prohibited list was presented by the substance and by the method of identification and containing three parts:

- Substances and methods prohibited at all times (in- and out-of competition)
- Prohibited in competition
- Prohibited in particular sports

DRUG USE IN SPORTS: A VERITABLE ARENA FOR PHARMACISTS

Pharmacists, in a variety of settings including community practice, dispense medications to athletes, and can offer advice on nonprescription products and dietary supplements. Pharmacists should question these patients as to whether they are competitive athletes subject to drug testing by a sports-governing body, and professional-sport organizations. If so, pharmacists can help the athlete to avoid banned substances, which are generally considered ergogenic and performance enhancing.

A network of trained pharmacists in local areas (e.g., community pharmacies) would be an asset for sports organizations.

Pharmacists with expertise in drug testing and doping control programs can serve as resources for universities, colleges, high schools, and other institutions that are interested in establishing their own in-house testing programs [12]. In this capacity, pharmacists can develop and implement the policies and procedures for specimen collection. They can also assist in formulary management in training rooms. Pharmacists can provide presentations and information to athletes, coaches, and athletic trainers on drug and supplement use at all levels of competition. Further, pharmacists can develop or participate in educational and rehabilitation programs for athletes that seek assistance or who have been referred due to a positive drug test [9].

Great caution must be exercised particularly when advising on the use of dietary supplements. There are sample opportunities for pharmacists to participate in other aspects of doping control as well. Athletes commonly use dietary supplements and other substances that have the potential to improve their performance. Due to the pressure and desire to win at any and all costs, some athletes turn to banned substances as well[10].

Pharmacists have many opportunities to provide care in this arena: counseling and advising athlete-patients, consulting with or serving as resources for high school and college athletic programs, and providing information to coaches and trainers [11]. Pharmacists can play a key role in doping control and prevent athletes from inadvertently consuming banned substances.

CONCLUSION:

The roles for pharmacists have been emerging in the field of sports pharmacy, including doping control. With the proliferation of drug and dietary supplement use and abuse in sports, pharmacists can play key roles in deterring illicit drug use and in preventing the inadvertent use of banned substances by athletes.

The Sports Pharmacist, even not yet officially recognized specialty, has a vital role in promoting the prevention of doping.

The Sports Pharmacist should further promote environmental development, such as activities to improve awareness of doping among young athletes and the establishment of medical drug consultation services for athletes (female athletes in particular).

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VO_2MAX OF HIGH LEVEL ATHLETES IN THE GYMNASTICS DISCIPLINES

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Key words: *Gymnastics, VO_2max, La, HR, test*

INTRODUCTION

The VO_2max test is the gold standard for determining the aerobic capacity of the athletes. Nevertheless in the gymnastics disciplines the anaerobic power is the predominant regime of energy supply [7; 8; 12; 13]. Gymnastics has been developed and has been changed few times since its appearance. New gymnastics disciplines have been formed and gymnastics family nowadays covers more than 7 disciplines. All of them have similar kinematic features but different dynamic structure. Artistic for example is the most demanding disciplines and also the precursor of the others. Acrobatics gymnastics attract with difficulty and spectacularity; rhythmic and aesthetic gymnastics with their beauty and femininity; aerobic with its dynamics and etc. The short timing of the competitive program (routine) and the intensity of the exercises performed for 1,30 to 2,45 minutes reflect to the following adaptation response in the athlete's body: HR at the end of the routine above 190 b/min and blood lactate concentration up to 9 mmol/L – in rhythmic gymnastics [7]; HR – between 180 to 190 b/min [15] and La – up to 11,6 mmol/L [20] – in aerobic gymnastics; HR 183-199 b/min, VO_2 33-44 ml/min/kg and La 7-9 mmol/L in the floor routine in artistic gymnastics [14]. There is theory which claims that aerobic endurance is the base on which the specific one is build [18] and also aerobic power in gymnastics is one of the important determinants of successful performance [3]. Other authors consider aerobic power as not the most significant and they will develop it through anaerobic work [12]. However the VO_2max of international gymnasts reported for the last 5 decades varies around 50 ml/min/kg [13] and haven't been changed although the increase of the difficulty and the intensity of the gymnastics routines.

The aim of this study is to measure and compare the gymnast's cardiovascular fitness and aerobic endurance in competitors from different disciplines as rhythmic, acrobatic, aerobic and aesthetic group gymnastics.

METHODS

A total of 60 high level athletes (14-19 years; average – 15,5±1,83) in 4 gymnastics disciplines (rhythmic; acrobatic – male and female; aerobic and aesthetic gymnastics) were tested. Each group (discipline) was comprised by 12 athletes (female), for acrobatics both males and females were tested (24 in total). A written consent was obtained from all subjects. The investigation took place during the preparation period. All subjects had their individual training regime.

VO_2max test was conducted with modified "Balke for Children – Athlete" [21] treadmill protocol. The speed of the belt during the test was constant – 8,4 km/h, the incline was increased with 0,6° (starting from 0°) every 30 sec until inability of the athlete to keep the pace. The choice of the test protocol – constant speed with load increments through increasing the incline of the treadmill was designed considering the subjects' age (14-18 years). Expired gas exchange was monitored during the test "breath by breath" by Oxicon Pro (Yaeger, Germany). Heart rate was recorded by POLAR RCX3 heart rate monitor. Blood samples were taken from fingertip to assess blood lactate concentration at rest and on the 3rd, 5th and the 9th min during the 10 min recovery period using an Accutrend Plus (Roche) lactate analyzer. The start of the laboratory test was preceded by a three minute light warm up.

STATISTICS

Descriptive statistics was used to characterize the metabolic demand at the treadmill test for each gymnastics discipline. Values were means and standard deviation (SD), range, minimum and maximal value of the group. The ANOVA was used to identify any differences between the gymnastics disciplines completing the maximal test. When significant main effects were found, a post hoc Tukey HSD multiple comparisons test was applied to determine the cell-to-cell differences. The level of significance of $p \leq 0.05$ was adopted in all cases.

RESULTS

Table 1. Physical characteristics of the different gymnastics disciplines groups (mean ± SD)

Discipline	Age (years)	Height (cm)	Body mass (kg)	BMI	Body fat (%)
Rhythmic Gymnasts	15,8 (±2,1)	160,3 (±8,4)*	46,7 (±8,1)*	18,1 (±1,8)*	12,9 (±5,0)
Aesthetic Group Gymnasts	16,0 (±2,3)	159,8 (±3,8)*	49,0 (±5,9)*	19,2 (±1,7)	15,6 (±6,1)
Aerobic Gymnasts	14,7 (±1,4)	162,0 (±4,1)	53,4 (±7,0)	20,4 (±2,5)	15,0 (±4,9)
Acrobat Gymnasts – Female	15,5 (±1,8)	159,2 (±7,4)*	47,8 (±8,3)*	18,8 (±1,9)*	14,7 (±4,6)
Acrobat Gymnasts – Male	15,6 (±1,4)	168,9 (±9,8)**	61,4 (±11,9)**	21,3 (±2,4) **	11,0 (±3,0)
All disciplines (average)	15,5 (±1,8)	162,0 (±7,8)	51,7 (±9,8)	19,5 (±2,3)	13,8 (±4,9)
p < 0,05 significant difference between the groups (ANOVA) * lowest of the groups ** highest of the groups	-	Post-hoc ACM > RG; AGG; ACF	Post-hoc ACM > RG; AGG; ACF	Post-hoc ACM > RG; ACF	-

RG – rhythmic gymnastics; AGG – aesthetic group gymnastics; AE – aerobic gymnastics; ACF – acrobatic gymnastics female; ACM – acrobatic gymnastics male

The average body mass index (BMI) of the gymnasts was 19,5 ± 2,3. Looking at the different gymnastics disciplines the values are: RG (rhythmic gymnastics) – 18,1; AGG (aesthetic group gymnastics) – 19,2; AE (aerobic gymnastics) – 20,4; ACF (acrobatic gymnastics female) – 18,8 and ACM (acrobatic gymnastics male) – 21,3. The difference between the groups (α – 0,003) was found between male acrobat gymnast (with their higher values) compare to the RG and female acrobat gymnast. The body weight of the girls from RG, AGG and ACF was significantly lower (46,7 – 49 kg) than the male acrobats (61,4 kg). The height of the boys also was higher compare to the female groups. Body fat mass varied from 11% for the boys to 15,6% for the girls.

The VO_2max of the tested groups reached values from 43,1 to 50,9 ml/min/kg. The best values are achieved by the AE gymnasts (50,9 ml/min/kg) followed by the RG girls (50 ml/min/kg) and the male ACM gymnasts (48,7 ml/min/kg) which shows similar result. The significantly (α – 0,004) lower values from 43 ml/min/kg were recorded from AGG and ACF. The difference found is between them compare to AE group.

The maximal HR values at the end of the maximal load were average 198 b/min for all gymnastics disciplines. Significant difference wasn't found although RG and ACM reached the zone above 201 b/min compare to the ACF with 194,3 b/min and AGG and AE with 196 b/min. This values represent the 96,8% from the gymnasts theoretical maximal heart rate. Blood La concentration caused by the maximal muscle effort went up to 12 mmol/L (ACM). Similar results were achieved by RG (11,3 mmol/L) and AGG (11,2 mmol/L) followed by the ACF (10,8) mmol/L. The lowest values which had significant difference with the male group are recorded by the AE gymnasts – 9,3 mmol/L.

The average duration of the maximal test was 8,5 min. The best result was achieved by the male acrobat group (9,6 min) and the aerobic gymnastics group (9,5 min). There is significant difference between

them and the female acrobat group with duration of the test of 6,8 min. RG and AGG groups lasted for 8,2 – 8,4 min of the increasing load. The incline of the treadmill at the end of the test was between 8° to 11,1° depending of the duration of the running.

Table 2. Results from the maximal treadmill test (means ± SD)

Discipline	t max (min)	HR max (b/min)	VO2 max (ml/kg/min)	La max (mmol/L)
Rhythmic Gymnasts	8,2 (±1,7)	201,8 (±7,0)	50,0 (±4,2)	11,3 (±1,5)
Aesthetic Group Gymnasts	8,4 (±1,8)	196,6 (±6,6)	43,2 (±8,6) *	11,2 (±1,8)
Aerobic Gymnasts	9,5 (±1,4)	196,2 (±7,9)	50,9 (±5,0) **	9,3 (±2,5) *
Acrobat Gymnasts – Female	6,8 (±1,8) *	194,3 (±5,1)	43,1 (±6,3) *	10,8 (±1,8)
Acrobat Gymnasts – Male	9,6 (±1,9) **	201,3 (±7,1)	48,7 (±6,2)	12,0 (±2,1) **
All disciplines (average)	8,5 (±2,0)	198,0 (±7,2)	47,2 (±6,9)	10,9 (±2,1)
p < 0,05 significant difference between the groups (ANOVA) * lowest of the groups/** highest of the groups	Post-hoc ACM > ACF	-	Post-hoc AE > AGG; ACF	Post-hoc ACM > AE

The values of the gymnasts' selected parameters reached at the point of Respiratory Exchange Ratio = 1 (RER=1) are summarized in table 3. It is assumed that beyond that point the anaerobic metabolism is greatly activated.

Table 3. Selected parameters (mean ± SD) at Respiratory Exchange Ratio=1 (RER=1)

Discipline	Incline (degrees)	HR (b/min)	VO2 (ml/kg/min)	VE (L)	% of the maximum at RER = 1
Rhythmic Gymnasts	5,4 (±3,1) *	187,3 (±10,6)	43,4 (±6,0)	63,1 (±10,5) *	86,5%
Aesthetic Group Gymnasts	7,6 (±2,2)	190,3 (±8,0)	40,2 (±9,4)	69,3 (±16,5) *	92,4%
Aerobic Gymnasts	8,7 (±2,6) **	187,9 (±9,3)	48,2 (±6,4)	78,5 (±11,9)	96,6%
Acrobat Gymnasts – Female	6,1 (±2,4)	186,3 (±9,0)	40,7 (±6,5)	66,1 (±10,7) *	94,5%
Acrobat Gymnasts – Male	8,4 (±2,7) **	192,6 (±13,7)	44,3 (±10,9)	89,6 (±19,0) **	89,8%
All disciplines (average)	7,2 (±2,9)	188,9 (±10,2)	43,4 (±8,3)	73,0 (±16,8)	91,6 (±9,3)
p < 0,05 significant difference between the groups (ANOVA) * lowest of the groups ** highest of the groups	Post-hoc AE; ACM > RG	-	-	Post-hoc ACM > RG; AGG; ACF	-

DISCUSSION

The BMI of the gymnasts in this study was in the normal range of the index (Table 1.). In the past it was likely to find female gymnasts in the underweight zone while nowadays the tendency has changed [1]. The RG girls have always had lower values and they still have, compared to the other disciplines and they are the only group beneath the zone of normal weight. Previous data for BMI of 19,1 ± 2,1 kg/m^2 [10] about the body index of aesthetic group gymnasts (aged 18,1 ± 1,8) are in agreement with our results. Previous researches report BMI values in aerobic gymnastics of 19,0 [3] which is lower than our result. Anthropometric testing in trampoline [19] conducted during the 2004 European Championship presented BMI values of – 19,81-21,31 for the women and 21,45-22,31 for the men. Body fat measured

in the tested gymnasts is in the norm for the athletes. However gymnastics is a sport where body shape and structure is also taken into consideration and reflects on the sport result. Low percent of body fat mass is preferable.

Table 4. Previously reported values of VO_2max of the gymnasts (literature review)

Author (year)	Age group	Number of subjects	Gymnastics discipline	Elite/non elite	VO2max ml/kg/min
Guideri et al. (2000)	13-16	9	Rhythmic	elite	52.7
Baldari et al. (2001)	13-16	12	Rhythmic	elite	51.7 ± 4.4
Douda et al. (2008)	13,4	15	Rhythmic	[a] – elite	54.81 ± 2.64 [a]
		19		[b] – non elite	45.10 ± 4.21 [b]
Gateva et al. (2010)	18,5	8	Aesthetic	national team	42,5
Savchin (2003)	10-11	16	Artistic		55,3 ± 4,0
	12-13	12			53,0 ± 4,2
	14-15	10			50,3 ± 5,1
	17-21	8			47,1 ± 3,9
Marina et al. (2014)	13,5	8	Artistic	elite	47.90 ± 4.03
Sawczyn et al. (2007)	13-17	19	Artistic		46.3 – 63.9
Jemni et al. (2006)	18,5-22,6		Artistic	elite & non elite	48.64 ± 4.63
Righetti et al. (2004)	-	7	Aerobics	national team	51.7 ± 3.5

The aerobic fitness level of the gymnasts didn't reach the highest values of athletes from other sports. Most of the elite endurance athletes have VO_2max values excessing 60 ml/kg/min [4]. In gymnastics as predominant anaerobic regime of work highest values of the aerobic power in their best are slightly above 50 ml/kg/min. Values we had measured in this research varied in the range from 43,1 to 50,9 ml/kg/min. All other results we found in the literature for gymnastics are similar [2; 3; 12; 14; 18] (see table 4).

Although the increase of the intensity and difficulty of the routine (for the last 30 years) the competitive gymnastics doesn't cause any higher demands towards the aerobic capacity of the gymnasts [13]. Changes do not reflect to development of better aerobic power and this still is not a limitation in the further development of the gymnastics disciplines. Looking at the aerobic capacity (table 2) the two highest results are achieved by the aerobic and the rhythmic gymnasts. Aerobics is very dynamic and intensive discipline that explain better aerobic power compare to the rest of the disciplines. Rhythmic gymnastics is known with very long training hours spent in the gym – up to 8 hours per day and lots of repetition of the competitive routine in every training [7]. This type of training increases the aerobic capacity of the athletes and most likely that it is the reason for the higher score in VO_2max for RG group. Surprisingly acrobat male gymnasts ranked on 3rd place (after AG and RG groups). In this test male acrobatic gymnasts have been the only male group and that's is why most of the cases there are significant differences between the groups based on their gender. But looking at the maximal oxygen consumption of the male group the results are lower than expected. Acrobatics is comprised by three routines – balance, dynamic and combine. In the balance combination ¾ of the routine is in a static position (pyramids, handstands, different configurations, etc.). In the dynamic routine ½ of it includes elements and the rest is choreography. Based on the rules (Code of Points) the routines are characterized with extreme static power. Also in preparation period full routines are not implemented and during the competitive period the number of executed routines are not as much as in rhythmic gymnastics. Considering these specifics we can explain the VO_2max results for both acrobatics groups. The results

achieved in this research by the aesthetics group gymnasts (VO_2max – 43,3 ml/kg/min) are identical with previous study in that sport where the aerobic capacity of the gymnasts is average 42,5 ml/kg/min [9]. Both times the test is done with the Bulgarian national AGG team which represent one of the best team in that sport worldwide. Although aesthetic and rhythmic gymnastics have lots of similarities [6] such as the background of the gymnast and the coaches (all are coming from rhythmic gymnastics) and the kinematics structure of the elements there is difference of the fitness level of the girls. In the study found in the literature VO_2max values of the aesthetic gymnasts are lower compared to the rhythmic and artistic gymnasts [8]. We assume the difference is based on the volume of the training load which is much more in rhythmic compare to the aesthetic group gymnastics. We haven't found in the literature any research in acrobatics gymnastics on that topic.

Table 5. Summary table and ranking from the maximal treadmill test

	RG	AGG	AE	ACF	ACM	mean	from-to
HR max	201,8	196,6	196,2	194,3	201,3	198,0	196,2 – 201,8
VO2 kg	50,0	43,2	50,9	43,1	48,7	47,2	43,1 – 50,9
La	11,3	11,2	9,3	10,8	12,0	10,9	9,3 – 12
t (max)	8,2	8,4	9,5	6,8	9,6	8,5	6,8 – 9,6
Ranking	II-III	IV-V	I	IV-V	II-III		

According to the duration of the maximal test aerobics gymnasts and acrobatic male gymnasts lasted longer (close to 10 min) than the other groups. Heart rate mobilization of the rhythmic gymnasts and the acrobat male gymnasts is higher – average of 201,8 b/min and 201,3 b/min respectively . Highest La values are reported on male acrobat group which showed significant activation of the anaerobic energy metabolism. Based on all parameters we can create a ranking of the groups for their aerobic capacity. As maximal oxygen consumption and duration are most informative they have bigger contribution when determine the positions. Best aerobic fitness level is achieved by the aerobic gymnastics group, followed by the rhythmic gymnasts and the male acrobat gymnasts. Fourth place is taken by the aesthetic gymnasts and with lowest results in this research is the acrobat female group.

CONCLUSIONS

VO_2max varied from 43,1 to 50,9 ml/min/kg which determined the aerobic power of the tested gymnastics disciplines as average. Based on parameters from the maximal test the fitness level of the gymnasts from different disciplines can be divided in two group: the aerobic, rhythmic and male acrobat gymnasts showed similar results, better than the aesthetic and female acrobat gymnast, who demonstrated significantly lower values. The aerobic gymnastics is the discipline which shows greater aerobic power considering all indicators in the study.

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APPLIED KINESIOLOGY AS A NEW METHOD FOR STABILIZATION OF THE MUSCULOSKELETAL SYSTEM IN SPORTS

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Applied kinesiology – the direction of sports rehabilitation, optimizing the body of the athlete to the training-competitive activity by adapting his body to external factors (physical activity, emotional stress, biochemical disturbances), and maximizes the use of reserve possibilities of an athlete due to the formation constant biofeedback with his organism.

The novelty of the method lies in the fact that the proposed evaluation of the reflex activity of the nervous system (reflex motion) in the course of sports load (manual muscle testing). Evaluation of the activity of reflex movements used in applied kinesiology as biofeedback with the organism. It makes possible to estimate the reflex activity of the nervous system to identify violations of the optimal function of the musculoskeletal system, internal organs, metabolic processes, and emotional energy balance directly performed during training-competitive activity and an entirely new use of rehabilitation measures.

Athlete on the team is constantly under the supervision of experts who evaluate the levels of training, performance, health status, presence of injuries and sprains. Negative dynamics of this process makes the coaching staff to seek advice and diagnosis to the doctors. Dynamic observation in different seasons reveals a weak link in the body of the athlete, inhibiting further growth of its professional expertise.

In order to assess how the body is adapted to the athlete's training-competitive activity, it is necessary to dynamically evaluate the ability of the nervous system under load to adequately respond to the physical, chemical and emotional impact. Diagnostic engine reflex response of the nervous system is the basis of applied kinesiology. When this activity is estimated reflexes specific muscle movement during the action performed (manual muscle testing). By reducing the activity of reflex movement (by the method of biofeedback) is determined by the cause (or group of causes) of violations, then select the method of correction, and finally, the technique of re-education in the framework of sports training, as well as specific measures to optimize the running of professional movements in accordance with the objectives of a particular sport.

THE BASE OF METHOD

Evaluation of the reflex activity of the nervous system (reflex motion) in the course of sports load (manual muscle testing), which is used as a method of biofeedback with the body to detect violations of suboptimal function of the musculoskeletal system and related systems, selection and use of chosen method of rehabilitation, and retraining to enable the restored muscle to perform movements.

In clinical rehabilitation using neurological evaluation **reflex rest** (kick neurological hammer on the tendon of the muscles attached to it), which allows us to estimate the impulse conduction along nerve pathways. In Applied Kinesiology estimated **reflex movements** (hand assessment of reflex capacity of the nervous system in terms of the load adequately respond to mechanical, chemical and emotional impact). This has important implications for sports rehabilitation, as measured response of the nervous system is not at rest and during stress. In addition, the analyzes do not total jerk all the muscles that have a common place of attachment, as a reflex of each muscle separately, which allows you to instantly identify the defect in the specific muscles involved in a particular movement to establish the cause, as well as to identify the optimal method of recovery. Practical important that the method does not require expensive equipment and can be used in field conditions.

In this regard, it is useful to distinguish between assessment reflex rest, which has been adopted in Neurology (to assess cardiac conduction along the nerve impulse) and reflex movements used in kinesiology, aimed at assessing and expanding adaptation of the organism to a specific athlete given load at a particular time in a particular place . In addition, neurology, estimating activity reflex by stretching the muscle tendon, analyzes the total reflex reaction of all the muscles that attach to this ligament-tendon complex. While applied kinesiology using the special position of the body of the athlete, to evaluate each of the reflex motion of the muscles, are woven into this complex.

Method of assessing reflexes movement (manual muscle testing) is based on the laws of the neurophysiology of muscle contraction, developed by prof. N. A. Bernstein (1946), which identified two phases of muscle contraction: phasic (arbitrary) and tonic (under the control of proprioceptors and interceptors). And also on the positions of the reflex muscle relationship with other organs and systems (prof. M. R. Mogendovich, 1950), who developed the system visceral-motor and motor-visceral reflexes.

In the practice of medical rehabilitation applied kinesiology used with 1966. (G. Goodheard, USA), and in the rehabilitation of athletes from the 80s (D. Leaf, USA). Somewhat later (since 1991), applied kinesiology began to be used in Russia and now the country is widely used in the practice of different specialists.

Using assessment practices reflexes motion allows to enter the true causes of reduced contractility, extensibility, endurance, muscle excitability, as a result of violations of adaptation to external influences (physical exercise, emotional stress, biochemical disturbances) and differential diagnosis of the causes and consequences of sports injuries between compression nerve adhesion process, pathological activity visceral-motor and motor-dermatology reflexes.

Decrease in excitability and hypotension particular muscle leads to a compensatory static and dynamic overload of other muscles, located in different regions of the musculoskeletal system that is clinically manifested their spasm and shortening. Without the use of manual muscle testing all the attention is directed to a rehabilitation correction spasm and shortened muscles without seeking the causes of the violation, namely localization hypotonic and hypo-excitable muscle. Pathophysiological basis of muscle testing significantly increases the effect of the rehabilitation of an athlete and makes complex activities more efficient.

STAGES APPLIED KINESIOLOGY: KINESIOLOGY DIAGNOSIS; CORRECTION; REHABILITATION

Applied kinesiology enables: identify the ***location of the weakest link*** of the musculoskeletal system; ***determine the cause*** of hypo-excitable and hypotonic muscles in founded weak link; pick up and ***use the method of rehabilitation***, which can eliminate the identification of the causes; and, finally, ***to restore optimal movement***, actively, including the restored muscle tone and excitability in motor acts, which make the most of the athletes in their sports activities. This approach enables maximize the possibility of athlete.

Kinesiology diagnosis – directed search localization weakest link of the musculoskeletal system - namely, the localization of hypo-excitable and hypotonic muscles, which caused tonic-force muscle imbalance of the musculoskeletal system as a whole through the use of special loads in the dynamics of athletic training. For this purpose, it uses visual diagnostics violation optimality of statics and dynamics, combined with manual muscle testing and the use of mechanical, chemical, emotional provocation.

Kinesiology correction – is aimed at determining the cause hypo-excitable and hypotonic muscles weak link in the results, to diagnose the level of damage to the nervous system: peripheral, segmental, central, or the result of pathological activity visceral-motor reflexes and others. Moreover, under the control of manual muscle testing is determined by that method rehabilitation, which can eliminate the identified cause of restoring excitability and muscle tone test. At the same time, using all kinds of manual exposure (massage, chiropractic, visceral therapy, cranial-sacral therapy), the methods of emotional recovery, biochemical correction (homeopathy), energy balance (reflexology), determining the

need for their use under mandatory supervision manual muscle testing, i.e. uses the group of methods that reduce the activity of the reduced reflex motion diagnosed muscle.

Kinesiology rehabilitation – aims to integrate the muscle with restored excitability and tone of motor acts in those who make the most of the athletes in their sports activities. Made retraining movement patterns from simple motor acts, in which the affected muscle should participate to the complex dynamic and static patterns (walking, running, individual sports rack, jumping). This approach maximizes the use of reserve possibilities of athlete`s organism and optimize it to the training-competitive activities.

CONCLUSION

The greatest value of applied kinesiology is not only the possibility of manual testing to reduce the activity of reflex movements, but also the use in this assessment of biofeedback for the selection method of rehabilitation, reducing the reflex activity of the muscles to improve athletic performance reserves individually for a particular athlete.

Options for Applied Kinesiology can be used in complex rehabilitation of athletes of any sport in the field in the form of mono-rehabilitation as components of comprehensive rehabilitation.

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MEASUREMENT OF SCAPULAR UPWARD ROTATION IN PAINFUL SHOULDERS AS A DIAGNOSTIC METOD

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Keywords: *shoulder joint, scapula, upward rotation, pain*

INTRODUCTION

Pain and dysfunction in the shoulder joint is one of the most common health problems related to work, household activities and sports. Many workers throughout the European Union (EU) during long part of their working time performed numerous repeated movements with the upper limb and hand.

During 2011/12 only in Great Britain 177,000 people who have worked in the last year have suffered from dysfunction of the upper limb or neck. [7]

Pain in the shoulder joint is often associated with altered scapular kinematics. Such impairments change the normal biomechanics of the shoulder and cause painful symptoms of mechanical compression of the tendon structures and other soft tissue in the shoulder joint and can develop various dysfunctions of the shoulder as glenohumeral instability, impingement syndrome and rotator cuff injuries.

Normal movements of the scapula in the scapulothoracic joint are essential for the proper function of the shoulder joint (glenohumeral joint) [4]

Often, the functional assessment of the shoulder joint with painful symptoms does not include the measurement of the upward rotation of the scapula. We should pay attention on the scapula assessment, simultaneously with glenohumeral joint.

Knowledge of how the scapula position changes will help us develop rehabilitation programs for recovery from dysfunction in the shoulder girdle. The aim of this study is to describe the measurement of upward rotation of the scapula in patients with painful shoulder.

METHODS

Authors worldwide have analyzed several methods for measuring the position of the scapula. Most of them are measured the scapula in static position. Very few of them have measured the movement of scapula simultaneously with elevation of the humerus. [2]

The methodology of the measurement of upward rotation of the scapula at the painful shoulder joint was described for the first time in Bulgarian scientific literature.

Clinical measurement of upward rotation of the scapula has an important role in the diagnosis of problems in shoulder joint, the treatment and prevention of dysfunctions in the shoulder girdle.

During 31.01.2014- 30.06.2014 year were assessed 26 participants with pain in the shoulder joint, middle-aged 48.7 years.

Participants were selected according to specific criteria that exclude congenital deformity of the scapula and chest, after fractural conditions, dislocations, subluxations, neuromuscular diseases and were aged 18 up to 68 years. All patients were questioned about exclusion criteria, explained the purpose of the study and informed about proper behavior during the procedure.

Upward rotation of the scapula is accompanied by elevation of the humerus. Elevation of the humerus was measured with a standard device (goniometer) and fixed degrees are marked with the patch.

The measurement of the upward rotation was recorded using a digital inclinometer (Fig.1) at the painful shoulder and also at the asymptomatic shoulder during 30 °, 60 °, 90 ° and 120 ° range of elevation in the shoulder joint in the scapular plane.

Fig. 1. Digital inclinometer with bubble level

Bone landmarks were: Posterolateral acromion along the crest of the scapula to its end. Every test was made several times depending on the body characteristics of the each participant. (Fig.2a and 2b)

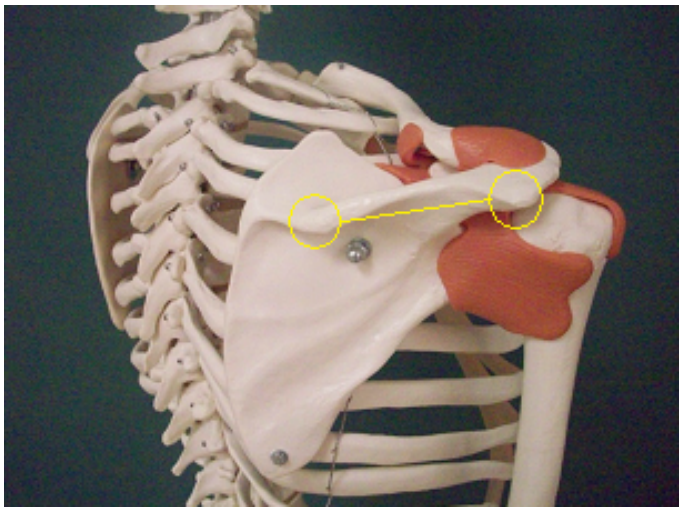

Fig. 2a Landmarks: Posterolateral acromion - Root of scapular spine [5]

Fig. 2b Landmarks on skin

The measurement was made in standing position of the patient. The hand was placed in a static position of the upper limb of the marked degree of movement and the measurement was made by one researcher, in order to avoid differences of working style of any other researcher. The device was placed along to spine of the scapula. (Fig.3) Every participant elevated her/his humerus to each level and held the arm for a few seconds. (Fig.4)

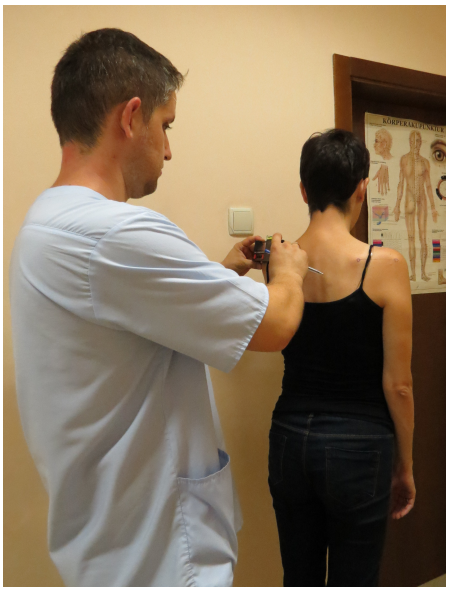

Fig. 3. Placement of the digital inclinometer for upward rotation measurements in the scapular plane.

Fig. 4 Humeral elevation at 30 °, 60 °, 90 ° and 120 °

RESULTS

The results were processed through IBM SPSS Statistics 19 program, using: variation analysis, statistical hypothesis testing, which includes Student's t-distribution for unrelated groups, correlation analysis, which includes biserial correlation coefficient [1].

Table 1. Statistical and practical dependence between subjective complaints and variables of the test movements

	Humeral elevation	w/ pain			Statistical parameters				w/o pain		
Studied sign		Upward rotation (°)									
Pain in left Shoulder Joint		n	$\bar{X}$	S2	t	P(t)	d	r_{pb}	n	$\bar{X}$	S1
	30°	8	4,51	3,69	1,03	68,46	1,06	0,205	18	3,45	1,6
	60°	8	8,7	4,84	2,26	96,66	3,27	0,419	18	5,43	2,59
	90°	8	18,9	5,24	4,30	99,98	8,00	0,660	18	10,9	3,97
	120°	8	33,65	8,85	4,07	99,96	12,35	0,639	18	21,3	6,33

Note: t(a-0.05) = 2.06

The group with painful left shoulder joint was with average values of scapular upward rotation at 30 °, 60 °, 90 ° and 120 °, respectively 4,5 °; 8,7 °; 18,9 °; 33,65 °. The group with asymptomatic left shoulder joint was with average values of scapular upward rotation in the same starting positions - respectively 3,45 °; 5,43 °; 10,9 °; 21,3 °. The differences between the two groups (d) are statistically significant in the tests of the initial position 60 °, 90 ° and 120 ° degrees, because the t-distribution is greater than the critical value of 2.06 (respectively 2.26, 4,3, 4,07) and guaranteed probability over 95%. The value of biserial coefficient (r_{pb}) for three tests is over 0.40 respectively 0.42; 0.66; 0.64 and that indicate the belonging to groups "pain" and "no pain" influence the studied sign – scapular upward rotation with elevation of the humerus (60, 90 and 120 degrees).

DISCUSSION

Scapula asymmetry has been associated with shoulder pathology by numerous researchers. According to analysis of several studies upward rotation of the scapula in patients with impingement syndrome

was decreased, according to others was increased and according the third it remains unchanged compared to the control group. [3]

We found that pain in shoulder joint increases scapular upward rotation. Probable causes for increased upward rotation of the scapula is existing dysfunction in the shoulder joint and is probably a compensatory mechanism to reduce pain in the shoulder joint.

However, it is important to emphasise that only scapular upward rotation was examined in this study. Other motions of the scapula are also very important to examine.

Further measurements would help to clarify the reason of increased upward rotation of the scapula and involvement of the muscles around the shoulder as m.trapezius, m. levator scapulae, m. romboids and serratus anterior.

CONCLUSION

Measuremzent of upward rotation using digital inclinometer is reliable procedure and provides important information about positional changes of scapula in painful shoulders. This will help to develop rehabilitation programs for recovery from dysfunction in the shoulder girdle.

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DETAILED FUNCTIONAL DIAGNOSTIC IN LUMBAR LORDOSIS THROUGH HAMSTRING LENGTH TEST

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INTRODUCTION

Postural disorders of the spine are significantly prevalent among children. A large percentage of them are in the sagittal and localization in lumbar spine [1, 4, 5]. In last years, our research found that the functional lordosis is not predominantly a feature of female children. Establishment concerns also in adolescent males. Early and detailed functional diagnostics of lordosis will help to precise programming of physiotherapy. This is the rationale for our study.

THE PURPOSE OF THE STUDY is to precise the functional diagnostic of the lumbar lordosis in children at primary classes through applying the Hamstring length test.

MATERIAL AND METHODS

The screening examination involves 83 children with the average age 8, 7 from II and III classes at the School "Iordan Iovkov" – Sofia. Of which are 42 girls and 41 boys. The investigation is implemented in 2012, October – December.

First is evaluated the lower back in the sagittal plane for the presence of excessive lordosis. To be continued with the test in standing position for determining the type of lordosis. Finally, is assessed the length and elasticity of the hamstring in supine position. Both lower limbs are examined.

All children registering with present: surgery; pulmonary disorders; infectious diseases; cardiovascular disease, scars, congenital anomalies and more.

TESTS

1. Inspection

From starting position standing with heels brought together, fingers pointing outward, knees are extended and upper limbs are freely granted to the body. Body and head are in the normal upright position without the additional stress of back and abdominal muscles. Inspection is applied from the front, side and rear. [4, 9]

2. Functional test determining the type of Lordosis

Initial position is standing. When running the test the leg of the evaluated patient is placed in 90° flexion in the hip and knee and holds this position for a few seconds. Screen whether lordosis by hip flexion is flattened. If the arch smoothes define as functional lordosis, if does not - structural lordosis (**Fig. 1**). The test is performed consecutively with both lower limbs. [9]

3. Hamstrings Length Test

The evaluated is placed in supine position. Head, trunk and upper extremities are relaxed. Contralateral pelvis stabilized. Passive flexion is performed in hip joint while maintaining extension in the knee joint. Ankle joint is in neutral position. With goniometer flexion is measured achieved only in hip joint without compensation or replacement movements such as flexion in the knee joint or contralateral limb. Norm is reaching 80° flexion in hip joint. [4, 7, 9] (**Fig. 2**).

Fig. 1

Fig. 2

RESULTS

During the inspection have distinguished two groups of children – by the presence of lordosis 21 (25.30%) out of 83 children without spinal curvature 20 (24.09 %)

Results of inspections for children with lordosis are confirmed by tests to determine the type of lordosis.

Hamstring elasticity is indicative of 20 (95%) of children with lordosis, where the average is 61,1° with a maximum value 75° and 45° minimum. Unlike children lordosis in the group of healthy children only 10 (50%) were identified with the shortened hamstring. The average value is 75 ° with 60° at the minimum and a maximum – 90 ° (**Fig. 3**)

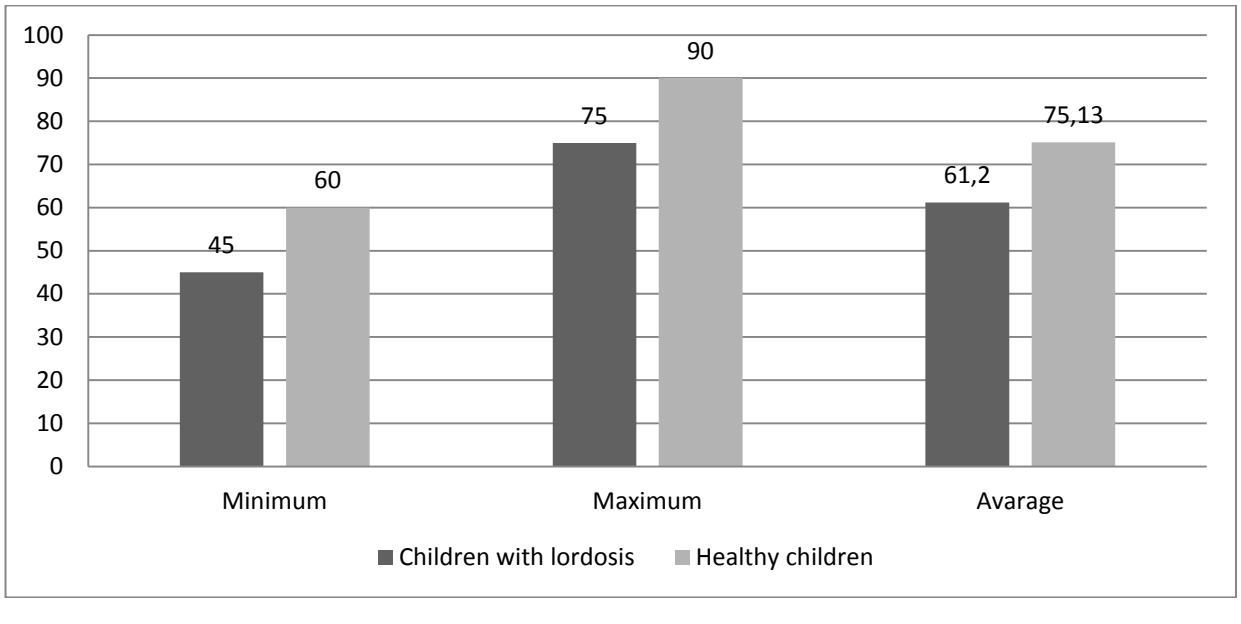

Fig. 3. Minimal, maximal and average values

Table 1. Variance on the average of the lower limbs in both groups of children

Index	N	Xmin	Xmax	R		S	V	As	Ex
Children with lordosis	21	45	75	30	61.19	7.89	12.9	-0.36	-0.3
Healthy children	20	60	90	30	75.33	11.13	14.8	0.03	0.8

Of variational analysis we can draw the following conclusions:

1. In children with lordosis values range from 45° to 75° in comparison with 60° to 90° in healthy children.
2. The study groups are sufficiently uniform performance hamstring test shortened muscles, as the coefficient of variation (V) is 12.9% for children with established functional lordosis and 14.8% of healthy children. Coefficients are close to those of highly homogeneous sample (Table 1).
3. Coefficients of skewness and kurtosis are, respectively, for children with lordosis and the As 0.36 Ex 0.3 at α = 0, 05 and healthy children - As0, 03 and Ex0, 8 at α = 0, 05 are below critical, which means that the criterion has a normal distribution [2].

A detailed look at the data, we make an analysis of the results in both lower limbs separately (Fig. 4). In children with lordosis find that 48% of asymmetry between the two lower limbs, while healthy children is 30%.

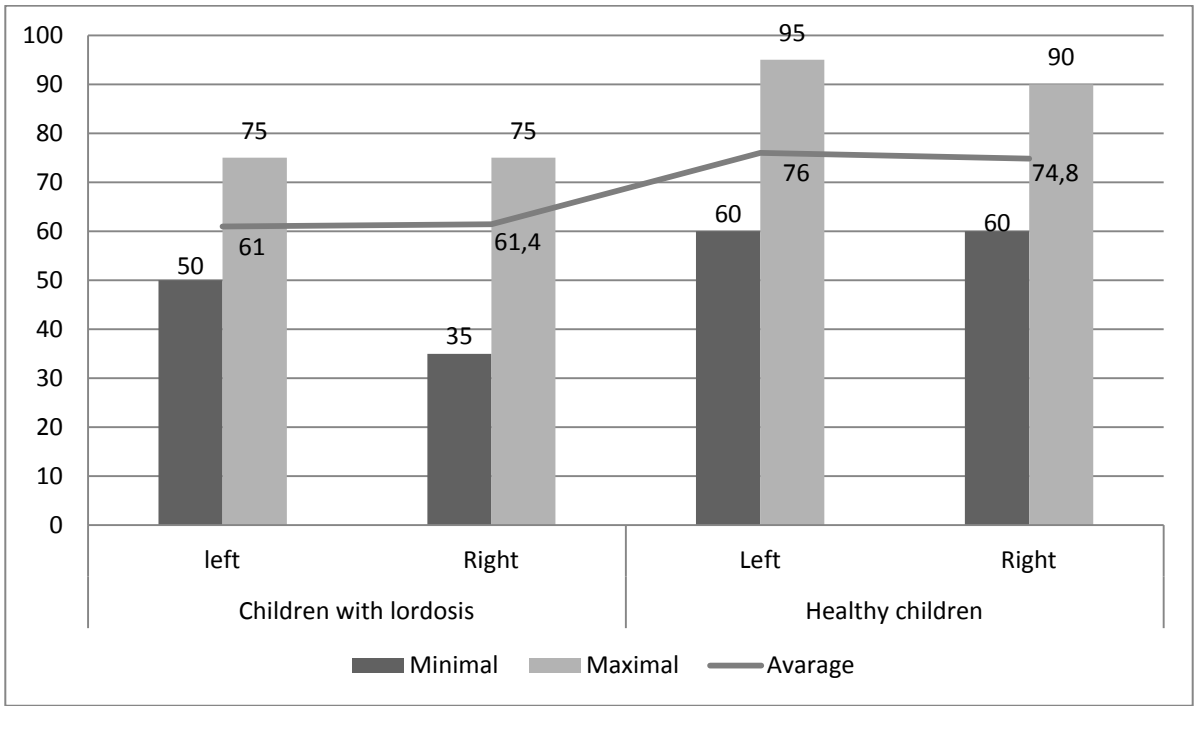

Fig. 4. Values for left and right lower limbs

Figure 4 shows that the average values of the group of children with functional lordosis for the left and right lower limbs below those of healthy children. Correspondingly: 61°; 61.42 ° in healthy children 76°; 74.8°.

There is a larger asymmetry between the minimum values of the left and right lower limb in children with lordosis, while healthy children the values are approximately equal.

By analyzing the correlation between the lordosis test and hamstring test is found that the critical value of the Pearson coefficient at n = 41 and a = 0.05 is equal to 0,343. Statistically there is a moderate cor-

relation between the two tests. This indicates that the results of one confirmed by other more specific information. Implementation tests are necessary to apply in time of lumbar functional diagnostics. The tests' results help to precise in preparing the physiotherapy program for children with functional lordosis.

DISCUSSION

The condition of the hamstring muscles is debatable ground in respect of lumbar lordosis [1, 5, 6, 7, 8]. There are not researches and literature about the problem. Consequently this study contributes to lay the foundations of precise functional assessment in lower back lordosis. The results confirm our assumption about the precision of assessment in children with lumbar lordosis using hamstring test. It is found that the test is significant positive in 95% of children with postural lordosis in the lumbar. Important contribution of our study is the demonstration of a significant asymmetry (15° in 48% of children with lordosis) between the two lower limb in the study. This, in turn, affects not only the position of the hips, but also in a kinetic chain affect the lower limbs, the other units of the spine and to retain the vicious models [3]. In respect of hamstring function emphasizes their important role to maintain the correct position of the pelvis in the sagittal plane. Therefore hamstring muscle should be studied children with postural lordosis and restored by targeted physiotherapy.

CONCLUSION

The hamstring length test dives the opportunity to specify the functional diagnostic of the children with lumbar lordosis. The data demonstrates the shortened muscles which is the mean reason for the imbalance and strain. This is contribution to develop and to apply the correct physiotherapy in lumbar lordosis.

Key words: children, hamstring, lordosis, physiotherapy

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PHYSIOTHERAPY FOR WOMEN WATER POLO PLAYERS WITH IMPINGEMENT SYNDROME

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Key words: impingement syndrome, Terrier's techniques, theraband.

INTRODUCTION

he most common shoulder injuries to water polo players are shoulder impingement, rotator cuff tears, bicipital tendonitis and labral injury [1].

The complaints in impingement syndrome include pain in the final area of abduction and external rotation of the arm, thus limiting the player's movements. This injury is common among water polo and other sports that involve repetitive overhead motions or throwing. During normal shoulder motion, the rotator cuff tendons and the subacromial bursa travel smoothly beneath the acromion in the space between the acromion and the head of the humerus bone. In shoulder impingement, the rotator cuff and bursa get pinched, or impinged, underneath the acromion during overhead activities, resulting in pain [10].

METHODOLOGY

The purpose of the study is to determine the effects of combined treatment of trigger points, fascial release techniques, Terrier's manipulative massage and theraband exercises on shoulder pain. The group of patients included women with middle age of 25, 4 years. 18 players with impingement syndrome have been studied. The players were tested at the beginning and at the end of the 2 months treatment course with a comprehensive test battery, including specialized tests for the shoulder area, an evaluation table for anterior shoulder instability Walch – Duplay (WD) [8]. and Athletic Shouder Outcome Rating Scale (ASORS) [8].

The goal of the physiotherapy is to maximum regenerate the possibilites of the shoulder joint for a participation in sport competitions and activities. The tasks of the physiotherapy are:

1. To reduce the symptoms of the pain .
2. To improve the strength of the muscles of the rotator cuff.
3. To regenerate the dynamic stabilization of the shoulder joint.
4. To improve the coordination and regenerate the technique of movement of the water polo player when throwing a ball with one hand.

The interval method was used for the training and the dozing was calculated depending on the repetitions made. The physiotherapy has been made for a month, 3 times per week conforming with the competitive calendar of the participants. We made a complex of 11 activities with teraband, which was made separately before the training for two months. The average duration of the course, which was assisted by a physiotherapist, was 12-15 procedures. The training period was two months.

A. Trigger points: First we find their location and point out the most sensitive place. Thereafter the muscle was stretched to produce a local discomfort at the trigger point. With the pad of the forefinger or thumb, the muscle is palpated to identify the localization of painful seal. All active trigger points apply 5-6 ischemic compressions which may be combined with twisting motion clockwise (for 5-10 sec.) .Combined with breaks of 12-15 seconds, perform rhythmic arc stretching of the muscle in both directions. Process consistently trigger points: m. trapezius pars descendens, m. infraspinatus and m. supraspinatus by stretching and squeezing.

B. Fascial release techniques are consistent with the following muscles: m.pectoralis major (**pic.1.a,b,c,d**); m. rectus abdominis (pic.2.a,b); m. dductor longus (**pic.3.a,b**) contralateral. he techniques are carried out simultaneously with both hands, one to another. Without losing contact the skin and fascia are pushed cranial by extention of fingers. At the end of the intervention the patient is asked to perform stretching [9]. The technique is carried out 3 to 5 times. C. J. Terrier's manipulative massage. We used maneuver A 2 for shoulder (**pic.4**), the first modification of maneuvers A 2 (**pic.5**), and the second modification of maneuvers A 2 (**pic.6**) [4]. .Techniques are performed 10-15 times.

D. Theraband exercises: We recommend 3 sets of 8-12 repetitions for each exercise. Initially, the exercises are done with 15 to 20 repetitions and then gradually increased to 25-30. If 25-30 repetitions are too easy to be accomplished, then the athlete should use a heavier resistance cord, increase the resistance by holding the cord closer to where it is attached, or stand further away from the attachment. The duration of our proposed complex for home training is about 20 minutes and it is performed before training. The most common rotator cuff exercises with stretch cords are internal and external rotation, arm abduction, and the internal rotation and horizontal adduction of the arms. Variety is important to ensure that all of the rotator cuff muscles are used

Rotator cuff exercises: internal/external rotation-elbow at side (**pic.7**), 90-degree internal/external rotation (**pic.9.a, b**), crossovers (**pic.10, 11**), lateral raise with internal rotation (**pic. 13. a, b**) .

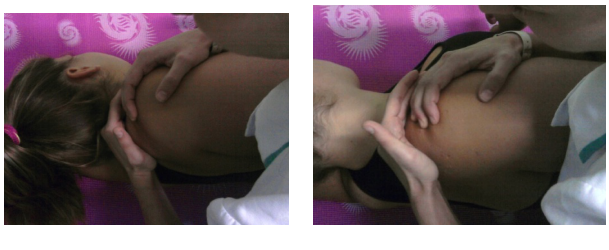
Scapula stabilizing exercises: Seated Row-Pull handle back to chest (**pic.16**), shoulder roll (**pic.14.a**, **b**), forward scapular punch (**pic.12.a, б**), scapular Push-ups (**pic.15**) [2].

Sport exercises – perform movements that imitate passes and shooting.

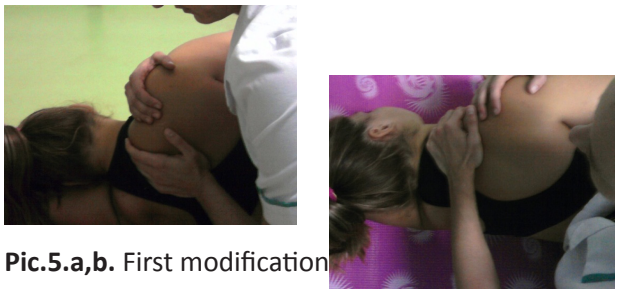
Pic.1 a,b,c,d. Fascial release techniques м. pectoralis major

Pic.2 a,b. Fascial release techniques rectus abdominis.

Pic.3 a,b. Fascial release techniques м. adductor longus

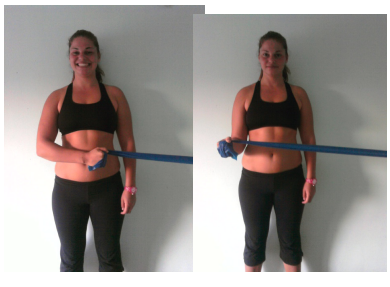


Pic.4.a, b. Maneuver A 2 for shoulder

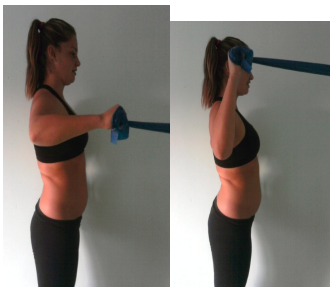


Pic.5.a,b. First modification

Pic.6.a, b. Second modification of maneuvers A 2

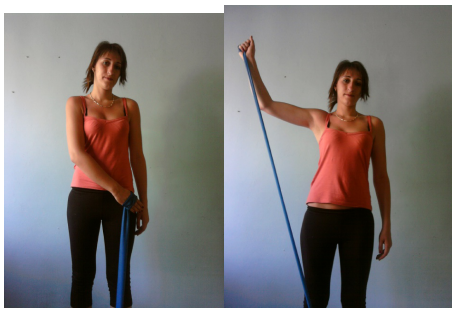


Pic.7.a, b. External rotation -elbow at side

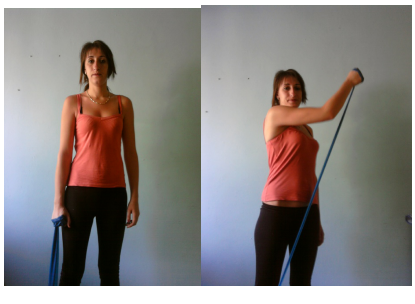


Pic.8.a, b. 90-degree **external rotation**

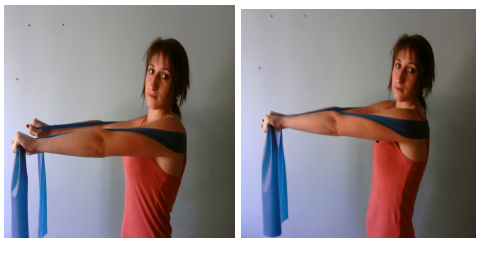
Pic.9 .a, b. 90-degree internal rotation Int. r



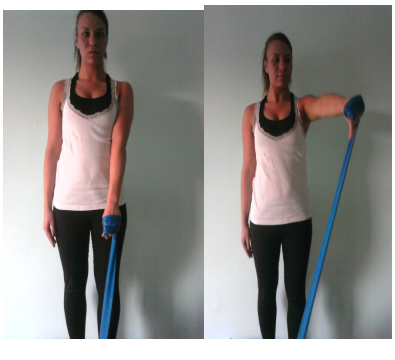
Pic.10 .a, b. Crossovers extension



Pic.11a, b. Crossovers flexion

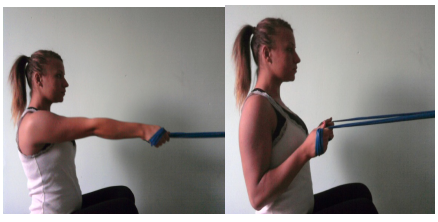


Pic.12.a, b. Forward scapular punch

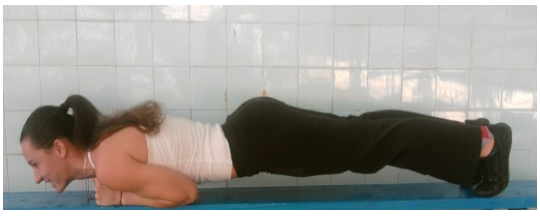


Pic.13. a, b. Lateral raise with internal rotation

Pic.14.a, b . Shoulder roll



Pic.16. Seated Row-Pull handle back to chest



Pic.15. a,b. Scapular Push-up

RESULTS

The results are given in **table 1** and **table 2**.

After the physiotheraphy program all of the studied patients showed improvements in the functional assessment of the shoulder joint on the scale of WD and ASORS .The results were statistically processed and are statistically significant.

Table 1. Shoulder instability scale Walch – Duplay (WD)

Walch-Duplay	n	$\bar{x}_1 \pm \sigma$	$\bar{x}_2 \pm \sigma$	$(\bar{x}_2 - \bar{x}_1)$
daily activities	18	14.16±3,53	24.44±2,35	10,28
stability	18	12,5±5,77	21,66±4,85	9,6
pain	18	11,38±7,63	22,77±4,27	11,39
Mobility	18	22,22±4,6	25	2,78

Table 2. Athletic Shoulder Outcome Rating Scale (ASORS)

ASORS	n	$\bar{x}_1 \pm \sigma$	$\bar{x}_2 \pm \sigma$	$(\bar{x}_2 - \bar{x}_1)$
pain	18	6 ±1,68	9±1.41	3
endurance	18	6,11±1,60	8.8±1,40	2,69
stability	18	8	10	2
Intensity	18	6.8±1,02	9.4±0,92	2,6
performance	18	6,44± 1,75	9,22± 1,21	2,78
objective	18	7,9±1,09	9,6±0.76	1,7

The greatest improvement in both scales resulted in reducing the pain sensation with 11.39 points and WD 3 points ASORS. These results could be explained by the focus of our methodology namely to reduce pain in the final range of motion, for which is used the techniques of manipulative massage, treatment of trigger points and fascial release techniques. The next improvement is on daily activities with difference 10.28 and stability by 9.6 points WD. In ASORS performance is improved with 2.78, endurance with 2.69 and stability with 2. Our program was also emphasized on endurance training of

the muscles of the shoulder, for which were used teraband exercises. We believe that improving the stability and the elimination of pain have positive affect on performing sport activity, and this leads to a higher number of points raised in activities of everyday life, averaging 10.28 points and 2.78 by WD ASORS .

DISCUSSION

Our suggested program improves muscle control in the shoulder area that influences not only the impingement syndrome, but also ensures the stability of the shoulder, which is the prevention of injuries and other complaints in this area.

Applied by us Terrier's manipulative massage activates and provokes joint receptors [4]. This is achieved by the fascial release techniques. After applying these techniques, patients reported improvements on freedom of movement, reducing stiffness and better coordination. Applying fascial techniques showed an increase in the quality of movement of the nearest joint. Quality refers to the creation of a balanced correlation between agonists and antagonists. The joint is at the same time freely movable and stable at all points of the range of motion. Fascial techniques, Terrie's techniques and treatment of trigger points combined with active teraband exercises have increased muscle strength and reduced painful symptoms. A way to prevent impingement by Popova, D. (2007) is with a program of exercises to strengthen the rotator cuff muscles, so the head stick centered in the glenoid well and tendons are not inflamed and teased [13].

There are several exercises in the literature that exhibit high to very high activity from the rotator cuff, deltoids and scapular muscles, such as 'full can' and 'empty can' , D1 and D2 diagonal pattern flexion and extension (pic.10 and 11);, ER and IR at 0 degrees and 90 degrees abduction (pic.7,8 ,9) [2].

Sets of 25-30 repetitions for each exercise are a good start to develop both the strength and endurance of the shoulder muscles.

A variety of weight-bearing upper extremity exercises, such as the push-ups (pic.15), standing scapular dynamic hug, forward scapular punch (pic.12), and rowing type exercises (pic.16). Supraspinatus activity is the same between 'empty can' and 'full can' exercises, although the 'full can' results in less risk of subacromial impingement. Infraspinatus and subscapularis activity have generally been reported to be higher in the 'full can' compared with the 'empty can', while posterior deltoid activity has been reported to be higher in the 'empty can' than the 'full can'.

Restoration of scapulothoracic muscles can not only be achieved with analytical exercises, they should be involved as stabilizers in proximal movements in the distal parts of the kinetic chain, elbow and wrist. This effect is achieved through the exercise of diagonal or spiral pattern - crossovers (pic.10 and 11).

Scapulothoracic muscles determine proper positioning and stabilization of the scapula, and our program is focused on restoring strength, endurance and muscular synergy of scapulothoracic muscle-mm. romboidei, m.trapezius, m. serratus anterior, m.levator scapulae (pic. 12, 14, 15).

Exercise of pictures: 12, 14 and 15 act to improve the synergy of the pair of rotating upward scapulae (m.trapezius pars descendens et transverza and m. serratus anterior), as their incorrect function leads to rotation scapula down and can limit the active elevation of the arm.

To succeed in dealing with the dysfunction of the dynamic stabilizers Catherine Krivinska offers isometric training as multiangular rhythmic stabilization in all places of movement of the arm. The resistance at the beginning is minimal, ensuring not to exceed an adequate scapular control. Training dynamic control is implemented in all movements of the arm in concentric and eccentric mode. Besides manually resistance free weights and pulleys can be used [6].

E. Dimitrova and N. Popov (2007) discussed in details the physiotherapy in pain syndromes of the shoulder complex and particular in impingement syndrome [12]. Terabands are useful in their complexes.

According N. Popov (2012) in chronic symptoms trigger points are always located. They do not pass away without an adequate treatment. Tissues around the points are hardened, but not connated. In application of massage, acupressure, stretching, cryotherapy, etc., they get softened and relaxed [11].

Travell & Simons (1999) found out that the techniques are effective not only in trigger points in the muscles, but also in the points where muscles are tensed or in their place of capture to the periosteum, and in particular in the ark of pain (quote by K . Lewit) [7].

According L. Kraydzhikova (2005) when combining the techniques of manipulative massage, active exercises for increasing muscle strength, the painful symptoms are reduced, the joint mechanic and the physiological movements in all durections get normalized [5].

Repetitive throwing or other overhead activity places great stress on the shoulder. As a result, the shoulder is a common site of injury in athletes. Addressing throwing-related injuries requires an understanding of throwing biomechanics and pathology. Nonoperative treatment is directed at restoring strength, flexibility, and neuromuscular control to the entire kinetic chain [3].

CONCLUSIONS

1. Timely administered in sufficient time physiotherapy is one of the possibilities of achieving good outcomes from the overall treatment of patients with impingement syndrome.
2. The normalization of endurance and synergism in the action of glenohumeral and scapulothoracic muscles leads to recovery of the dynamic stabilization of the shoulder joint.
3. Fascial release techniques and Terrier's manipulative massage are proved to be effective to decrease shoulder pain in water polo players with impingement syndrome.
4. The complex of teraband exercises improved coordination and recovery technique of movement in the performance of throwing one arm over the shoulder at all tested water polo players.

Understanding when and how much shoulder muscles are active during upper extremity sports is helpful to physicians, therapists, trainers and coaches in order to provide appropriate treatment, training and rehabilitation protocols to these athletes. To keep shoulders healthy and pain-free, it is important to know how to do sports and avoid common injuries.

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EFFICACY OF DIFFERENT MANUAL THERAPY TECHNIQUES IN ATHLETES WITH HAMSTRING STRAIN

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Key words: *hamstring strain, physiotherapy.*

INTRODUCTION

The hamstring muscles are very susceptible to tears, strains and other common sporting injuries. Hamstring injuries typically are caused by rapid acceleration activities when running or initiating running activity. The period of maximal eccentric contraction in the running cycle, when the muscle is both lengthening and contracting at the same time, seems to carry a higher risk for muscle injury [6]. Common precondition for hamstring injuries is an imbalance between the quadriceps muscles and the hamstring muscles (strong quadriceps with weak hamstrings). A low hamstring-to-quadriceps strength ratio will increase the extension moment through the knee, potentially stretching the eccentrically contracting hamstring beyond its elastic capabilities [8]. Other factors which contribute to hamstring injuries are a lack of flexibility and poor strength of the hamstring muscles. Also, when the hamstrings become fatigued or tired they are more susceptible to injuries. According to Turlp&George (1998) and Shacklock (2005) adverse neural tension is a factor in repetitive hamstring strain. Those athletes particularly vulnerable are competitors involved in sports which require a high degree of speed, power and agility. Sports such as Track & Field (especially the sprinting events) and other sports such as soccer, basketball, tennis and football seem to have more than their fair share of hamstring injuries.

The ***purpose*** of this study was to compare the effect of different manual therapy techniques on hamstring flexibility and pain after hamstring strain in athletes.

METHODOLOGY

34 athletes (18 men, 16 women) ranging in age from 17 to 25 years after hamstring strain were randomly assigned in both groups for physiotherapy. Injuries to the hamstring group of muscles in athletes range from a minor strain to a moderate tearing (**Table 1**).

Mechanism of injury and injury risk factors

Different activities recruit the hamstring in different ways, and the implications for injury also vary. Dancers were injured during static partner stretches. Water skiers were at a higher risk for proximal injury when being pulled out of the water. This occurs if they were forcefully pulled into hip flexion while maintaining their knees fully extended. Hockey players, whose feet are constantly on ice, were thought to develop hamstring problems that stem from core muscle weakness. Weakness of the abdominal muscles allows an anterior pelvic tilt, placing the hamstrings at a mechanical disadvantage that can lead to overuse injury. Marathon runners have been shown to develop decreased eccentric strength at the hamstrings during the course of a race [7]. Soccer demand frequent bursts of sprinting over a prolonged period of time, with a higher risk for muscle fatigue. The kicking aspect of this sport also predisposes to a muscle injury that can require more prolonged recovery times, since the forces driving the hip into flexion during the acceleration phase of the kick are relatively greater. Likewise, demand for the eccentric braking action of the hamstring muscles is greater during the kicking motion as well [12]. Risk factors that have been associated with hamstring injury include competition (versus practice), decreased quadriceps flexibility (which keeps the knee relatively extended), older age (which has been

shown to be associated with increased hip flexor tightness and increased body weight), over-striding during sprint acceleration, black race, low hamstring:quad ratio, muscle fatigue, hamstring tightness (though it is unclear whether this is a cause or consequence of injury), decreased tendon compliance, later stages of competition, and previous injury, which is consistently one of the highest predictors of subsequent injury risk.

Table 1. Characteristic of patients according to severity of injury

Severity of strain	Description	Group 1 (n)	Group 2 (n)
1st degree	Excessive stretching or minor tearing of a few muscle fibers. The pain can often be localized with one finger. Some stiffness and weakness will also be present. If exercise is attempted, the pain and stiffness may decrease during the activity, but return after, often with much greater intensity.	11	10
2nd degree	Moderate tearing of muscle fibers with pain generally covering a larger area than the 1st degree strain. Stiffness and weakness will be felt and the painful area may appear black and blue due to bleeding within the injured muscle. Significant limping may also occur when walking.	6	7
3rd degree	A complete tear of the muscle. Wide-spread bruising will be present and a "balling up" of the muscle may be seen or felt with a hand. 3rd degree strains are a rare occurrence.	-	-
Number of patients (n)		17	17

Both groups of athletes underwent a traditional hamstring strain physiotherapy (PT) program.

Description of the physiotherapy program

Early rehabilitation of the hamstring is vitally important to achieve full healing. The RICE principle was employed as early as possible after the injury. We applied ice to the effected area for a period of 15 - 20 minutes before and after the physiotherapy procedure. Utilizing a compression bandage helped to minimize the pooling of blood and reduced the associated pain. Active rest included activity in a rehabilitation program and avoiding the activities that produced sharp pain. Elevation of the extremity helped to move the swelling that occurred out of the area; this facilitated the healing process. Also, the use of nonsteroidal anti-inflammatory (NSAIDs) agents helped to reduce the associated swelling and pain. This treatment continued for at least 48 to 72 hours. This was the most critical time for the injured area. Heat was not applied to the area during the first 3-4 days since this would have increased swelling and bleeding within the muscle.

After the first 72 hours we started a comprehensive rehabilitation program. This program included a great deal of strength and stretching exercises, as well as massage. Early stretching began while icing after the injury. The athlete sat with an ice bag under the affected area, and slowly leaned forward. This bilateral stretch exercise (sit and reach – SAR) helps to relieve the muscle spasms associated with the injury. Though some experts believe early stretching to be valuable, caution should be taken early on to avoid aggressive stretching (stretching beyond the point of mild discomfort) which may hinder healing. Gentle stretching during the first few days, helped to properly align the healing muscle tissue. We avoided bouncing while stretching, because bouncing would have activated the stretch reflex and the athletes kept a flat back and bended only at the hips. Allowing the back to „hump" while toe-

touching stretches the back more than the hamstrings. Other forms of hamstring static stretching also were utilized (unilateral exercise – SLR, single leg stretch) in both group of patients. It was important to begin stretching early, this helped to break the pain-spasm-pain cycle, and prevented scar tissue from causing a permanent shortening of the injured muscle.

The next phase of the rehab process involved general strengthening. The program included straight leg raises (prone, abduction, adduction, and supine), standing hamstring curls, bent over hip extension, forward step-ups, and pain free squats. These exercises were done with no or very light weight, progressing by utilizing the principles of Progressive Resistance Exercise (PRE). PRE's employed a systematic increase in repetitions and weight to gradually stress the muscles involved, leading to increased strength. Also, the aerobic fitness of the athlete began with interval training on a stationary bike, stair climber, or elliptical trainer. As the hamstring began to heal, and the athlete was able to perform the exercises with decreasing pain and increasing endurance, more advanced exercises were performed. When beginning more advanced activities such as running, we avoided quick starts and stops or other ballistic movements which could cause re-injury. When the athlete was almost ready to return to competition, more ballistic training began.

General pain was acceptable, during the rehabilitation, but sharp pain in the area of the injury was a signal to back off. Sharp pains in the injured areas indicated that the rehab was too aggressive and causing further damage. Paying careful attention to the pain that the athlete felt during the rehab would allow the athlete to return to competition at a pre-injury level. By doing this the athlete would return as an immediate contributor, with little chance for more time loss.

Group 1 also performed a manual muscle relaxation and stretching techniques (manual techniques – RI, PIR, PFS, PNF stretch) – 2 times weekly and active hamstring self PIR (2 times daily).

Group 2 also performed manual neurodynamic techniques – 2 times weekly, and active slump stretch (repetitive active knee extensions – 30 repetitions, 2 times daily) performed in a neural slump sitting position and in straight leg raised (SLR) repetitive active ankle dorsiflections (30 repetitions, 2 times daily) performed in a supine position.

Before and after 4 weeks of training, flexibility of the hamstring muscles was determined by goniometric measurement of knee extension range of motion (ROM) with the femur maintained in 90 degrees of hip flexion. Pain was assessed by a numerical estimate of the visual analogue scale (VAS).

RESULTS

Analysis of variance revealed significant difference in knee joint range of motion gains between the manual muscle techniques (mean = 18.2 degrees) and neurodynamic techniques (mean = 8.7 degrees). Both stretch groups' knee joint range of motion improved significantly ($p < 0.05$). We conclude that 6 weeks of manual muscle relaxation and stretch techniques improves hamstring flexibility in subjects, statistically significantly compared with neurodynamic techniques. The most effective stretching occurs when the muscle is warm from exercise and when the stretch is held for long duration (min 30 sec.).

The results of this study suggest that, although both manual muscle stretch techniques and neurodynamic techniques increase hamstring flexibility, the neurodynamic techniques were more effective than the manual muscle techniques, for reducing pain. At baseline 100% of patients in both groups were complaining of pain. Recorded hamstring pain levels varied from ‚some' to ‚severe' (between 2.5 and 6.9 cm on the VAS). Application of neurodynamic techniques in Group 2 produced immediate pain relief after the first treatment procedure (between 1.2 and 5.8 cm on the VAS). The effects were sustained six weeks later. At discharge hamstring pain improved relative to baseline in all patients, but more effective in Group 2. They had an improvement from 7.4 to 0.98 on the pain score (according to VAS). The restoration of normal function and pain reduction were associated with normalization of neurodynamic by performing repetitive active knee extensions in a neural slump sitting position. This exercise is an active neural mobilisation technique with good pain relief effect. The mechanisms

by which neural mobilisation decrease pain after injury is a contentious issue: they may improve nerve conduction or reduce muscle spasm or have an antinociceptive effect on the gate control mechanism. On the other hand the applications of manual techniques ensure better control of patient's functional response, optimal dosage and efficacy of treatment. 94.12% of Group 2 patients had pain relief at the end of a course of physiotherapy compared to 82.35% in Group 1. They had a lower level of improvement from 7.3 to 1.78 on the pain score (according to VAS). Manual muscle relaxation and stretching techniques help to reduce pain in many ways including releasing the body's endorphins. Mechanoreceptors, which sense touch, pressure and tissue length, are stimulated causing a reflex relaxation. The restoration of normal function is usually associated with pain relief.

We registered functional recovery within 2-3 weeks after injury. After that a gradual conditioning program (incorporating a proper warm-up and stretching session), specific to practicing sport, prepares the hamstrings for the high demands placed upon them during athletics.

Timeframes for rehabilitation and return to sport vary depending on the nature and severity of the strain. As a general rule, Grade 1 hamstring strains should be rested from sporting activity for about three weeks and Grade 2 injuries for a minimum of four to eight weeks. In the case of a complete rupture (Grade 3 strain), the muscle may have to be repaired surgically and the rehabilitation to follow will take about three months.

Premature return to sport and inadequate rehabilitation will increase the risk of re-injury. Full stretch and strength should be achieved in addition to the ability to perform full speed training. Assessment of sport-related activities, such as twisting, jumping and changing direction suddenly should also be evaluated [9].

DISCUSSION

Hamstring injuries, when ignored, can cause an athlete to miss the entire competitive season. For this reason, it is very important to begin an early rehabilitation program. That rehabilitation program should employ a combination of flexibility training, resistance training, aerobic conditioning, and education.

Frequency and duration of stretching exercises and manual techniques have not been extensively examined. Additionally, the effect of multiple stretches per day has not been evaluated. According to W. Bandy, J. Irion, M. Briggler (1998), a 30-second duration is an effective amount of time to sustain a hamstring muscle stretch in order to increase ROM. No increase in flexibility occurred when the duration of stretching was increased from 30 to 60 seconds or when the frequency of stretching was increased from one to three times per day. The results of other study from the same authors suggest that, although both static stretch and dynamic range of motion stretching technique will increase hamstring flexibility, a 30-second static stretch was more effective than the dynamic range of motion stretching technique.

According to Feland J. et all (2001) longer hold times during stretching of the hamstring muscles resulted in a greater rate of gains in ROM and a more sustained increase in ROM in elderly subjects.

There is no foolproof way to completely avoid hamstring injuries. However, the risks can be minimized by paying attention to the principles of muscle strength and flexibility. The best preventative for hamstring strains remains adequate preseason conditioning. This should include aerobic training and strength training that ensures a balance in strength between the quads and hamstring muscle groups. The quad to hamstring strength ratio should be 60 - 80%. That is, if the quads can lift 200 pounds the hamstrings should be able to lift 120 - 160 pounds. This ratio is important in preventing not only injuries to the hamstring from violent starts, but also prevents the quad from contracting with such force that it actually injures the hamstring. Individual flexibility should be maximized by a regular stretching program as well as a period of warm-up and stretching before the intended athletic activity. Also, there should be minimal imbalance in strength between the right and left legs (the injured hamstrings should be about 90% as strong as the uninjured hamstrings). If necessary, a weight-training program should be instituted to optimally achieve these goals.

Chronic hamstring strains are usually first degree in nature and are often associated with improper warm-up or overuse. If proper warm-up and stretching techniques are being followed, resting the strained muscle by decreasing the intensity, duration, or frequency of the activity may be sufficient to resolve the problem.

The incidence of recurrent injury runs between 12 and 14% in soccer players, and as high as 30% in Australian rules football. Premature return-to-play is also cited as a risk [5].

Hamstring injuries commonly result in large amounts of time lost to competition. Sprinters have been shown to average 16 weeks for full return, while dancers in the same study averaged 50 weeks [1].

CONCLUSIONS

The results of this study suggest that manual stretch techniques increased hamstring flexibility. Muscle stretch techniques were more effective. Neurodynamic techniques were more effective than the muscle stretch techniques, for reducing pain.

The length required for recovery after hamstring injuries varies depending on the severity of the muscle injury and the applied PT program. Premature return to sport and inadequate rehabilitation will increase the risk of re-injury. Full stretch and strength should be achieved in addition to the ability to perform full speed training.

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TRADICIONAL CHINESE METHODS OF TREATMENT IN ACUTE LOW BACK PAIN IN GYMNASTS

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Key words: acute low back pain, Qi, acupuncture, auricular therapy

INTRODUCTION

Diagnosis and differentiation of low back injuries in gymnasts acording Tradicional Chinese Medicine are established on the theory of wholism. That is to say that a terapist should summarize and analyze all comprehensive factors including climate, season, environment and specificity of training activity and their relation with the symptoms and singns. In Traditional Chinese Medicine pain syndrome in the lumbar region is divided into acute and chronic (Wang Xiu, 2003).

Acute low back pain in gymnasts occurs with a history of sudden movement, twisting the spine or trauma. Acute condition caused when damage blocking the channels, collaterals and the circulation of Qi and Blood. Developing obstruction leads to the appearance of pain. The pain is localized bilateral, unilateral or central in the lumbar spine. It can occur immediately, after a few hours or the next day.

On palpation of the lumbar spine is established spasm of muscles, sensitivity to pressure or fixed pain. Pain usualy aggravated upon movement and/or pressure. Rigidity of lower back. Coating of the tongue is white. Pulse is tense and "string" (Chen Jia - xu, 2007). All of these reasons lead to abnormal feeding into the lumbar spine, which is associated closely with the "kidney channel" (KI), "manager channel" (DU) and "bladder channel" (BL), (Li Jing - wei, 1989).

HYPOTHESIS

Application of Chinese methods of treatment will lead to shorten the acute period of pain in the lumbar spine in gymnasts. This will reduce the recovery period and will contribute to the early involvement of athletes in the training process.

AIM OF THE STUDY

The aim of this study is to establish a system of Chinese healing methods with a view to reduce the acute period of pain in the lumbar spine in gymnasts.

METHODS

Using the methods of needle sticks (acupuncture), electroacupuncture and auricular reflex method (auricular therapy). Traditional Chinese Medicine procedures were made by a licensed professional, according to the health law.

ORGANIZATION OF THE STUDY

We studied 50 gymnasts with low back pain. Divided them into two groups: experimental (group A) and control (group B), each with 25 gymnasts.

Examined pain intensity according to the subjective feeling of gymnasts by visual analogue scale (VAS). Respondents themselves celebrating the horizontal line bolevite sensations with a score of 0 to 10. We applied too the test „lifting the skin fold" . At the time of testing detecting the resistance of the skin in the affected area and pain in a 4 point scale.

To the gymnast in the experimental group A applied Chinese methods to treat low back pain (acupunc-

ture, auricular therapy and electroacupuncture) in order to shorten the recovery period and is not interrupted training cycle. The number, duration of treatment procedures and selected active points determined strictly individualized according to the sensation of pain, her course of treatment and the type of pain. We did a total of four acupuncture procedures every other day with duration of each 40 min. Used disposable needles from 1 and 1.5 cun. We fixed plant seeds folded on the ear with hypoallergenic adhesive tape within a period of 10days.

The Gymnast control group B, after prior consultation with doctor to treat painful symptoms were administered oral NSAIDs, consistent with age and external elastic waist corset over a period of 10 days.

DISCUSSION

According to the principle of "treat symptoms during the acute phase, and treat the cause during the convalescent phase", we recomment treatment of pain during the acute phase of low back pain in gymnasts. The main pain treatment methods in the experimental group A are as follows:

1. Acupuncture

Traditional acupuncture operates according to channel and collateral theory, and its practice is to adjust Qi and Blood. Modern clinical practices are based on channel and collateral theory and also recognize that acupucture stimulates electrical currents and nerve conductance as well as enhancing cellular metabolism. Release of a number of biologically active substances, which can achieve general sedation due to the influence on the reticular formation of the brain. Therefore, acupuncture has established results for injuries of nerve roots and the spinal cord.

In the treatment of acute low back pain, we aimed to regulate the circulation of Qi energy in the channels and collaterals through needle sticks on these active points:

BL 18 Liver Shu (ganshu) 1.5 cun lateral to the posterior midline, on the level of the lower border of the spinous process of the 9th thoracic vertebra (**Fig. 1)**

BL 23 Kidney Shu (shenshu) 1.5 cun lateral to the posterior midline, on the level of the lower border of

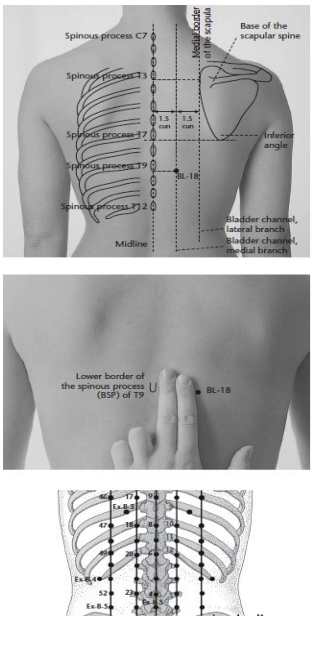


Fig. 1. BL 18 Liver Shu (ganshu)

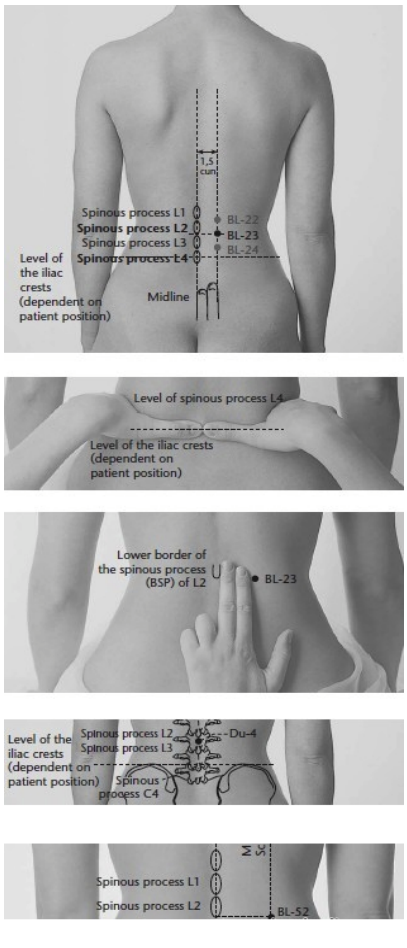


Fig. 2. BL 23 Kidney Shu (shenshu)

the spinous process of the 2nd lumbar vertebra (Fig. 2).

FigBL 40 (wei zhong) in the popliteal fossa. Acute back pain on the BL meridian, pain below BL 23 (Fig. 3).

BL 37 Gate of Abundance (yinmen) 6 cun distal to BL 36 (gluteal crease), on a line connecting BL 36 and BL 40 (in the popliteal crease), in a gap in the musculature. In lieu of UB 40 if there is pain and tenderness here and no congestion of blood vessels at UB 40 (Fig. 4).

BL 32 (ciliao) 'Second Crevice', 2nd sacral foramen (Fig. 5).

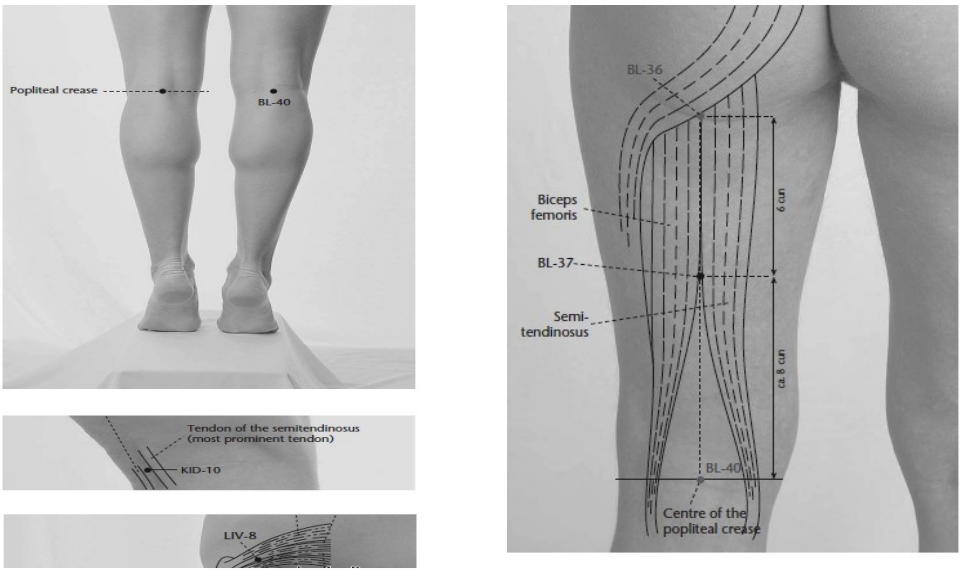


Fig. 3. BL 40 (wei zhong)

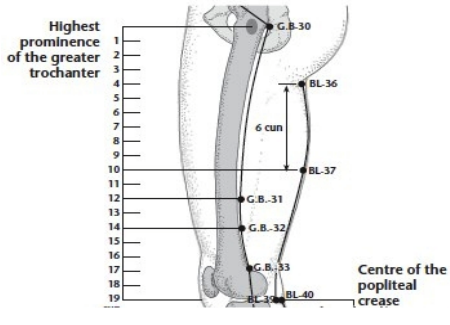


Fig. 4. BL 37 Gate of Abundance (yinmen)

DU 2 (yaoshu) On the midline, in the sacral hiatus (Fig. 6).

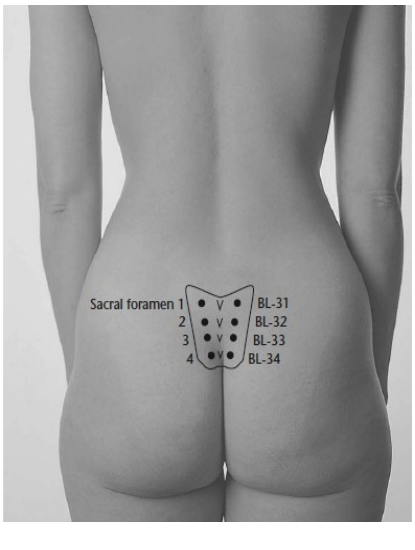


Fig. 5. BL 32 (ciliao) 'Second Crevice'

DU 4 (mingmen) “Gate of life” On the posterior midline, below the spinous process of the 2nd lumbar vertebra (Fig. 7).

DU 8 Sinew Contraction (jinsuo). On the midline, below the spinous process of the 9th thoracic verte-

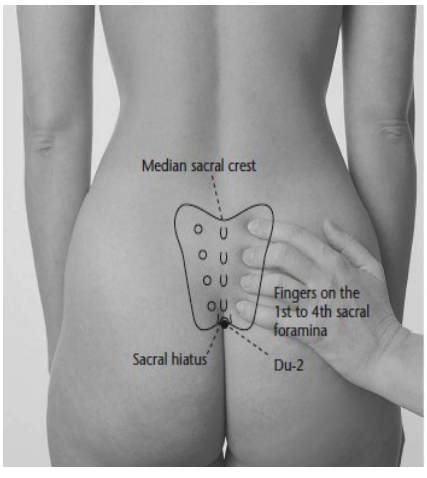
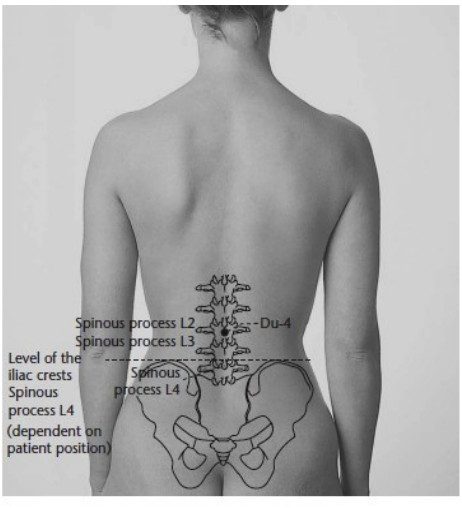


Fig. 6. DU 2 (yaoshu)



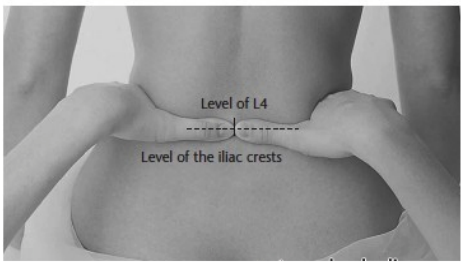


Fig. 7. DU 4 (mingmen) “Gate of life”

bra. Stiff and/or rigid spine (Fig. 8).

Du 26 Man’s Middle (renzhong) Below the nose, on the upper third of the philtrum. Note: shuigou (Water Grave) is an alternative name for this point. If pain is only on the midline of the back and patient has flexion/extension difficulty (Fig. 9).

SI 3 (hou xi) When a loose fist is made, at the ulnar end of the distal palmar crease proximal to the 5th

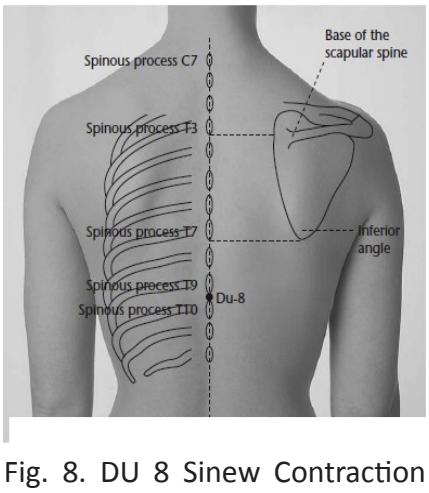
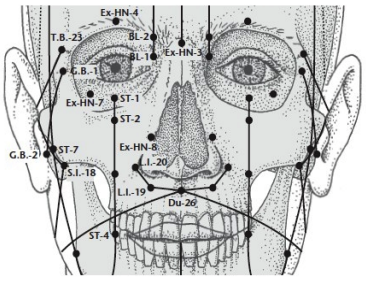


Fig. 8. DU 8 Sinew Contraction (jinsuo)



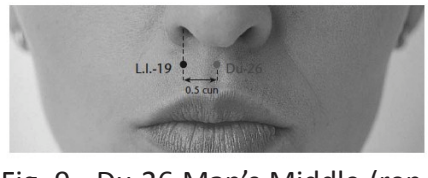


Fig. 9. Du 26 Man’s Middle (renzhong)

metacarpal phalangeal joint at the junction of the red & white skin. if pain is on the posterior-midline and also lateral and/or patient has torso rotation difficulty (Fig. 10).

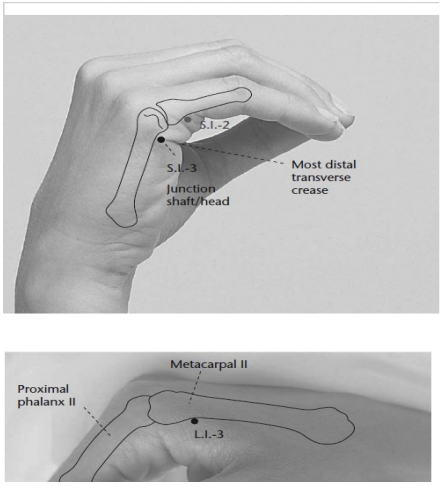


Fig. 10. SI 3 (hou xi)

2. Electroacupuncture

Applied electrotherapy in the above active points, exept SI 3 and DU 26. After inserting the needle, connect them with electrodes through which a low frequency alternating pulse current, supplied by apparatus ITO ES 160. Use program 2 (Fig. 11).

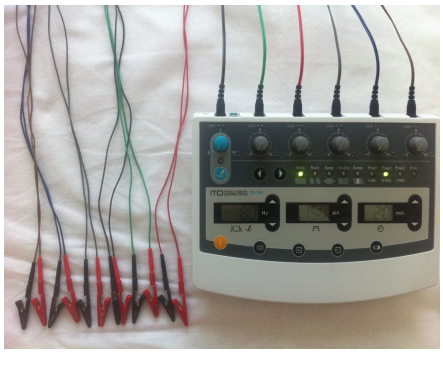


Fig. 11. ITO ES 160

3. Auricular therapy

Influence on auricular reflex points and areas corresponding to Zang - fu organs, the channels and collaterals, affected of the acute low back pain. Fixated plant seeds on the ear with hypoallergenic adhesive tape on the following active points:

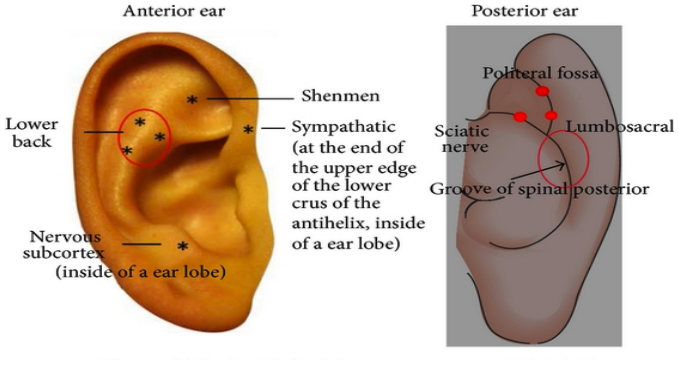


Fig. 12. Auricular reflex points and areas of the acute low back pain

RESULTS

In analyzing the results of the VAS of group A at the beginning of the experiment, we found the following:

Registrants pain in the lumbar spine as strong by visual analogue scale and assess whether three subjective sensations was 92%. 8% of respondents gave a score of 2 on pain sensations (Table 1). Radical difference found when comparing the results at the end of the experiment: the low back pain was controlled. Only one gymnast had mild pain.

In analyzing the results of the VAS of group A at the beginning of the experiment, we found the following: Registrants pain in the lumbar spine as strong by visual analogue scale, and whether the assessment of the three subjective sensations was 84%. 16% of respondents gave a score of 2 on pain sensations (Table 1). In the comparative analysis of the results after the experiment in Group B did not disclose changes. Was not controlled low back pain.

Table 1. Subjective pain data (VAS)

Group	Study	Pain assessment							
		3		2		1		0	
		n	%	n	%	n	%	n	%
A	before	23	92%	2	8%	-	-	-	-
	after	0	0%	0	0%	1	4%	24	96%
B	before	21	84%	4	16%	-	-	-	-
	after	21	84%	4	16%	-	-	-	-

In analyzing the test “lift skin fold” in the experimental group A, found the following: Before the first procedure of acupuncture all gymnasts respondents with skin resistance. 88% in grade 2 and 12% - grade1. After the first procedure of acupuncture, in 24% gymnasts was controlled completely low back pain and skin resistance. After the second - 64%. After the third in 92% and after the fourth was controlled completely (Table 2).

Table 2. Test “lifting skin fold” during therapy performed in group A

Procedure	n	Before procedure			After procedure			
		3	2	1	3	2	1	0
First	25 100%	-	22 88%	3 12%	-	4 16%	15 60%	6 24%
Second	19 76%	-	4 16%	15 60%	-	0 0%	9 36%	10 64%
Third	9 36%	-	-	9 36%	-	-	2 8%	7 92%
Four	2 8%	-	-	2 100%	-	-	0 0%	2 100%

In the comparative analysis of the results after the experiment in Group B did not disclose significate changes. Was not controlled the low back pain (Table 3).

Table 3. Test „lifting skin fold“ during therapy performed in group B

Group	n	Before			After			
		3	2	1	3	2	1	0
B	25	-	23 92%	2 8%	-	21 84%	4 16%	-

CONCLUSION

Chinese treatments (acupuncture, auricular therapy and electroacupunture) have a pronounced analgesic effect and can be included successfully in the treatment of acute low back pain in gymnasts.

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APPLICATION OF MULLIGAN'S MOBILIZATION WITH MOVEMENT TECHNIQUES IN PATIENTS AFTER DISTAL RADIAL FRACTURE

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Key words: *MWM, distal radius fracture, supination*

INTRODUCTION

Fracture of the distal radius is one of the most common fractures and in different studies, the proportion of the total number of fractures is indicated between 10% and 25%. Postimmobilisation problems are related mainly to pain, swelling, restricted range of motion, reflex muscle guard, limited activities of daily living. This requires the application of special techniques.

Loss of supination is often limitated postimmobilisation after distal radial fracture and thus prevents the self-service. Supination of the forearm provides important motor activities requiring orientation of the palm to the face and body, and a number of work and daily living activities [9].

In order to increase the range of the forearm supination, joint mobilization, mobilization with movement (MWM) and stretching exercises are commonly used to reduce pain, improve flexibility and forearm and wrist function.

No comprehensive studies on the influence of MWM on the restoration movements in these patients after distal radial fractures and restoration of supination at all can be found yet.

The aim of this study was to investigate the effect of Mulligan's mobilization with movement (MWM) techniques on restoring range of supination in patients after distal radial fracture treated by immobilization in plaster or pins and plaster.

Material and methods

10 subjects with distal radius fracture, 2 males (mean age 24,5 years) and 8 females (mean age: 62 years) in the early postimobilisation phase received a conventional kinesitherapy program that included traditional techniques and MWM.

The outcomes used to assess function and pain were active supination range of motion, and Michigan Hand Outcomes Questionnaire (MHQ). Each measure was conducted prior and after first treatment session and two weeks post treatment.

PROCEDURE

The proposed mechanism for the clinical efficacy of Mulligan's mobilization with movement (MWM) is based on a mechanical model that proposes that minorpositional faults occur after injury or strain or because of physiological changes secondary to degenerative conditions, resulting in movement restrictions and/or pain. The MWM technique, or correctional mobilization, is thought to restore pain-free function by means of repositioning [3]. Mobilization with movement is a manual force technique applied to promote restoration of normal joint alignment and arthrokinematics, rather than the stretching of tightened tissues [1]. The technique includes sustained manual correction of subtle joint malalignment, with active movement immediately superimposed on the corrected joint position [10]. The active movement chosen is one that previously produced pain but, when superimposed on improved joint alignment, occurs painfree [2, 11].

The success of MWM relies greatly on the selection of the direction for the sustained corrective glide [6].

One of the reasons supination will be limited and may produce pain may be if there is insufficient volar gliding of the head of radius in proximal radioulnar joint or the head of ulna against the radius in distal radioulnar joint.

Because of the frequent engagement of the distal radioulnar joint in distal radial fracture pathology, its mobilization is not appropriate in early postimobilisation period. Therefore we used MWM for proximal radioulnar joint - ventral mobilization of the radial head at 90° degrees of elbow flexion, combined with active supination of the patient's forearm in a painless range of motion and later with overpressure (Fig.1 and Fig.2).

This mobilization in proximal radioulnar joint does not lead to increased pain on ulnar side of the patients' wrist, which is one of the most common complaints, while performing active supination. We think that this mobilization does not hide risks of displacement of the fracture – applying very carefully with absolutely pain free motion.

MWM was applied for 3 sets of 10 repetitions per treatment session during 5 sessions over a 2 weeks period.

Fig.1. MWM of proximal RUJ –sustained ventral glide of the radial head with active supination

Fig.2. MWM of proximal RUJ - active supination with overpressure

RESULTS

Analysing the results indicated improvement of painless range of forearm supination by an average of 9,5 degrees for all patients directly after the first application of the technique.

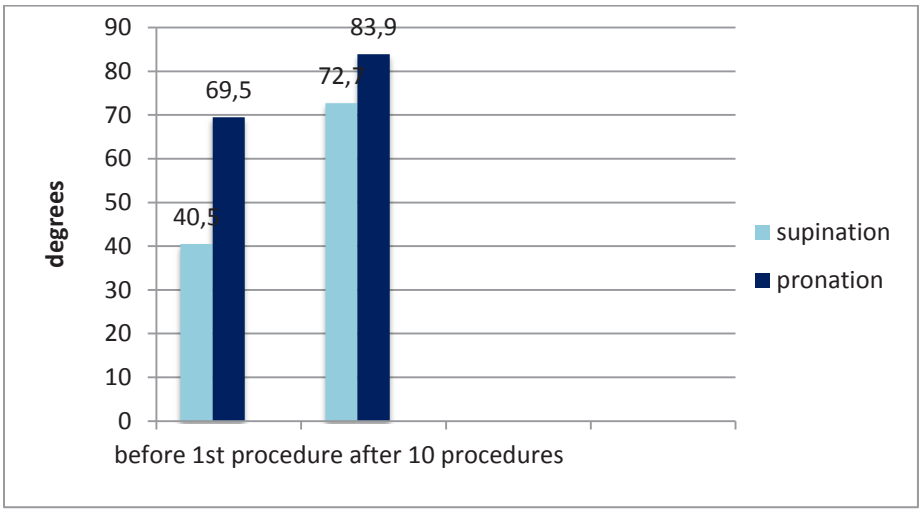
For a period of 2 weeks, 10 conventional kinesitherapy procedures including also 5 MWM, the amount of increasing supination was average 32.2 ° for all patients, from 40,5 ° to 72,7 °, and pronation average with 14.4 ° from 69.5 ° to 83.9 ° (Diagr.1).

In one patient, the range of supination before starting kinesitherapy was 0°. The technique had the greatest effect after the first application - an increase of 20° degrees, while the other techniques had almost no effect. Only one patient had no effect after applying of MWM.

Deficit in the range of supination is reduced at the end of the clinical trial. We believe growth from 32.2° for 10 treatments is significant, and of course contribute to this and other kinesitherapy techniques that we have chosen to apply, but in some of patients were needed the initial impetus and unlock by MWM.

In assessing the complex function of the hand by MHQ (not at all difficult=1, a little difficult=2, somewhat difficult=3, moderately difficult=4, very difficult=5), activities requiring supination like „Turn a

door knob", were impacted as follows: from score 5 (very difficult) - 80% and 4 (moderately difficult) – 20% of the patients at the beginning to 3 (somewhat difficult) – 60% and 4 (moderately difficult) – 40% at the end. The results for „Turn a key in a lock" were from 5 (very difficult) – 60% and 4 (moderately difficult)– 40% to 2 (a little difficult) – 50%, 3 (somewhat difficult) – 40% and 4 (moderately difficult) – 10%. These activities are complex and their restoration requires recovery of optimal muscle strength and precise control.



Diagr. 1. Active range of supination and pronation before first and after 10 kinesitherapy procedures

DISCUSSION

In the research of twenty-two studies dated between 1980 and 2011 included in the systematic review for analysis Heiser, R. et al. (2013), concluded that there is limited evidence for the joint mobilizations in the treatment of wrist and hand conditions [4].

Despite numerous clinical studies indicating the presence of positional faults, there is limited evidence of imaging studies confirming positional faults. A case report by Malo-Urriés Miguel et al. (2014) offers clinical and ultrasonographic evidence of a proximal positional fault of the radius included pain during active pronation increased by associating a passive movement of the radius in a proximal direction and it was reduced by associating a passive movement of the radius in a distal direction [7].

Mulligan incorporated Kaltenborn's (1989) principles of passive mobilization in this approach. Based on the convex-concave rule of Kaltenborn volar gliding of of the head of the radius in proximal and volar gliding of of head of ulna in distal radioulnar joint has been emphasized in improving forearm supination.

Supination is more difficult for restoration movement in this type of fracture, especially because of patient's immobilisation position in pronation.

Malligan recommended for loss of supination to push the lower end of ulna down on the stabilasated radius. He said about amazing results using this technique after Colles' fractures and even long standing restrictions [8]. He said in supporting the positional fault hypothesis is the fact the repositioning that restores say supination will also restore pronation.

To date, no researches and scientific evidences support the clinical use of MWM in patients after distal radial fracture. The application of these techniques significantly alleviated and assisted the use of other techniques to increase the supination. Almost all patients (90%) reported for reduction of the pain level by increasing the range of motion and the most important is that is painless range of motion.

However, in practice, the process of determining the direction for MWM could be more of an iterative one in which a series of different directions are tested before settling on the most effective.

CONCLUSION

Including the MWM techniques in the ordinary kinesitherapy leads to significant release of supination and facilitates its earlier and painless restoration.

In our view MWM is a technique that should be used in an attempt to increase the supination and should be examined individually for each patient what are application possibilities.

MWM technique had shortterm effects on decreasing the ulnar wrist pain and increasing the active range of motion (AROM) of forearm supination in patients after distal radial fracture. MWM can be recommended for increasing the AROM of forearm supination and decreasing ulnar wrist pain.

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HIPPOTHERAPY FOR PEOPLE WITH MULTIPLE SCLEROSIS

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INTRODUCTION

Multiple sclerosis (MS) is an autoimmune, chronic, inflammatory, demyelinating disease affecting the central nervous system (S. Manoz-Lasa, 2011). Its development has several different forms - cerebral, spinal, cerebrospinal; and each may have a different course and development - benign, relapsing remitting, primary and secondary progressive and malignant form. The symptoms are strictly individual in each individual, which makes it extremely difficult for differential diagnosis and timely treatment. The severity of the disease depends on the number of lesions, areas which have neuroglia, their rate of multiplication, and the number and rate of relapse. To insert such a diagnosis is monitored for the appearance of multiple attributes, as well as at least 3 plates – MRI.

The most common symptoms are retro-bulbar neuritis - visual impairment; violation of speech; gait disturbance, which in turn was inspired by a number of other symptom such as the appearance of spasmodic muscles of the lower limbs, change in sense - proprioretseptsiya, damage to the vestibular system, changes in psycho-emotional state, and more (Porosinska A, 2010). So far it is believed that MS is incurable. Of course there are many therapeutic approaches to suppress and limit the development of the disease by drug therapy in traditional and non-traditional medicine, but they are fully symptomatic.

Kinesitherapeutic approaches are diverse and very effective in people with MS. Use of natural factors combined with healing gymnastics is well suited to facilitate and support the way of life of these patients. Treatment through movement and specialized methods, in combination with medicaments has beneficial effects on muscle tone, range of motion in joints, correct posture, improve coordination, improve gait and balance, psycho-emotional health, and many others. A suitable method is the hippotherapy (HT), interference by therapeutic riding combined with specialized exercises with a different therapeutic approach (T. Borges de Araùjo, 2013; N. Gencheva, 2007; S. Long, 2013; N. Scott, 2005;).

For centuries, horses have been used as a method of recovery and rebuilding confidence in the Greek wars after battles. The name "hippoterapy" comes from the Greek "hipos" - horse "terapie" - treatment in direct translation would mean "treatment with the help of the horses." The rehabilitation with animals is used worldwide. The most effective and replicable remains the therapeutic riding and HT. Furthermore except the good impact over the psychics, there are very good effect on the biomechanics of the human body, which in turn makes it an excellent rehabilitation approach of the healing gymnastics (S. Long, 2013; http://www.telegraph.co.uk/science/science-news/10788931/Horses-can-help-beat-tress.html).

Already in the fifth century BC, the father of medicine - Hippocrates, has recommended the treatment of neurological diseases, neuroses and psychoses accompany and therapeutic riding.

At the end of 50 years of the 20th century the HT has been used as a treatment for psychiatric and neurological diseases. In Europe has a number of centers involved in the treatment of problems in the musculoskeletal system - scoliosis, atherosclerosis, cranial trauma, poliomyelitis, diseases of the gastrointestinal tract diseases in children adults Dawn, autism and many others, as and total body strengthening (H. Ajzenman , 2013).

Using this method reaches a physical and psychological independence, due to the fact that even some of the time on horseback, patients had complete independence from the surrounding environment, reducing their depressive states. One of the main effects of HT is the design, building, reinforcing the

need for body movement patterns. In trying to keep the rider's balance on the horse's back which supports the extension and the alignment of the spine column, respectively corrects the muscle imbalance and the position of the head. This reflex plays an important role in the fitness level of the vestibular system. Analysis of movements while riding show that motor pattern generated by swinging the horse - transmitted to the rider, the motor model resemble the body of a man - while walking (D. Cattaneo, 2007; L. Hallberg, 2008; S. Long, 2013; K. Menezes, 2013;M. Janura, 2009).

Proven impact of horseback riding to relieve stress there is another side - improving cognitive, intellectual and communication skills in the very contact with the horse. This makes activities with these animals important to re-socialization of all those in need. (S. Jenkins, 2013).

HT is a method combining riding with specialized methods necessary to unlock certain models of movement or serving particular needs of patients (C. Bronson,2010; K. Menezes, 2013).

Like all treatments HT has also contraindications: fragility of bones, hemophilia, kidney, mainly contraindication in patients with MS is reaching fatigue.

Hypothesis HT would help people PwMS to increase the quality of life, by helping to correct the posture, balance, decrease the chronic fatigue and influence positively on the emotional state.

Objective of the study was to trace the impact of HT in persons with multiple sclerosis - cerebrospinal form.

METHODOLOGY

The study was attended from 9 people, it was held on the territory of Sofia in the hippodrome "Asparouh", whit the help of coaches and students. The program was carried out within the research project funded by the National Sports Academy "Vasil Levski". Altogether 16 sessions, each 30 minutes that each patient was indebtedness to fulfill in order to achieve results. The tests were taken in regular intervals, aiming to trace the development of the three stages and the results - a first (primary), eighth (intermediate) and 16th (final) visit.

Patients were asked and invited by the association "MS Society Bulgaria." Each matched our requirements - clinically proven diagnosis - MS, cerebral spinal form of the disease.

Test battery include: fatigue scale (SF), Scale postural control Bertotti (PAS) Test for emotionality (TE).

METHODOLOGY OF THE HIPPOTERAPY

Common methodology aims to lower stress, create positive emotions, stimulate proper function of muscle corset body to reduce the muscle tone, releasing movements of the hip and unlock the correct mechanism of movement, both in the lower and upper limb to improve gait, coordination and balance, reduce chronic fatigue.

Classes consist of preparatory, primary and final part for the program included more complex coordination exercise - during the main part, each one with a specific purpose. In the beginning we started with a slight move of the horse, then include exercises for coordination of the upper limbs - gradually include exercises for the spine and hip.

RESULTS

Each of the patients showed significant improvement in both the bleached units - from PAS test and overall score. Their posture while riding significantly improved, as the position of the head. Fatigue decreased significantly with increasing overall fitness level of the body, and estimates of TE shows increased positive emotions and reduced tension. This is shown in **Table 1**.

From the mean values we can see that the grades have increased with one in the second testing of the whole group and with 1.6 in the last results.

Graphic changes in the values of postural activity represented Fig. 1 and Fig. 2.

Table 1 Postural control – Bertotti

PAS Name / results	Grade 1	Grade 2	Grade 3
S.T.	6	11	11
B.B.	10	10	12
G.J	3	4	7
M.B.	9	9	12
D.R.	12	14	15
A.M.	2	3	6
S.P.	8	9	10
P.T.	12	15	15
M.A.	9	7	8

From Table 1 it can be seen significant improvement in the seat while riding on the second assessment.

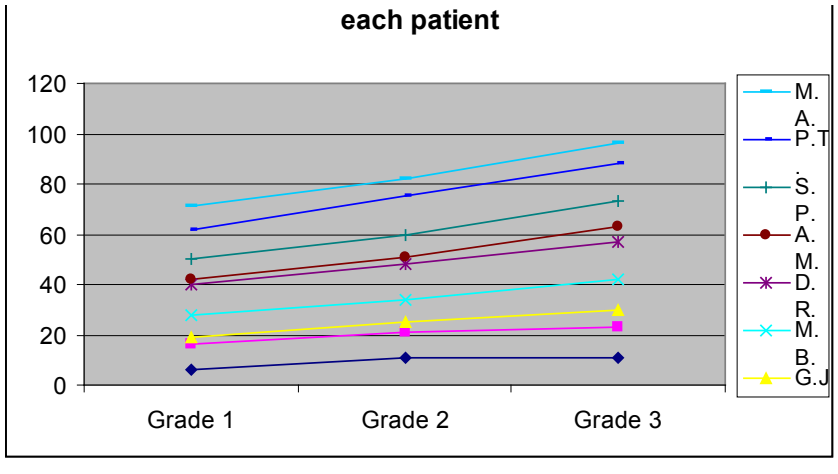

Fig. 1. Changes in the assessment of postural control in each patient

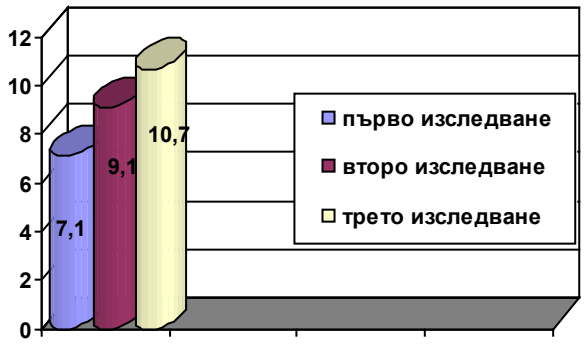

Fig. 2 Change in mean values of the three measurements Bertotti (first testing, second testing, third testing).

After, the end of the 16 procedures were observed minimal or retention of previous results, which we believe can be an excellent result. Fitness level of the body during horseback riding is important for the extension of the spine, improving the position of the head relative to the body and the space and the inclination of the pelvis. Strengthening the muscles of the spine, trying to keep the center of gravity improves the position of the hips. The position on the horse in combination with the body temperature of the animal decreased muscle tone in the lower limbs, allowing proper occupation of the desired item. This combination helps the motor stereotype in PwMS, supporting walking. On the one hand when rid-

ing the movement of body resembles its movement during walking, which makes the method suitable for exercise and endurance training in people with gait disturbance, alleviating their daily needs.

Chronic fatigue tests showed a drop in grades, which means that HT, reduces the levels of fatigue, which in turn will give more effective time (Table 2).

Graphical results are shown in Fig. 3 and Fig. 4. At the point of the second measuring the results are 0.3

Table 2. Results of the test for chronic fatigue.

SF Name / results	Grade 1	Grade 2	Grade 3
S.T.	41	45	36
B.B.	39	44	35
G.J.	58	57	54
M.B.	44	43	39
D.R.	29	26	28
A.M.	59	57	56
S.P.	51	50	52
P.T.	15	12	10
M.A.	50	49	49

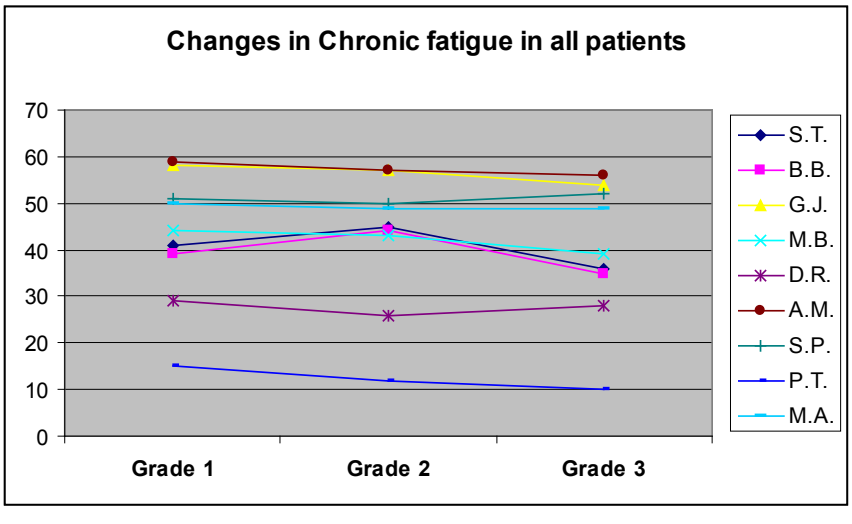

Fig.3. Changes in Chronic fatigue in all patients

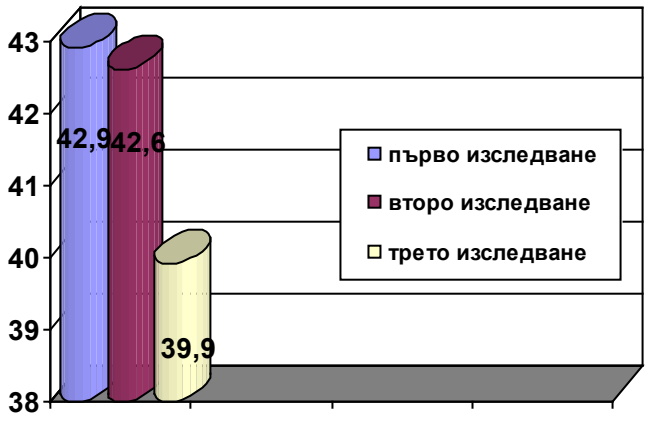

Fig. 4 Change in average indicators Chronic fatigue in triplicates (first testing, second testing, third testing).

less then the first ones. At the end of the 16-th session we see that they have 2.7 less then the second and , whole 3 points less then the first testing.

Lowering chronic fatigue, it can be said that this would affect on psycho-emotional state of each of them. In Table 3 are shown the results of TE - Emotional intensity.

Emotional tension is lowered. In three of the patients can be seen that the second and the third score

Table 3. Test results for Emotional tension (TE)

TE Name / results	Grade 1	Grade 2	Grade 3
S.T	14	17	20
B.B.	24	25	25
G.J.	10	15	16
M.B.	19	27	26
D.R.	31	33	33
A.M.	10	15	17
S.P.	20	19	19
P.T.	30	31	33
M.A.	17	16	21

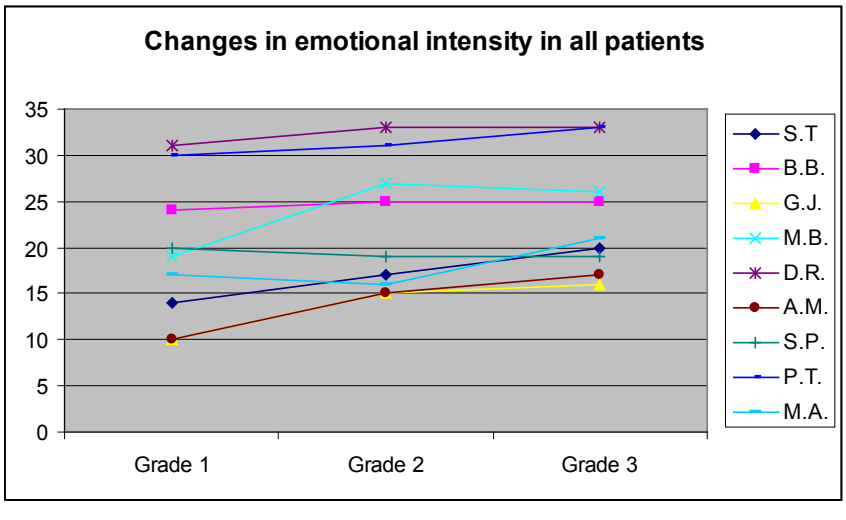

Fig. 5. Changes in emotional intensity in all patients

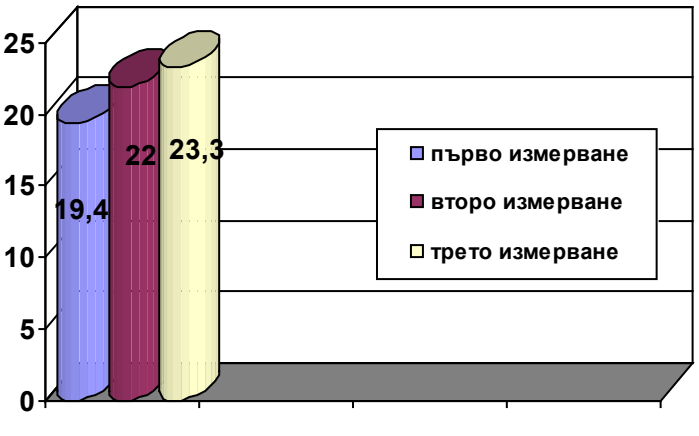

Fig. 6. Change in mean score for emotional intensity in all three measurements (first testing, second testing, third testing).

are identical. As a general conclusion we can say that the HT has a positive emotional state at PwMS. Speaking for the whole experimental group the results have been increased, which tells us that the emotional state has improved with 3.4 from the first, 1.3 – comparing the 1st and the second period, and with 4.7 more at the end – comparing the 1st and the third days of testing.

Fig. 5 and Fig. 6 show as the change in the emotional tension.

DISCUSSION AND CONCLUSIONS

The small number of patients studied did not give us reason to make definite conclusions, but the obtained in this pilot study results, we see that after the application of HT in patients with MS has a very beneficial effect on some of the physical and psycho-emotional symptoms, lower levels of fatigue and tension, improving coordination, balance and muscle strength, we support their smooth re-socialization and utility, both for society and for themselves.

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MOBAQ-LUX8 – A COMPETENCE-ORIENTED TEST BATTERY FOR 8 YEAR-OLD LUXEMBOURGISH STUDENTS: ITEM ANALYSIS

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Key words: *motor qualifications; motor test; test validation; item analysis*

INTRODUCTION

The University of Luxembourg is conducting the project of Basic Motor Qualifications (MOBAQ[1]) to gather more information about the motor status and potential deficiencies of students at the age of 8 years. The MOBAQ-concept is an innovative competence oriented concept to evaluate basic motor qualifications of students permitting PE teachers to foster students individually [2]. The aim of the project is the elaboration of competence-oriented test items according to the MOBAQ-approach [3] and according to quality criteria of standardized tests. To reach this goal, two pilot studies will be realized. The objective of the first study – of which a part of the results will be presented in this article – involves the generation of a psychometrically high quality item pool, which reflects the dimensions, facets and levels of the theoretical competence model (study I). For this purpose, statistical analysis of the developed tasks (item selection) using methods of classical test theory are performed. It is empirically tested whether the previously on a theoretical basis determined test dimensions are empirically valid. In a next step, the test battery is used in a pilot study (study II) to establish a diagnosis tool for pedagogical purposes in several school classes of the class level 3 in elementary school in Luxembourg. Those results should help to identify students with remediation needs on school and classroom level, in order to be able to suggest specific services and offers to students and their parents.

BACKGROUND OF THE STUDY

In opposition to usual approaches based on abilities and the statistical legitimation of minimal standards, the MOBAQ-approach fixes normatively basic motor qualifications as minimal requirements for students to be able to participate in the movement or sports culture. Thus, a basic motor qualification is a motor task that is (1) sufficiently complex; (2) related to a specific context, and (3) codified in a binary way (performed successfully vs. not performed successfully) [3, 4, 5, 6, 7]. This approach and the experiences made during the development of MOBAQ-NRW and MOBAQ-LUX12 have led to several criteria for MOBAQ-test-items [3]: (1) There is a consensus of the minimal requirements for children or adolescents to be able to participate in the culture of human motion in the sense of cultural participation; (2) the test situations do not demand specific technical requirements but are designed functionally in order to give place for individual solutions; (3) the limitations of the minimal standard are accepted as verisimilar for the living environment and have no time or other measurable limits or expectations; (4) all qualifications needed to solve a problem can principally be learned or reached by all children or adolescents, which means that their physical requirements are not relevant and that the needed learning places are accessible for everyone. Further relevant criteria are an easy-made planning and

[1]MOBAQ is the German acronym of the project and stands for "Motorische Basisqualifikationen".

organization of the tests, high movement intensity during test situations, the need of concentration to solve the test situation and enough time for practice before the tests. Examples of MOBAQ-test-items are described by Scheuer, Bund, and Becker (2013).

METHODS

Test dimensions and item collection

A development group consisting of associated teachers, students and scientists working in the MOBAQ-project designed the total of 29 items in 6 test dimensions. The test construction consists of 6 test dimensions: (1) Moving on equipment; (2) Moving in water; (3) Running and jumping; (4) Rolling and riding; (5) Playing with small devices; and (6) Playing with balls. Each test dimension counts five test items (tasks), as e. g. the test dimension "Moving on equipment": (1) Balancing; (2) Climbing; (3) Swinging; (4) Stabilizing and (5) Rotating. Figure 1 shows the different stages in the process of the item development (**Fig. 1**)

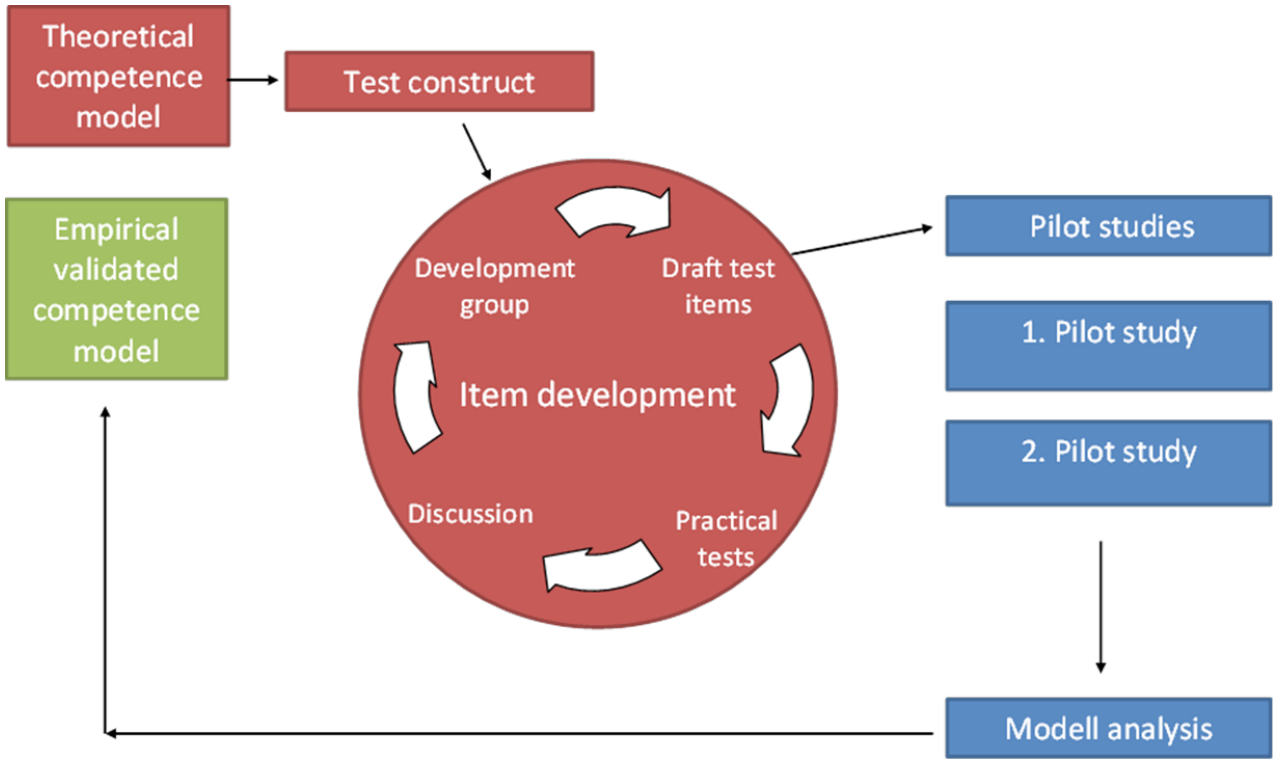

Fig. 1. Process of test and item development (Scheuer, Bund, & Becker, 2013, p. 344)

Validation of the MOBAQ-LUX8 test instrument

In study I a pre-test is conducted to validate MOBAQ-LUX8 scientifically in order to develop an adequate test design (including a test manual and test materials for teacher training). Test data of a sample of 113 students in eight classes allow to validate empirically the test construction, to select and revise the test items and to optimize the test instructions. The classical test criteria will be validated as described in table 1 below.

In study II, the impact of possibly relevant variables (e.g., gender, physical activity, social and economic background, migration background) will be taken into consideration, as well as in comparison to other tests. Furthermore, confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) to revise the theoretical structure of the test battery will be conducted using the study data. The analysis of the data of study II is not subject of this article.

Sample

The review of the test items was performed on a sample of n=113 students from eight classes of class level 3 in Luxembourg.

Procedure

The tasks to capture the basic motor qualifications of 8-year-old students were tested in different dimensions according to the MOBAQ-approach based on the criteria for the development of MOBAQ-test-items. A pre-test for the scientific substantiation of MOBAQ-LUX8 in Luxembourg was conducted in order to develop a suitable test procedure.

Data analysis

The collected data were examined for the classical test criteria objectivity, reliability and validity. The findings provide the basis for the subsequent item selection and item re-construction. The aim was to have a test battery consisting of three test items per test dimension after the study I testing. Table 1 gives an overview on the evaluation of the different test criteria.

Table 1. Test Quality Criteria

Criteria	Procedure
Validity	Content validity: rating of the items by experts
	Construct validity: correlation analysis in the test dimensions to test the item characteristics
	Criterion validity: teacher rating / assignment in PE
Reliability	Re-test in one class
Objectivity	Standardization to assure objectivity in implementation, analysis and interpretation
	Rater compliance in assessment of video recording of min. 20 students

Objectivity. Standardisation. In order to ensure the objectivity of implementation, evaluation and interpretation, a written test manual with a description of the 29 test items affecting the test setup, the test procedure and the evaluation criteria for task assessment was compiled and given to the test administrators.

Inter-rater objectivity. To verify the objectivity, between nine and 51 students were filmed for each MOBAQ task depending on the test item. These recordings were presented to four PE teachers with a request to evaluate the subjects' task-coping. The ratings were then tested for compliance. Such coincidence checks at nominal scaled data can be made by defining Cohen's Kappa. Since Cohen's Kappa can only be calculated for the agreement between two raters, Fleiss` Kappa – representing the generalization to, specifically in this case, four ratings – had to be calculated. There were specified both Fleiss' Kappa values for the mean agreement on the contributor (Intra-class-correlation for mean of ratings), as well as the probability that a rater chooses the same category as any other rater (Intra-class-correlation for single rating).

Reliability. To check the reliability of MOBAQ, the test tasks were repeated in one class. By calculating the mean for each test dimension (i.e., summing the task values divided by the number of tasks) an interval-scaled value is obtained for which a test-retest-coefficient (r) can be determined. However, on task level a different approach was needed. Since the evaluation of tasks is carried out on nominal scale (performed successfully vs. not performed successfully), the consistency of the results was calculated using Cohen's Kappa.

Validity. Content validity. The content validity of the test items was examined by an expert rating of two physical education teacher and two sports scientists from the field of Physical Education.

Construct validity. A correlation analysis within the test dimensions was performed to verify the item assignment. Furthermore, we checked the overall model fit by calculating a selectivity coefficient.

Criterion validity. The school grade in physical education (from 1 = very good to 6 = very bad) given by the teachers was taken as external criterion which should be positively correlated with the MOBAQ-test performance in case of given validity.

RESULTS

In the following the results of the item analysis of study I are presented. The scale analysis will be produced in a further step.

Item analysis

Table 2. Results of the item analysis

Test item	ID	SD	Objectivity	Reliability	Validity	
			ICC	Cohen's Kappa	Construct	Criterion
BAG 1: Balancing	.98	.146	.817**	n. c.	.083	-.046
BAG 2: Climbing	.94	.247	1.000	.634	.437**	-.193*
BAG 3: Swinging	.96	.204	1.000	1.000	.405**	-.227*
BAG 4: Stabilizing	.89	.311	.986**	1.000	.304**	-.136
BAG 5: Rotating	.86	.349	.863**	1.000	.351**	-.063
BIW 1: Sliding	.93	.255	.948**	.328	.164	-.142
BIW 2: Diving	.89	.321	.925**	1.000	.116	-.077
BIW 3: Jumping into water	.98	.151	-.280	n. c.	.306**	-.027
BIW 4: Driving	.80	.399	n. c.	.857	.205	-.009
BIW 5: Floating	.89	.321	.577*	n. c.	.312**	.034
LUS 1: Persistent running	.64	.483	n. c.	1.000	.242*	-.261*
LUS 2: Coordinated running	.97	.180	.909**	.762	.290**	-.233*
LUS 3: Orientated running	.95	.229	.868**	n. c.	.180	-.066
LUS 4: Rhythmic jumping	.80	.401	.826**	.595	.224*	-.187
LUS 5: Coordinated jumping	.85	.363	.714**	n. c.	.017	-.049
RFG 1: Controlled riding	.93	.254	.891**	n. c.	-.102	.064
RFG 2: Changing track	.97	.164	.734**	n. c.	.379**	.049
RFG 3: Braking and stopping	.96	.200	.971**	n. c.	.120	.132
RFG 4: Controlled sliding 1	.92	.277	.111	n. c.	.187	.319**
RFG 5: Controlled sliding 2	.99	.117	-.750	n. c.	-.055	.015
SKG 1: Throwing in a target 1	.87	.337	.818**	.276	.117	-.055
SKG 2: Throwing in a target 2	.74	.440	.899**	.378	.254*	.012
SKG 3: Hitting in a target	.49	.503	.987**	.865	.003	-.327**
SKG 4: Controlling with a stick	.78	.413	.968**	n. c.	-.061	-.032
SPB 1: Throwing and catching 1	.96	.192	1.000	n. c.	.290**	-.135
SPB 2: Throwing and catching 2	.72	.449	.828**	.737	.323**	-.041
SPB 3: Controlled dribbling 1	.87	.342	.884**	.759	.268**	-.268**
SPB 4: Controlled dribbling 2	.79	.409	.878**	1.000	.433**	-.295**
SPB 5: Shooting and stopping	.86	.352	.945**	.587	.313**	-.029

Note. ID: Item difficulty; SD: Standard deviation; ICC: Intra Correlation Coefficient; n. c.: not calculated (as all results of at least one rater are the same); * p<0,05; **p<0,01

As **table 2** shows, the item difficulty of the different items lies between .49 for the most difficult item and .99 for the easiest item. Even if the MOBAQ concept focuses on minimal standards, and should thus a priori lead to high item passing quotes, several items – like e.g. BAG1, BAG3, BIW3, LUS2, RFG3, RFG5 and SPB1 – have very low item difficulties. The ICC-value giving an indication on the objectivity of the test-items is in general very high, except for BIW3, LUS1 and RFG4, which gives a positive indication about the quality of the standardization and the description of the test items. In the same way, Cohen's Kappa – giving an indication about the reliability – is in general high. For several items Cohen's Kappa has not been calculated, as at least at one test moment all the students passed the item successfully. Finally, the correlation values for the construct and criteria validity are less satisfying, as they are mostly indicating weak correlations with either the test areas or the external criterion of the grade in physical education.

DISCUSSION

In the following, the results of the review of the quality criteria for the individual tasks – as described below – are summarized and discussed.

Item difficulty

A test item can be considered as suitable difficult, if the item difficulty, or consist quote of a test item, lies between .80 and .95. Since MOBAQ tasks are minimum qualifications, the individual test tasks should also have high pass rates. Thus, if the item difficulty is under .80, the task can be seen as too difficult and should be more suitable for older children. If the item difficulty is above .95, the task can be regarded as too easy and should be more suitable for younger children.

Thus, the results show that especially the items LUS1 and SKG3 are too difficult and could be rejected or should be adapted. In the same logic, several other items (value 0 in the table) should also be adapted.

Objectivity

In the inter-rater objectivity should exist a high correlation, i.e. the respective cross-correlation coefficient ICC should be above r = .70.

The ICC values reflect in general a very high correlation between the different raters, except for the items BIW3 and RFG4, which means that only small improvements are needed for the standardization of the test items, which is mainly given by the description of the test items in the test manual.

Reliability

In the Intra-rater agreement should exist a high correlation, i.e. the respective correlation coefficient Cohen's kappa should be above r = .70.

The high intra-rater agreement values show that the results in the different test items are mainly the same on two test points, which is an important pre-requisite for the quality of the test items. Except the items constructed to evaluate skills in "Throwing" (SKG1 and SKG2) seem to lead to different results, which might be explained by the fact that the students have to solve the problem situations in these items several times to be successful (e.g. throw an object in a goal three times out of six trials).

Validity

In the construct validity, the selectivity coefficient according to Spearman should be at least medium, i.e. r = .30. However, as the item difficulties are generally high due to the concept of basic motor qualifications, it must be taken under consideration, that the calculated selectivity coefficients will be lower in general [1].

This means that, even if the results generally show low correlations between the isolated test items and the respective test areas, it cannot be concluded at this moment of the test review that most of the test items do not fit in the proposed construct. It can even be supposed that the test areas BAG and SPB consist of test items that fit rather good in the respective test areas, as the correlations are highly

significant. In the other test areas, this is only the case for a few of the test items.

In the criterion validity, the correlation between the grade in physical education and the test result should at least be low, i.e. r > .20, or here r < -.20, as the criterion is negatively scaled.

As can be seen in table 3, the correlation of the test items with the criterion "grade in physical education" is mostly very unsatisfying. This can be explained by the choice of the criterion, as it consists of a rather broad and vague subjective evaluation by teachers who are not specialized in the field of physical education but as elementary school teachers have to be generalists.

Table 3. Summary of the item analysis

Test item	ID	Objectivity	Reliability	Validity	
		ICC	Cohen's Kappa	Construct	Criterion
BAG 1: Balancing	0	+	n. c.	-	-
BAG 2: Climbing	+	+	0	0	0
BAG 3: Swinging	0	+	+	0	+
BAG 4: Stabilizing	+	+	+	0	0
BAG 5: Rotating	+	+	+	0	-
BIW 1: Sliding	+	+	-	-	0
BIW 2: Diving	+	+	+	-	-
BIW 3: Jumping into water	0	-	n. c.	0	-
BIW 4: Driving	+	n. c.	+	-	-
BIW 5: Floating	+	-	n. c.	0	-
LUS 1: Persistent running	-	n. c.	+	-	+
LUS 2: Coordinated running	0	+	+	-	+
LUS 3: Orientated running	+	+	n. c.	-	-
LUS 4: Rhythmic jumping	+	+	-	-	0
LUS 5: Coordinated jumping	+	+	n. c.	-	-
RFG 1: Controlled riding	+	+	n. c.	-	-
RFG 2: Changing track	0	+	n. c.	0	-
RFG 3: Braking and stopping	0	+	n. c.	-	-
RFG 4: Controlled sliding 1	+	-	n. c.	-	-
RFG 5: Controlled sliding 2	0	+	n. c.	-	-
SKG 1: Throwing in a target 1	+	+	-	-	-
SKG 2: Throwing in a target 2	0	+	-	-	-
SKG 3: Hitting in a target	-	+	+	-	+
SKG 4: Controlling with a stick	0	+	n. c.	-	-
SPB 1: Throwing and catching 1	0	+	n. c.	-	0
SPB 2: Throwing and catching 2	0	+	+	0	-
SPB 3: Controlled dribbling 1	+	+	+	-	+
SPB 4: Controlled dribbling 2	0	+	+	0	+
SPB 5: Shooting and stopping	+	+	-	0	-

Note. Item difficulty (ID): ID between .80 and .95: +, ID between .70 and .80 or > .95: 0, ID < .70: -; Objectivity: Intra Correlation Coefficient (ICC): r > .70: +, r between .60 and .70: 0, r < .60: -; Reliability (Cohen's Kappa): r > .70: +, r between .60 and .70: 0, r < .60: -; Construct validity: r > .50: +, r between .30 and .50: 0, r < .30: -; Criterion validity: r > .20: +, r between .10 und .20: 0, r < .10: -; n. c.: not calculated (as all results of at least one rater are the same)

CONCLUSION

As the results show, it is inevitable that some of the constructed tasks do not fulfil the requirements of standardized tests. Thus, these items have to be rejected or – in the case of minor defaults – they have to be adapted. With a view on the construct validity, it can be concluded at this point that the theoretic construct of MOBAQ has some failings, as the construct validity is generally very low, even if the concept of MOBAQ of minimal standards brings these low levels forward. Further conclusions about the construct validity can only be taken after the calculation of the scale analysis in a next step and the factor analysis of the data of the upcoming study II with the improved items. Besides this, it appears that the criterion "PE grades" chosen to review the criterion validity is not appropriate. This is why in study II should be collected further data, as e. g. the grade of physical activity during the week, as control variables in order to review the criterion validity.

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THE CONTRIBUTION OF PHYSICAL EDUCATION TO THE ACQUISITION OF KEY COMPETENCES: ESTABLISHING DIMENSIONS

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INTRODUCTION

Following the Lisbon European Council of 2000, the EU began the long process by which proposals were made to define and develop citizens' competences. Finally, in 2006, the European Parliament and the Council of the European Union made the following recommendation on competences for lifelong learning.

Competences are defined here as a combination of knowledge, skills and attitudes appropriate to the context. Key competences are those which all individuals need for personal fulfilment and development, active citizenship, social inclusion and employment. (European Union, 2006, L 394/13) [10]

If in other periods the onus had been on observable and measurable behavioural competences, the new curricular models reflected the institutional belief that young people's competence would be better served by mobilising their practical skills, knowledge, motivation, ethical values, attitudes, emotions and other social and behavioural traits [7, 8, 15, 18, 19, 25, 28]. Most of the literature also emphasises the importance of combining the mobilisation and use of the resources available to the individual, which Le Boterf [13] typifies as knowledge, information networks, social networks and know-how. Another key point in the literature is the applicability of learning outcomes in specific contexts, which Zabala and Arnau [28] describe as follows:

No se puede afirmar que una persona es capaz de demostrar cierta competencia hasta el momento en que aplica esos conocimientos, habilidades y actitudes en la situación adecuada, resolviéndolo de forma eficaz. Por este motivo, las competencias tienen implícito el elemento contextual, referido al momento de aplicar estos saberes a las tareas que a persona debe desempeñar.[1] (Zabala and Arnau, 2007, p. 49) [28].

Harnessing the competences they have acquired, therefore, young people in education must be able to identify real-life demands and choose, under each set of circumstances, the knowledge and skills that serve them best. This makes particular sense in modern life, where the complexity of our versatile, globalised, technological and, above all, unpredictable world requires us to juggle the full range of our competences to successfully engage with a host of changing contexts.

For the first time, Spain's national school curriculum [23, 24] defines the key competences that young people must acquire in their education to complete their own personal process of growth, meet the challenges of the world at large and pursue a profession that benefits society. These key competences must be useful in different contexts and reflect the students' use of learning outcomes that resolve the problems encountered in everyday life. They must therefore be interdisciplinary and transversal, meaning that they combine learning outcomes from different subject areas [2, 7, 17, 28]. Finally, if education systems are to foster equal opportunities amongst school leavers, these competences must also be within the reach of all students.

[1]A person cannot be considered capable of demonstrating a level of ability until the moment he or she applies knowledge, skills and attitudes in the right context to effectively solve a specific problem. In this sense, competences are determined by context, meaning the moment when knowledge, skills and attitudes are applied to the tasks that individuals must complete.

Following EU guidelines [9] the eight key competences identified in the Spanish national curriculum are: *Linguistic communication*; *Mathematical competence*; *Knowledge of and interaction with the physical world*; *Information processing and digital competence*; *Social and civic competences*; *Cultural awareness and artistic expression*; *Learning to learn*; and *Personal autonomy and sense of initiative*.

At a national level, the objective is to relate the objectives of each subject or subject area in school syllabuses to these competences, selecting and sequencing syllabus content and learning objectives. Adopting this competence-based approach, educators will assign greater importance to the societal, family and educational dimensions of skills learning and help students acquire and apply such skills in their school setting and then transfer them to their experience of further or higher education, or to social and family settings.

La educación basada en competencias implica utilizar formas de enseñanza que requieren dar respuesta a situaciones, conflictos y problemas próximos a la vida real [2] (Blázquez and Bofill, 2009, p.140) [1].

Because of this, as these authors observe, in a competence-based model of education students are not expected to be competent per se but to demonstrate a greater or lesser degree of competence that will allow them to effectively address a problem in the future. In a competence-based approach, students gain skills to address problems by using previously acquired knowledge and abilities. In the teaching of physical education, therefore, a competence-based approach will be one that helps students acquire and integrate knowledge, skills and attitudes to act effectively in a specific social setting. It will put emphasis on the learning outcomes that motivate students to pursue physical activity as a rewarding part of a lifelong process and focus on the promotion and acquisition of an active and healthy life style. A curricular design based on key competences will also facilitate the decision making process by which learning objectives are selected and help define teaching content, strategies and assessment. It will ensure that when teachers teach motor skills, they focus on skills that are genuinely relevant and useful for learners, so that the learning processes that take place in a school setting or originate from that setting will be relevant and have practical value elsewhere. And the first step towards ensuring this is to establish the particular dimensions of the competences that are to be taught (the knowledge, skills and attitudes that characterise each competence), and then relate these to the other elements in the school curriculum.

As a school subject, physical education can be directly and clearly related to the attainment of key competences. As observed by Salmerón [26], the human body is an essential element in the interrelation between people and their environment, and physical education is directly concerned with the acquisition of optimal physical, mental and social well-being in a healthy environment. But as well as helping people acquire instrumental skills or regular habits in the practice of physical activity, physical education can also be used to relate physical activity to a scale of values, attitudes and rules and to the knowledge of the effect this has on personal development. It can become a highly effective means of developing students' key competences because it attempts to educate individuals in the round, because it is interdisciplinary and because it teaches useful life skills. This paper establishes the dimensions (knowledge, skills and attitudes) that characterise the Spanish national curriculum's eight key competences and identifies the contributions that physical education can make to do these.

METHODOLOGY

The method used is that of the "literature survey". The sources analyzed are classified into two groups: legal documents referring to European and Spanish curricula and curriculum guidelines; and scientific papers drawn from the main educational databases.

The research was completed in the following stages:

a) Key competences were identified in the European reference framework document of 2006, the Spanish Organic Law on Education of 2006 and, from the same year, the two Spanish decrees on

[2] Competence-based education is delivered using teaching methodologies that require students to address situations, conflicts and problems that are close to their experience of everyday life.

minimum teaching requirements in the national curriculum in compulsory primary and secondary education (Decree 1513 of 7 December 2006 and Decree 16131 of 29 December 2006).

b) The literature was reviewed to identify other proposals.

c) The skill dimensions for each competence were established according to the two decrees described above in (a).

d) The contribution made by physical education was identified for each dimension.

e) A workshop discussion was conducted.

f) A document was prepared to describe the aspects of physical education that should be used to teach the dimensions (knowledge, skills and attitudes) of key competences.

RESULTS

Our research results are described in the following tables.

Table 1. Contribution of physical education to Linguistic Communication

Dimension	Contribution
Communication	• Communication through physical activity • Body language • Conflict resolution in the practice of physical activity
Communication in a foreign language	• Comprehension of messages and their association with motor responses • Use of the foreign language in the practice of physical activity
Representation and interpretation of reality	Vocabulary associated with physical activity and sport (materials, installations, techniques, strategies and rules) Interpretation of the rules of games and sports
Self-control of emotions and behaviour	Description of one's physical actions and the physical actions of others

Table 2. Contribution of physical education to Mathematical competence

Dimension	Contribution
Use and association of numbers and basic numerical operations	Use of basic notions of mathematics in the practice of physical activity (measuring distances and frequencies, counting repetitions, calculating periods of duration and pauses)
Mathematical reasoning	Solving motor problems
Interpreting the spatial dimension of reality	Spatial awareness in physical activities

Table 3. Contribution of physical education to Knowledge of and interaction with the physical world

Dimension	Contribution
Protection of individual and community health	Knowledge of one's own body Physical fitness Safety in physical activity
Looking after the environment	Responsible approach to the natural environment in which physical activities take place
Reasonable use of material resources and responsible eating habits	Reasonable use of resources associated with physical activity (installations, equipment and sports kits) and responsible eating habits

Table 4. Contribution of physical education to Information processing and digital competence

Dimension	Contribution
Selection of information	• Retrieving useful information
Information processing	• Critical awareness of media stereotypes about the body • Critical analysis of information about sport
Use of ICT	• Use of ICT in team projects in physical activity and sport • Understanding the risks of sedentary, ICT-related leisure activities

Table 5. Contribution of physical education to Social and civic competences

Dimension	Contribution
Knowledge and understanding of social reality	• Sport as a social phenomenon • Conflict resolution in physical education
Valuing multiculturalism	• Games and activities to assist multicultural expression
Acquisition of social skills	• Cooperation in physical activities • Negotiation
Creation of a personal values system	• Resolution of problems in the practice of physical activity
Commitment to democratic participation	• Participation in the organization of physical activities

Table 6. Contribution of Physical Education to Cultural awareness and artistic expression

Dimension	Contribution
Appreciation and enjoyment of art and other expressions of culture	• Physical activities as expressions of culture (traditional games, sports, physical theatre, dance)
Artistic creation	• Physical expression

Table 7. Contribution of Physical Education to Learning to learn

Dimension	Contribution
Awareness of personal abilities	• Knowledge of personal physical abilities and limits
Possession of learning strategies	• Diversity of physical response • Teamwork
Sense of personal ability	• Personal objectives in physical activity • Constructive management of physical effort
Application of learning outcomes	• Physical activity in free time

Table 8. Contribution of Physical Education to Personal autonomy and sense of initiative

Dimension	Contribution
Personal development	• Overcoming adversity, diligence, and a positive attitude towards tasks
Personal criteria in selection processes	• Decision making in the completion of tasks in physical activity and sport • Responsibility and honesty in the observation of rules
Turning ideas into action	• Organization of physical and sports activities and activities of personal expression

DISCUSSION AND CONCLUSIONS

Our results identify the aspects of physical education that should be used to teach the dimensions (knowledge, skills and attitudes) of the Spanish national curriculum's eight key competences. They support the general consensus that education policy actors need to analyze the capabilities implicit in each of these competences and formulate these as dimensions and sub-dimensions [7, 17, 20, 21, 22]. Our research also shows that where it addresses the physiological, social and cultural aspects of the body and of human movement, physical education can contribute substantially to the acquisition of the competences *Knowledge of and interaction with the physical world*, *Social and civic competences* and *Cultural awareness and artistic expression*. This is supported by most of the authors who analyze the contribution of physical education to key competences [4, 6, 11, 14, 15, 16, 27]. More specifically and about the contribution physical education makes to *Knowledge of and interaction with the physical world*, González Arévalo [12] observes the following:

> *La educación física se convierte en materia fundamental en la consecución de la "competencia en el conocimiento y la interacción con el mundo físico"... El alumnado debe acabar su escolaridad obligatoria conociendo cómo funciona su cuerpo y qué hacer para mantenerlo en forma, para consolidar toda una serie de hábitos saludables que le acompañen a lo largo de su vida y superarse a sí mismo*.[3] (González Arévalo, 2011, p.36) [12]

Note that the remaining competences are also favoured by the practice of physical education insofar as this subject encourages learners to develop autonomy in learning and in the management of what should become a lifelong practice. The close ties between physical education and *Personal autonomy and sense of initiative* have been observed in particular detail by Zagalaz, Lara and Cachón [29] who argue that physical education contributes substantially to this competence. Cañabate and Zagalaz [3] provide an exhaustive analysis of the contribution physical education can make to *Learning to learn*. On its contribution to *Communication in languages*, the reader should note the importance in physical education classes of body language; and we agree with Coral [5] that when physical education is taught in a foreign language, the functional use of language forms part of the subject's learning objectives. Finally, we also propose that physical education can contribute to the acquisition of knowledge, skills and attitudes in *Mathematical competence* and *Information processing and digital competence*, as indicated in our research results, although this is not made explicit in the Spanish national curriculum.

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IMPACT OF INNOVATIVE TECHNOLOGIES, USED BY TEACHERS OF PHYSICAL EDUCATION, ON THE LEVEL OF MOTOR ACTIVITY FOR PUPILS IN UKRAINIAN SCHOOLS

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Keywords. *Motor activity, innovative technologies, physical education, physical development*

INTRODUCTION

Nowadays scientists of many research institutions in Ukraine continue to search for new ways to further improve the system of physical training of all categories of the population in the state. Besides a lot of very important research investigations were carried out in this sphere of science in many other countries of the world [2, 5].

For full adaptation to the conditions of people living in most of the settlements in Ukraine, as in many other towns in the world, nowadays requires a fairly high level of development of their basic physical qualities. Therefore it is extremely important to make a scientific study, development and implementation in the practice some complexes of special methods of teaching different categories of pupils, which will be useful to contribute their physical development and which will not be harmful to their health [9].

The results of analysis the current scientific and methodical literature show that in our time finding the ways to improve the system of physical education of schoolchildren is one of the most important directions of scientific activity.

Proper development in adolescence such physical qualities, which are required for their full adaptation to life in a modern society, is very important for important for their future, because by means of this qualities the adult people will be able to perform the different work assignments with high level of quality reliability [6].

In the course of professional activities usually are used such physical qualities as strength, endurance, agility, flexibility, and many others. In order to develop these qualities in the way of reaching of their desired level, it is necessary to begin the process of their formation in childhood and to preside it during the school years, applying constantly the system of long-term training [4].

Through, to perform successfully the system of training, aimed at the establishing all basic physical qualities in children and adolescents, it is necessary to apply such mode of loads, which would be sufficient for the formation of physical qualities, but will not be excessive in terms of the possible negative impact on the health of schoolchildren. Typically, this process takes a long time and requires a lot of effort and its providing needs the process of monitoring the state of schoolchildren's health [1, 3, 8].

The results of research investigations, carried out in many countries in recent years, prove, that now it takes place an urgent need to improve the global system of physical education of all people, who belong to the younger generation, to ensure the harmonious development of their physical, spiritual and intellectual qualities, as well as to maintain and strengthen their health [7].

METHODS

Subject matter

At the time of this study were used the following research methods: analysis of scientific information from the domestic and foreign scientific literature; method of pedagogical supervision; method of

pedagogical experiment; methods of questionnaires and interviews; testing of health indicators in schoolchildren; methods of definition the level of physical development of pupils; methods of statistical treatment of the data, obtained in the results of providing the experiments.

The main objective of this study was to investigate the effect of the application of various kinds of innovative technologies, using in the sphere of physical education in schoolchildren on the character and level of their impellent activity.

Experimental design

This research investigation was conducted in the period from February 2013 to May 2014. To participate in this study were involved 84 schoolchildren from different schools in Kiev and region. During the study, first were investigated the indicators the state of health of schoolchildren, and then were studied the indicators of physical activity the same schoolchildren in the conditions of application or avoiding of application some of the modern innovation technologies.

Statistical analysis

For statistical analysis of data, obtained in the course of this research investigation, were used some advanced computer programs, designed specifically for application in the field of medicine and physical education of the population.

RESULTS

In the process of carrying out of this work was obtained some information about the dynamics of changing in the indicators, which characterize the level of development main physical qualities of schoolchildren and the state of their health, depending on the application of innovative technologies in the process of their physical education.

To participate in this study, of the total number of schoolchildren, studying in the schools of Kiev and region were selected 84 schoolchildren, whose overall level of physical activity was thought to be not sufficient enough. All selected schoolchildren were divided into two equal studying groups, which included members of the same anthropometric, age and sex characteristics.

During the process of physical training all schoolchildren of the first group (group S) were used the standard technologies, officially approved by the Ministry of Education and Science of Ukraine. For the training all schoolchildren of the second study group (group I) were applied some modern innovative technologies, which act throughout the observation period. After expiry of this period was made a follow-up study of the main indicators, characterizing the performance of physical qualities and the health of all schoolchildren, and besides was estimated the degree of changes in the level and nature of their motor activity in general.

The level of development the basic physical quality each of the surveyed schoolchildren was assessed by means of performing them the sets of special test exercises. Moreover, these complexes of these exercises were fully adapted to the potential physical abilities of each of the age groups of schoolchildren.

It should be noted, that a significant proportion of schoolchildren, selected for participation in this study, in their childhood had a certain contraindications to the employment of different types of physical activity because of illness, any problems of the state of health or because of some other circumstances.

Some of the results, obtained in the course of these studies, are presented in the nest table (Table 1).

As you can see from the data, presented in this table, there was a fact of improving the results of all physical tests, which schoolchildren performed in order to demonstrate their level of training.

The growth of indicators, which are characterized the level of physical development of schoolchildren, was significantly higher in the group, where were applied some innovative technologies, comparing with a group of schoolchildren, performed by menace of standard technologies.

An objective analysis of the results of our investigation showed, that the most significant progression the qualities of physical development of pupils was observed in those cases, where the innovative tech-

nologies in the process of physical education of schoolchildren were used optimally, reasonably and with mandatory medical monitoring.

Table 1. The results of testing the physical abilities of schoolchildren

Type of test	Indicators of physical development			
	Beginning of the course		The end of the course	
	Group I	Group S	Group I	Group S
Lifting the body (form a prone position)	25,9 ± 2,4	25,8 ± 2,4	32,2 ± 2,8	29,8 ± 2,6
Sprint 30 m (sec)	7,4 ± 0,8	7,4 ± 0,8	6,9 ± 0,7	7,2 ± 0,8
Flexion and extension arms in emphasis lying	17,2 ± 1,3	17,1 ± 1,2	21,4 ± 1,9	19,1 ± 1,4
Long jump without a run (cm)	132,6 ± 10,4	132,3 ± 10,3	148,4 ± 11,3	136,4 ± 10,7
Shuttle run 10 x 4 (sec)	12,8 ± 1,2	12,9 ± 1,2	11,2 ± 1,0	12,5 ± 1,1
Torso forward from a seated position	9,2 ± 0,9	9,3 ± 0,9	12,8 ± 1,2	10,4 ± 1,0

As was shown in studies of many prominent scientists, working in the sphere of human's impellent activity investigations; there is an unaffected correlation between the level of optimality the motor activity of schoolchildren and the level of severity the indicators of their physical development.

In addition, on the base of the results of this research it was established, that in many cases the application of innovative technologies in the process of physical education of schoolchildren have promoted of their achievement such indicators of the physical development, which are typical for the schoolchildren in more older age groups.

Thus, conducted this research investigation, we received confirmation that the rational proper using the special educational and training programs, based on the principle of application some innovative technologies, promotes the acceleration of development the main physical qualities of schoolchildren, which characterize their level of physical fitness.

DISCUSSION

The results, obtained in the course of this research investigation, provide compelling evidence, that the using of innovative technologies in the course of physical education of schoolchildren contribute the improving the character and mode of their impellent activity and promote the acceleration of development their basic physical qualities.

One of the advantages of such special programs for the physical education and training, based on the principle of application the innovative technologies, is that their practical application not only promotes a more complete development of physical qualities of the schoolchildren, but also contributes to the preservation and strengthening of their health.

However, for the proper implementation of such special programs requires an extremely high level of professional skill of teachers of physical education, trainers and coaches.

In addition, in order to achieve the desired result, except the high-level of knowledge and professional skills of specialists, working in the sphere of physical education, it is necessary to use special equipment

and special conditions for the implementation of innovative technologies in the process of physical education of schoolchildren and other categories of youth.

Given the fact that in many countries of the world in our time is working on the improvement of educational programs in physical training, it can be assumed that most of these programs will be used in modern innovative technologies that can significantly improve the efficiency of the educational and upbringing process among young people.

Given the fact, that in recent years were published many research-scientific papers, devoted to the study the item of the influence the modern educational-training programs on the state of health all pupils of primary schools, secondary schools and students of other educational establishments, there is no need to prove, that the widespread best practice of physical education students will contribute not only increase the level of physical development of schoolchildren and students, but also to strengthen and preserve the state of their health.

The well-known fact is considered, that optimization the style and character of impellent activity of schoolchildren and students, as well as other categories of the population, is the most effective means to enhance the state of their health and to improve their mental and emotional condition.

In addition, it should be noted, that many scientific-investigation studies have confirmed, that the lack of impellent activity in childhood and in the school ears is one of the most conductive factors for the incipience of such pathological conditions as diseases of the cardiovascular system, diabetes, obesity, metabolic disorders and others.

In summary, it should be noted, that the scientific information, obtained in the course of this study, can be successfully used for the development of special programs for the physical training, based on the innovative technologies, that will be able to prevent the progression of any disease in those children who have chronic diseases, so, such programs can be used for physical education of schoolchildren, who studies in the special medical groups.

This direction of scientific-research work can be considered as the most promising in terms of further improvement of the system of physical education in schools, aimed at achieving two main tasks: to contribute to the optimal development of physical qualities of youth and the protection and preservation of their health.

CONCLUSIONS

Thus, based on the information, obtained in the course of executing our research investigation, we can draw the following conclusions:

Rational using in the course of physical education the pupils of primary and secondary schools special educational-training programs, based on the implementation of innovative technologies, helps to optimize schoolchildren's impellent activity and promotes more complete development some of their basic physical qualities, above all, such as strength, endurance, speed, agility, and others.

The correct application of modern educational-training programs, based on implementation the innovative technologies (in some cases with the use of medical monitoring), contributes to the successful solution of problems, related not only with the development of main physical qualities of schoolchildren, but also of the preservation and enhancement the state of their health.

Practical application of the modern educational and training programs, based on some innovative technologies, requires from physical education teachers, trainers and coaches the extremely high level of professional skills. And all scientific information, obtained in the course of executing this study, can be successfully used for the development of new educational and training programs, designed for schoolchildren and adolescents, and aimed at optimizing their physical development, as well as the preservation and strengthening of their health.

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PHYSICAL EDUCATION AND LIFE SKILLS FOR LIFE COMPETENCE

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Key words: *Physical Education-Life Skills-Competence-Active Schools Break*

INTRODUCTION

Life skills are abilities for adaptive and positive behaviour, that enable individuals to deal effectively with demand and challenges of everyday life (WHO, 1997). Physical Education can participate in the education of life skills. 1st Hypothesis of the research is every day Physical Activity Break program in a primary school to develop the life skills of "coping with stress" and learning how to relax and improve concentration in the learning school setting. The "coping of stress" and "coping of emotions" era Life skills as abilities for adaptive and positive behaviour, that enable individuals to deal effectively with demand and challenges of everyday life (WHO, 1997). Physical Education can participate in the education of life skills. 2nd Hypothesis of the research is every day Yoga Break program in a primary school to develop learning attitude and positive classroom climate

METHODOLOGY, It is descriptive and qualitative research and it is composed in two part: 1st historical research based on primary and secondary sources on the arguments life skills and competence in Physical Education (PE) and Physical Activity in the school setting (PA); 2nd part is provide detailed information from survey based on assessment the development of copying stress life skills by physical activity breaking in the primary school setting. It is planning by concentration questionnaire (8 question, multi-chosen close replay), pre-test before 8 week physical activity break program based on Yoga training involving primary school students (aged 9-10 years).

The Historical research: the primary sources life skills "The life skills education for children and adolescents in school. Introduction and guidelines to facilitate the development and implementation of Life Skills Programmes" (WHO/MNH/93.7a Rev..2, Geneve 1993-1997 p. 1) purposed materials focused on the teaching of life skills at the children and adolescents in the school setting. It is school based health and psycho -social interventions. The psycho-social competence (PSS) is person's ability to deal effectively interrelation and challenges for every day life (to maintain state of mental well-being, to demonstrate the adaptive and positive behaviour with others person, culture, environmental. The PSS is import for promotion of health and involved physical, mental, social, well-being.

"The life skills are ability for adaptive and positive behaviour, that enable individuals to deal effectively with the demands and challenges of everyday life" (WHO/MNH/93.7a Rev..2, Geneve 1993-1997 p. 1). The life skills are innumerable and different across the culture and setting. The core/heart set of life skills for promotion of health and well being are: 1) decision making (personal participation and constructive deal about the decision for our life); 2) problem solving (research constructive solutions with the problem of our life); 3) creative thinking (identified the problem and to explore all the opportunity of resolution); 4) critical thinking (to analyse information, experience by objective point of view and assess all the factors as value, peer pressure, media); 5) effective communication (to be able to express and understanding the message of verbally e non verbally communication addressed at the culture and situation); 6) interpersonal relationship (to make and keep friendly relationships climate in the family, school and peer setting); 7) self-awareness (to recognise ourselves and understand our character, point of strengths and weakness, desires and dislikes, recognise the stress and under pressure situation); 8) empathy (ability to image what feel other person, understand and accept the difference of others,

encourage nurturing towards people needs as care, assistance, tolerance) ; 9) coping with emotions (to recognise the emotions in ourselves and others, to understand the influence of emotions in the behaviour and the relationships between the negative intense emotions- e.g anger, sorrow – and negative effects on the health) ; 10) coping with stress (to recognise the sources of stress in our life, understand the effects and adopt acting to help the stress management and control as increase the volume of physical activity and active life style, learning the technique of relax). The life skills can be taught to young people by teaching knowledge and practice experiences. It is importance to understand the cultural difference in the life skills learning programme and open at the variety of the country, different social-and religion value. The conceptualizing of life skills role for health promotion:

a) 10 life skills can be group together in 5 areas:

1st Area	2nd Area	3rd Area	4th Area	5th Area
Decision making	Creative thinking	Effective ommunication	Self Awareness	Coping with emotion
Problem Solving	Critical thinking	Interpersonal relationship	Empathy	Coping with stress

(WHO/MNH/93.7a Rev..2, Geneve 1993-1997 p. 3)

The teaching life skills in the 5th areas provides to develop the psycho-social competence. The survey present the 2nd part of this document is oriented at the 5th area

b) The life skills teaching programmes demonstrate effectiveness in variety of prevention topics as substance abuse, adolescent pregnancy, the intelligence promotion, prevention of bullying, AIDS prevention, self confidence and self-esteem. The survey present in the 2nd part of this document is oriented at topics intelligence promotion (Gonzalez, 1990), bullying prevention (Olweus, 1990), self confidence and self esteem (Tacade, 1990)

c) Teaching life skills in relation at the every day life as part of broad-based life skills programmes for primary prevention education

d) Model of life skills and relationship with positive health behaviour and prevention:

Knowledge attitude values	+	Life skills for psychosocial competence	+	Behaviour reinforcement or change	=	Positive health behaviour	→	Prevention of health problems

(WHO/MNH/93.7a Rev..2, Geneve 1993-1997 p. 4)

The motivation to behave healthy is not only is based on the abilities but also is important the social support, cultural and environmental factors

The life skills are in relation with the personal perception of self-efficacy, self-confidence and self –esteem. The mental well-being by life skills is mile stone for prevention of mental disorder, health and behaviour problems

Teaching life skills for develop the psycho-social competence is complementary in the school and education setting with literacy skills (reading, numeracy, learning to learn, specking mother tongue…) and technical and practical livelihood skills. In the contemporary culture and society is inadequate the family and cultural traditional mechanism for passing the life skills caused from fast social changes and globalization by media influence (TV, internet…)

The life skills education is based multilevel programmes: health information, draft of environmental and social changes. The approach of life skills education programme (LSEP) is based on the Social Learn-

ing Theory (Bandura, 1977). It is active learning model focused on the active acquisition, experience processing and structuring. The students are involved in small working group and pairs (peer education and cooperative learning), brainstorming (free association of ideas; organization of ideas in mental and conceptual maps) , role play and games (active resolution of real situation by life skills for life competence) and debates (dissemination and amplification in the time and place of life skills for life competence). The teachers start exploring students ideas, knowledge about specific situation by brainstorming 2nd step is the discussion in small working groups or with partner; 3rd teacher to be mediator of role play and games where the students are engaged in real problematic situations and they need to organize and manager life skills for resolution; 4th step teacher assign homework to encourage: discuss, debate and practice the life skills after in the time (vertical continuity) and in other contexts/places (horizontal continuity in family, friends, community…). The life skills teaching born in the school formal education and grow in the informal education around the world. The young student age is ideally before the negative established negative behaviour and relationships patterns established. The school life skills learning programme point of force: school socialization role for young people; large scale school young population participation; economics efficiencies of habitual structure for young; teacher expertise; parents and community high credibility; short and long time evaluation. The school curriculum life skills programme participate at the prevention of drop-out. The life skills PE teacher training is a part of pre-service and service professional up to date. The life skills education require support of school authorities and of community finances. The benefits from life skills programme are directly on improve positively the child health, indirectly pupil relationship (Pearson et al. 1988), lesser classroom negative behaviour problems, positive improved academic performance (Weissberg et al., 1989), school attendance e prevention drop-out (Zabin et al., 1986), less bullying, less requests of specialist support at adolescents problems, better relationships between peers and parents. LSEP process need also evaluation, data shared with decision makers por future implementation, changing priority based on the children on going needs. (WHO/MNH/93.7a Rev..2, Geneve 1993-1997 p. 5-6-7).

The support structure for development life skills educational programme is organized at national level and require two bodies: a. management of the technical tasks of the programme design, implementation and evaluation (Life Skills Development Group); b. supervise the process (Life Skills Advisory Panel.

The objectives and strategy for life skills programme development are in according with the Convention on the Right of the Child (Article 29) (United Nation, ????) *"education of child shall be directed to the development of the child's personality, talents and mental and physical abilities to their fullest potential; … the preparation of the child for responsible life in a society, in the spirit of understanding, peace, tolerance, equality of the sex, and friendship among all people,,,"* (United Nation, 1978 "Convention on the Right of the Child -Article 29)

The Life Skills Education Programme is for age target 6-16 years old, with priority at6 the pre-adolescent or early adolescent years (age most vulnerable to behaviour-related health problems)

The designing life skills programme lessons are active and experiential (engage the teacher and pupil in dynamic process of learning by brainstorming, group discussion/debate. Experiential learning is based thorough doing/ practice with game (traditional children's game), role play, homework assignment for encourage pupils to extended the practices of life skills in the live, family, communities. (WHO/MNH/93.7a Rev..2, Geneve 1993-1997 p. 19-20).

The broad-based life skills programme to promote psychosocial competence is based on three basic levels in the lessons ongoing in sequence: 1st level teaching the core components of life skills, practised in relation to common everyday situations; 2nd level application at the relevant themes connected to various health and social problems; 3rd level application of skills in specific situation can rise to health and social problems. (e.g. in this chapter: PE yoga break lesson for develop the life skills copying with stress and with emotions).

Life skills	1st Level	2nd Level	3rd Level
Copying with stress	Identifying sources of stress	Methods for coping in stressful situation	Copying in situations of adversity
	Spend long time sitting in the chair in small place	Break the long time sitting with physical activity (yoga position, stretching movement, controlled breathing…) under the teacher guide	Break the long time sitting with physical activity (yoga position, stretching movement, controlled breathing…) under self control every time it is need at school or in the daily life
Copying with emotions	Recognition of the expression of different emotions	Understanding how emotions effect the way we behave	Coping with emotional distress
	Iper-activity reaction at to long time sitting position and fatigue in concentration	Physical activity distress power and relaxing post controlled breathing under teacher guide	Physical activity distress power and relaxing post controlled breathing under self control every time it is need at school or in the daily life

(WHO/MNH/93.7a Rev..2, Geneve 1993-1997 p. 21-22 adapted and modified Cazzoli, 2014).

The designing life skills programme is flexible and based on the integration into the school curriculum, teaching with academic subjects (Physical Education, Science…) and infused in the existing curriculum (weekly subjects timetable and daily routine, e.g the break/pause learning and recreational time), in the perspective of the implementation extra-curricular activity.

Life skills teaching materials manual is describing the rationale, theory (approach, pedagogy) , value and methodology (structure, phases, materials) for feedback documentation and internal evaluation about the experience and for transfer the experience in other situation and external evaluation and future development.

In according with life skills competencies education (WHO, 1993-1997) is possible to develop knowledge by new approach of Physical Education Teacher training based on the Physical Education Competence.

PETE based on competence model is in according with the adaptation at the PE subject from Perrenoud (1999) models for implementation of Quality Physical Education:

1. Planning and organizing the PE learning situation by competence on integrated and functional set about knowledge, to do knowledge; to be knowledge, to became knowledge for to face various categories of situations, to adapt and to resolve problems and to carry out projects long life time.

The practice/doing is aimed to develop the complex knowledge for life. The theory (PE knowledge system based on the PE epistemic knowledge nets in the field: education, sport, leasure, movement culture for organization of learning objectives) and practice (PE actions) are integrated system.

- Working from the students PE representation
- Working from the wrongs and obstacles in the PE learning
- Building and planning the PE didactic sequence. Students involving in PE research activity and in knowledge projects

2. Management the progressive PE learning:

- Conceiving and planning PE problem situation in order at student level (step of movement, cognitive, emotional, motivation development and possibility (level of training)

- Acquiring the longitudinal vision about learning objectives and development in the time
- Fixing link between PE theory and learning activity
- Observing and evaluating the students in the PE learning situation by formative approach (changes)
- Fixing periodic PE competence monitoring and making decision for progression
- Planning PE learning cycles by deeply/highly expertise

3. Planning and management of individual difference: . . Management PE classroom heterogeneity

- Opening the management of the PE classroom in open space (outdoor/indoor)
- Carrying out the PE integrate support, working with students in difficult (Special Educational Needs, students with disabilities, Intercultural students)
- Developing students cooperation and mutual learning in PE
- Double constructing: from knowledge versus practices and viceversa

4. Involving the students in the PE learning and school working:

- Arousing student PE learning, carrying out the relationship knowledge, understanding and scholastic work mining, student development of self-evaluation PE capacity
- institution of student council and negotiating the rules and contracts by curricular and extracurricular physical activity
- offering optional PE education activity
- promoting the definition of PE student personal project

5. Working group:

- elaborating PE group project and PE commune representations
- encourage PE working group, management of meeting
- forming and renewing PE pedagogical group
- confronting and analyzing PE complex situation with the group, practices and professional problems
- management of
- crisis and conflicts between people in the PE classes

6. Taking part of the school management:

Elaborating and negotiating of PE institution project/PE department

- management the school sources for PE
- PE coordination and encourage school participation for all stakeholder
- PE organizing and supporting the students evolution and participation
- PE developing competencies for working by learning cycles

7. To inform the parents:

- Encourage and management PE information meeting and debates
- Supporting conversation about PE
- Involving parents in the PE learning building

8. To use the technologies for education:

- Support becoming
  New Technologies in PE school discipline, doing knowledge and teaching tool
- Utilizing PE
  Video-software and PE smart application in mobile, tablet, pc
- Utilizing the didactic power of software in relation of PE learning objectives
- developing PE distance communication by computer science and technology tools
- Utilizing the computer science and technology tools for PE learning

- PE Competences based on the technology culture

9. To confront with ethical duty and dilemma:
- Preventing the violence in the school and in the city by the sport/PE fair play
- Fighting against prejudices and sexual, ethnic and social difference by team play
- Taking part at rules construction for community life about PE school discipline, respect of rules and regulations play, sanctions
- Analyzing the pedagogical relationship, authority, classroom communication in PE class
- Developing of responsibility mining, solidarity, justice mining in PE

10. Management of PE Continuing Professional Development –CPD:
- Explaining PE self practices
- Monitoring the PE competences balance and self Continuing Professional Development – CPD
- Negotiating the common PE educational project with colleagues (group, school)
- Self involving in PE teaching tasks (in order at the PE school teaching) or management task (in order at the education system)
- Accepting and taking part at the PE newcomer/pre-service teacher colleagues
- Becoming active actor of PE Continuing Professional Development –CPD (Cazzoli, 2014)

2nd part Case study:

The protocol is: 30 minutes physical activity every day over PE; for 8 weeks, after 2 hours of classroom work; activity: yoga position, visualisation, diaphragmatic breathing, listening nature sound…) . Sample: 24 students in the setting of national primary school, student aged 10,05 years (9.6-10.5) (experimental group); 23 (control group) experimental group; period March-April 2014.

The aims of the research is to determinate characteristics about break physical activity program for improve the facilitate school setting and students learning positive attitude. Sample 24 students in the setting of national primary school. Instrument observation and professional logbook about planning and management of physical activity for 20th hours in two months (March- April 2014); typology of activity (yoga position, stretching, visualisation, diaphragmatic breathing, listening nature sound); perception and self-awareness of children from the experience (narrative storytelling, design, auto-evaluation)

Results, Data show concentration are improved (from/to) in study 37,5%-50%; lesson 16,6%-45,83%; imagination 16,6%-41,66; distraction 25%-20,83; silence classroom setting 37,5%-62,5%; management interference from classmates 29,16%-50%; management of interruption of study 37,5%-54,14%. In the control group the data have not changed significantly. From the data it is possible to draft a documentation of the experience and improve the comparative situation in vertical (same sample in different time) and horizontal (other similar sample in the same time

Discussion and Conclusion The improvements about all the data in experimental group confirm daily physical activity breaks are facilitators of "coping stress" life skills and improve attitude at learning.

The positive results from teacher, students and learning observation are opportunity for the future deepen investigations and improve experience about the physical activity break in the school curricula and setting

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FROM SCRAP TO STREET: REPAIRING ABANDONED BICYCLES FOR THE STUDENTS OF THE UNIVERSITY OF CANTABRIA. A PROPOSAL TO ENCOURAGE PHYSICAL ACTIVITY AMONG THE COLLEGE COMMUNITY WITH SUSTAINABLE TRANSPORT MEANS

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Keywords: College sports, sustainable transport, physical activity, urban cycling

INTRODUCTION

Between the late nineteenth and early twentieth century bicycles were highly popular, e.g. in 1896 the production of bicycles reached 1 million a year in the USA (Sanz and cols. 1999, p. 11) and became a boom in the industrialised countries, overcoming obstacles such as bad pavements, high costs, poor technical development and the mindset of the times.

Bicycles experienced a golden age by combing the bourgeois desire to enjoy leisure time with the proletarian desire for freedom.

Later, from the second half of the twentieth century on, the technical progress in the automobile industry resulted in a marked decline in bike users and in urban planning and management, leaving bikes confined to purely sporting events (seriously damaged today by doping practices) and leisure activities. The popular, everyday and functional use of bicycles significantly decreased (associated with the professional and daily activities) (Augé, 2009, p. 29).

At the end of the twentieth century, bicycles recovered their previous position for various reasons. For instance, Asian bicycles alone carry more people every day than all the cars in the world (Lowe, 1989; Sanz and cols 1999, p. 11).

Some of the motivations and reasons behind this new revival of the bicycle culture could be due to the following benefits (Sanz and cols., 1999, p. 18-19):

- Less danger (although it is a risky means of transportation)
- General health benefits (improving fitness and reducing pollution)
- More social communication
- Higher environmental quality (less noise and pollution)
- Lesser environmental damages
- More social freedom (children, youths, elderly persons, etc.)
- Less energy and material costs
- Less use of infrastructural areas
- More equity
- More economic (lesser energy and material costs resulting in a long-term investment).

Some authors suggest that cycling *"offers a healthy, cost-effective, equitable way to improve the sustainability of urban transportation systems and build more liveable cities. As shown throughout this book, cycling is indeed a path to more sustainable transportation"* (Pucher and Buehler, 2012, p. 362)

Study Background .

Since the early 1980s the governments of Europe and other countries made speeches to promote cycling as a means of transportation, but these speeches did not always coincide with the corresponding practices and policies.

The University of Cantabria (UC) also wanted to join these initiatives and has been implementing a series of proposals and actions from different institutional bodies.

On the one hand, the Ecocampus Project, which is the formalization of the UC commitment to *Agenda 21*, also known as *Programme 21,* an attempt to implement small-scale biological and environmental principles emerged from a series of declarations and agreements derived from the 1992 Rio Summit to address climate changes.

Ecocampus UC has two main goals:

- Improve the environmental situation in the campus of the University of Cantabria
- Make the university community more aware by promoting participation, involvement, and local solutions to global environmental conflicts.

On the other hand, the Sports and Physical Activity Services of the University of Cantabria, under the Vice President for Space, Services, and Sustainability is also on board. This is an attempt to become an innovative service providing wellness and added value through physical activity and sport.

The objective is to direct, generate and promote the practice of physical and sporting activities, promoting comprehensive training and focusing on quality of life and improved health-related aspects.

The targeted values are sustainability and social responsibility: encouraging the use of bicycles is one of the various actions and activities planned.

Both Ecocampus and the Sports Services implement a series of projects related to using bicycles as a means of transportation. In this respect, various aspects can be addressed with a policy favourable to using bicycles (Sanz and cols. 1999 pp. 37- 40):

- Planning (comprehensive plan, timing of actions)
- Engineering (design, preparation and provision of required space and materials)
- Education and Culture (user information and education)
- Promotion (dissemination and communication of proposals)
- Financing (resource research, financial efficiency)
- Participation (user opinions)
- Rules (regulations and legislation)
- Evaluation and monitoring (investigational activity, suggestions for improvement)

These aspects resulted in various activities such as the Biking Thursdays where cyclists ride through the city of Santander and free Courses in Mechanics for university students to learn the basic notions of bicycle repairs and maintenance. This is similar to the idea advocated by Tonucci (2001) proposing a course to obtain Bike Cards and create *"Bicycle Laboratories"* in secondary schools: a place to thoroughly get to know a bicycle (p. 144-145).

This work would like to show one of these actions, namely the repair and recovery of abandoned bicycles for later use by the university community of Torrelavega. This town has approx. 55.000 inhabitants and is the second largest city of Cantabria after Santander; it is a major focus of bicycle fans, the birthplace of such famous names as Oscar Freire and Vicente Trueba. The UC campus has three faculties in this city (Mining, Physiotherapy, and Speech Therapy).

The Town Hall of Torrelavega, following the guidelines issued by other European cities introduced a public bicycle rental system for the first time with an initial investment of 180.000 Euro in May 2009. Six months later, when the system would have been free to use, the activity was suspended: "*But the initiative did not work. It soon showed low user figures, many bicycles disappeared - some ended up in the river – and others were damaged. The situation was so chaotic that the Town Hall had to initiate*

disciplinary proceedings. A few months later, the service stopped functioning and the bikes eventually ended up in the same situation" (Cerro, 2012). For various reasons, this rental system made all the mistakes that this type of service should not make (Sanz and cols. 1999, p. 110.)*: "Various faults: theft, imbalance between sources and destinations, adjustments to demand, damaged bicycles, problems with management and surveillance*".

In the autumn of 2012, the remaining bikes that "survived" this mismanagement were offered to various groups by the Town Hall of Torrelavega so that they did not end up on the junk heap. Having learnt about this in the Press, the Vice President for Space, Sustainability, and Services, being interested in bikes, developed a project for the restoration and subsequent use of these bikes by the members of the university community in Torrelavega.

During April and May of 2013, the bikes were repaired by two UC students - the authors of this paper - who managed to get twenty bicycles ready for use. At the beginning of the course in October of that year, these bikes were loaned out to the university students for a year, free of charge, against a deposit payment of 50 Euro. Eleven persons filled out the forms, but only seven collected the bikes. Finally, only six people actually used these bikes during the academic year.

Hypothesis

Presuming that the low participation figures in this programme was due to the potential users not being sufficiently informed, and if there is more information published, the number of rented bikes should increase next year. Another hypothesis is that any specific actions aimed at improved sustainability should have a feasible, realistic project and strategy with constant feedback allowing optimal control and monitoring of the development of this initiative.

Aim of study

This paper attempts to analyse the possible motives for the low participation in this rental system, investigate possible actions and activities for improvement, and reflect together with the users and participants in the promotion of cycling within the context of the UC, focusing on the bikes of Torrelavega. At the same time, issues such as university sports and physical activities within the UC should also be debated.

METHODOLOGY

Commencing with a proposal framed within Qualitative Research, specifically Investigative-Action, participant observation, interviews, and analysis of documentation is used as a means.

This type of research is extremely interesting in Social Sciences, especially in the world of physical activities and sport, because in this sphere the lives, stories, bodies, identities and selves are multidimensional, complex, and dynamic depending on the context and time, so the researchers must find forms of analysis that are sensitive to and aware of this complexity and multiplicity (Sparkes, 2003, p.59).

The main criterion of Qualitative Research is that the findings are based on empirical data and that the methods are selected and properly applied to the object of study (Flick, 2007, p. 19). A representative sample is not required, but it must provide useful information via an inductive perspective. The unique and individual aspects are emphasized, without generalisation, explanations, or cause, but striving to study the situation in depth and understand it completely. As Perez once said (1994, p. 46) when discussing the ideas of Watson-Gegeo (1982) "*the focus should be on detailed descriptions of situations, events, people, interactions and behaviours that are observable. Moreover, that what participants say, their experiences, attitudes, beliefs, thoughts and ideas as expressed by themselves should also be considered*".

The interviews were aimed at the six users of the bicycles repaired by the UC in Torrelavega. A questionnaire was prepared with forty questions grouped into the following areas: Urban Cycling, Physical Activity, University Sport, Physical Education, and Sustainability. In the end only five interviews were actually performed, mostly by telephone.

RESULTS

As a basic and initial result could highlight their own satisfaction at having been able to repair twenty bicycles, taking the necessary spare parts from over thirty completely destroyed bikes. On 15th May the repaired bikes were presented to the public and media, all assistants (both the mechanics and representatives of the academic and political institutions that had made this possible) showed great satisfaction and joy in the vested interest and achieve to provide the university community twenty bikes that seemed doomed to the rubbish heap. Moreover, there were enough frames, wheels, and spare parts left over to rebuild some new bicycles for the next course by purchase of new material.

This feeling of achievement was somewhat diminished by the disappointment of learning that fourteen of these bicycles had been collecting dust again during the course.

In view of this fact, we must find out the reasons why this happened. After talking to the users this year and analysing the whole process, it seems clear that the information did not reach all potential users. E-mails were sent to all members of the UC and posters were hung up in schools in Torrelavega. Respondents and others involved are aware that it would be more widespread advertising and complimentary bicycle rental system. So in September 2014, with the start of the new academic year, it is desired to propose guidelines for improvement, for which the information, suggestions and ideas raised in this small investigation will be considered. All seem to share the idea that has been an excellent initiative, but we must keep enhancing it and supporting it, these bikes to avoid falling back into ostracism. As proof of this they have several ideas that can be very helpful for next year, as can be expand rental possibilities alumni and members of other educational institutions own bikes or use as a publicity stunt, physically displaying them in the faculties, early next year.

On the reasons that have led users to use these bikes loan, there is a variety. Many of them are students from other Spanish regions and why are these bikes very comfortable, they could pedal through Torrelavega, but without having to bring their own bikes or buy a new home in Cantabria. Also had users who were born in the Community of Cantabria. The previous cycling history was also very varied, from those who had ridden up enough people who had barely used the bike. Applications that were given were varied: sports, recreation, utility, etc. But everyone did a functional and everyday bikes UC. Used them to go to class and the gym, use it to run errands or to take leisurely walks around town.

The sample was very small, but heterogeneous, although everyone was praising the fact that he recovered bicycles (by one way or another, users knew the origin and problematic of these bikes) and they were aware of the benefits in the short and long term, which means strengthening sustainable mobility (energy saving, less pollution, reduced obesity and sedentary lifestyle, higher levels of health, etc.).

Most users had no mechanical problems except a few punctures, especially anything catch them. Although there was some comment about the lack of updates on bikes, it´s heaviness, discomfort or poor quality on some of it´s components, all recommended the use of this service to others.

If previous history of each cyclist was mixed, the same was the practice of physical and sporting activities, although the majority were of different activities and methods, often for recreational purposes. But everyone agreed to consider using the bike as urban transport as a physical activity, for it was not necessary to enjoy a certain physical condition.

This clash with moderate knowledge that these users (four pupils and a researcher) had regarding Sports Service UC, including with respect to the promotion of bike (for example on Thursday with Bike and Mechanics Courses). None knew about these activities and only those who had been on the campus of Santander had knowledge of the range of options, not focused exclusively on competitive sport, which presents the Sports and Physical Activity UC.

Again it is clear the need to increase the divulgative channels, but the students of the Campus of Torrelavega have it much more complicated. The Sports Service is centralized in Santander, this city is located 27 kilometers from Torrelavega and for this reason it is very difficult for the university students to participate in teams, courses and activities organized in Santander. An objective which is trying to

achieve with the repair of bicycles was to equip the best Torrelavega Campus facilities and services, so that the quality of university life of their members grew up.

A fact which is often seen as a barrier to cycling is bad weather (cold, rain, wind, etc.)as may happen in northern Spain, was not seen as a great impediment here. Users advocated using clothes and materials according to the weather. What it can be a handicap for urban cycling is the existence of large drops. Luckily Torrelavega is a fairly flat city. Many users demanded the need for more bike paths and neighborhoods provide complementary infrastructure, such as parking garages for bicycles.

As an institution that promotes the bicycle as transportation, UC is better positioned than Cantabrian political institutions.

Finally, talking about sustainability and Physical Education, practically any user could comment on any initiative where for driving content and / or sports, have been proposed and sustainable social purposes, despite the significant presence of values in such content.

DISCUSSION AND CONCLUSIONS

Initially it was thought that might be enough the publicity done, but it appears that more disclosure is necessary use more direct means, for example, show bikes in the halls of schools and make the promotion at various times of course, paying attention to when spring weather arrives. These and other ideas put forward to the improvement of the system by the users can be extremely useful. We must avoid that this rental system UC suffer the same ills as did its predecessor, bikes Torrelavega. In this first and unsuccessful experience in this city can be concluded that the proposed objectives were not achieved simply with big budgets and abundant material, the active involvement of all the participants (users, technicians, designers, institutions, etc.). And when something does not develop as expected was there to assess the situation and intervene to try to improve the process.

Presently the defense of the bicycle as a means of transport, in Spain, does not receive the desired support from the sports world (sports clubs, associations, etc.). From the sports world itself begins to change the situation, begin to support these innovations, even the sports rider takes years model introducing news, for example, new modalities emerge bicycle, as can be BMX, bike polo and mountain bike, which highlights the heterogeneity and diversity of forms of practice them, as a reflection of a society that seeks individual welfare and enjoy outdoor environments, with informality and debureaucratisation (Camino and cols.2008, p.15). But much remains to be done.

From the Sports Service UC has been seen the promotion of the bike as a form of bolstering the motor activity of the university, because it impinges on a highly health-related exercise and improved quality of life. University sport emerged as a complement and purely recreational activity (Guàrdia, 2004, p.96), when it should try to promote the same values promoted by physical education in other educational segments (primary and secondary), accept the formative potential and pedagogical of motor activity. This university sports should, as exemplified in some of the actions to promote bike, offering a wide variety of options and not be limited to the university community, open to outside groups, especially within its nearest geography. Of this form it helps that the university is a point of reference for the population in general and social involvement of the institution is strengthened.

You should seek greater involvement in the sports world social, political and community aspects. Sport, as a social and cultural product is, it should move beyond a simple regulated and institutionalized competition.

The physical practice in the universities can help students to improve their coping strategies to academic stress, improve your self esteem and self-perception, generate motivational resources and increase social relationships (Guàrdia, 2004, p.97).

If it is joined by sustainable objectives can potentiate the previous effects. "*Promotion of cycling can be seen as means of reducing congestion and increasing the sustainability of transportation, due to reduced emissions and consumption of land. Moreover, cycling can be conceived of as a means of increasing physical activity and improving public health. The potential double gain has made cycling popular*

worldwide and cities are developing cycling strategies to contribute to liveability, sustainability, and public health objectives" (Nielsen, 2013, p. 110). The three pillars of sustainability are: people, environment and economy. In this sense, the world of physical activity may find allies beyond the university sports services, as in the UC with Ecocampus, which fight against climate change, promoting the use of alternative modes of transport. In the case of the bike make specific actions such as improving infrastructure associated with circulation routes cyclists, construction and improvement bicycle parking, technical and financial support for the promotion of cycling and transport service information public and bicycle hire. In other Spanish universities have similar efforts, such as the University of Girona (UdG), with its *Bicicletes Universitàries*, bicycles from municipal deposits and rehabilitated by social economy enterprises for subsequent hire by members of the University of Girona (they started with twenty bikes and already have fifty).

Cars are the masters of the city, automobile industry directed significant financial resources, infrastructure, space and time and energy. Usually fewer cars more bikes, so the promotion of two wheels without engine cannot put aside the means of public transport, *"the bicycle has to be integrated in a consistent and gradual way in all modes of transport and the generation scheme of urban travel needs"* (Sanz and cols., 1999, p.31), *"What the most advanced cities around the world are now doing is trying to live better with the three modes of transport: walking/cycling, collective transport, and private vehicles and effectively to integrate their use. What is emerging as a goal is the active city"* (Low, 2003, p.5).

A cycling city could *"humanize a city that not long ago was more gray, sullen and inhospitable"* (Augé, 2009, p.69), be a place where the people can live and actively participate, *"The city is not only the monster of cement that has condemned the boys to live like caged birds: it may be different if we use spaces that already exist and others which should be restored with programmed urban interventions"* (Tonucci, 1990, p.45).

Contexts and to get healthier and active people is necessary to act coherently and work hard, the objectives are not achieved without effort. One of the steps that must be done is to act against the obstacles for cyclists (Sanz and cols.1999) either by reducing the negative effects (distances, slopes, adverse weather conditions, etc.), facilitating the means (improving roads, vehicle availability, placement of parking) or eliminating risks, dangers and inconveniences (thefts, road safer, environmental pollution, etc.).

Since the pioneering system of the French city of La Rochelle, in 1976, until the systems hire and bicycle hire such services have been seen as a powerful resource to facilitate the use of bicycles and put machines at the disposal of anyone interested . But, as said before, all this requires monitoring and structure, a planned and coordinated work within a global context, cooperation and good readiness of all stakeholders (institutions, cyclists, drivers, etc.). In a way it is the intention to get the University of Cantabria through different measures.

The bicycle is part of our culture, as seen in interviews, and his potential is great. We recall the cyclist myth to demystify and if all goes well, to make it happen (Augé, 2009, p.13). *"The bike is therefore mythical, epic and utopian* [...] *the bike is at the heart of stories that simultaneously raised the individual personal history and myths shared by many; these last two are united and give an epic tone to the most modest individual memories"* (Augé, 2009, p.51).

So it is always a pleasure to restore an old bike and give it a new life. "*The bicycle, then, is considered the true city car of the future and not an archaic and nostalgic memories of the past"* (Tonucci, 2003, p.125).

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EFFECT OF LOW TO HIGH INTENSITY OF RESISTANCE TRAINING COURSE IN ENHANCING UPPER BODY STRENGTH OF COLLEGE MALES

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Key words: *Resistance, Strength, Intensity, Enhances.*

INTRODUCTION

Strength training is the use of resistance to muscular contraction to build the strength, anaerobic endurance, and size of skeletal muscles. Strength training is primarily an anaerobic activity, although some proponents have adapted it to provide the benefits of aerobic exercise through circuit training. strength training provides significant functional benefits and improvement in overall health and well-being, including increased bone, muscle, tendon and ligament strength and toughness, improved joint function, reduced potential for injury, increased bone density, increased metabolism, improved cardiac function, and elevated HDL, good cholesterol. Strength is the force exerted by the important muscles group of the body in one maximal contraction, (Judith, 1985). Strength training is the most important ingredient in the process of making an athlete and it enhances performances along with success not only in rehabilitation, but in preventing injuries as well. Proper strength training yields benefits for any athlete young or old. As a result is stronger, faster, more flexible, more enduring, and less likely to suffer from sports injuries. Strength training use directly to improve maximum strength, power or strength endurance and it leads to intensive demands on muscles, tendons, ligaments, and joints, (Daniel, 1982). In this study it was reveals that two times training per week also has shown improvements in strength (Bell, 1990; Faigenbaum et al., 2002; Flanagan et al., 2002). Muscular strength is the amount of force that a muscle can exert and it is on important fitness component in performing motor skills and in jumping events in athletics, (Wescott, 1995). Resistance training schedule is designed particularly to improve muscular strength and endurance through increased workload demand and may include the use of free weights, machine weights, elastic tubing/stretch bands, hydraulic machines or body weight exercises (for example: push-ups, chin-ups), (Stratton et al., 2004). Several research studies have verified that resistance training might improve muscular strength and also aerobic capacity (Petersen 1989;Keller 2001); although a varied range of different exercise executions composes resistance training , and the combination of these variables could influence in a different way the adaptive response to training (Paoli 2012). Upper body strength is very important and part of the training program for the following sports men and women globally i.e., cricketers, basketball players, boxers, baseball players, wrestlers, judo players, etc (K.Azeem, et.al 2006). Upper strength is very essential for men and women athletes. Muscular strength is an important variable of health related fitness. Greater strength in upper body of individuals and greater the performance in various racquet sports (S. Ibrahim and K.Azeem, 2010). Resistance Training has been integrated in the common Guide Lines as an important component of physical exercise (ACSM 2011).

The purpose of this investigation was to find out the impact of low to high intensity of resistance training course in enhancing upper body strength of college males.

METHOD

Selection of subjects: Thirty participants were selected for this study from the various sections of college under going physical education classes at King Fahd University of Petroleum & Minerals, Saudi Arabia during the year 2012-13. The age of the subjects was between 18-22 years. The reason of this study was explained and doubts were addressed to the subjects.

Experimental Design: The subjects (N=30) were selected for this study randomly. The resistance training program was employed for 12 weeks, 25 minutes of training per session, two days of training program in a week. The resistance training exercises which was employed on the participants was, (B1: high pulley, B2: incline chest press, B3:sitting shoulder press, B4:sitting triceps extensions, and B5: Preacher curls). The low to high intensity exercise program which was executed on the participants is presented in the below table.1.

Table 1. Low to high intensity exercise program

	Pre- test (Test Items : B1, B2, B3, B4, B5)			
Week : 1	Intensity:20%, of body weight	Sets 2	Reps 25	Rest between the sets : 1 min
Week : 2,3	Intensity : 20% and 40%	Sets 2	Reps 20	Rest :1 min
Week : 4,5,6	Intensity : 30% and 60%	Sets 2	Reps 15	Rest :2 min
Week : 7,8,9	Intensity (20 %, 40%, 80%)	Sets 3	Reps 15,12,10	Rest :3 min
Wk,10.11,12	Intensity (20%, 60%, 100%)	Sets 3	Reps15,12,6	Rest 3 min
	Post Test : (B1, B2, B3, B4, B5)			

Table 2. Table showing the details of the selected variables for the pre and post test

Sl.no	Variables	Test
1	High pulley	To find out the strength of the lats
2	Incline bench press	To find out the strength of chest
3	Sitting shoulder press	To find out the strength of shoulders
4	Sitting triceps extensions	To find out the strength of triceps
5	Preacher curls	To find out the strength of biceps

Procedure of testing: The selected upper strength test considered for this study was High pulley, Incline chest press, sitting shoulder press, sitting triceps extensions, and Preacher curls for 10 reps x lifting max weight, (kgs). A Pre and post test was conducted before and after the 12 weeks training program. The scores were recorded in kilograms. The training was given at the Gymnasium at stadium, King Fahd University of Petroleum & Minerals, Saudi Arabia. All the scores for pre and post test were recorded in kilo grams for analyzing the data.

Statistical Analysis: To compare the mean differences between pre to post test, mean, standard deviation and t-tests were computed by means of Statistica Software. A significance level at 0.05 level was adjusted.

RESULTS

The analyzing of data for selected variables i.e. (High pulley, Incline chest press, sitting shoulder press, sitting triceps extensions, and Preacher curls), performance from pre to post test among participants is presented in the table -2 by the help of statistical tools i.e. mean, standard deviation and t test.

The analyzing of data reveals that the mean and standard deviation with regard to high pulley performance among training group from pre to post test were (47.13,15.45) and (70.33,12.73) respectively. Incline chest press performance shows by the training group from pre to post test with mean and standard deviation were (31.67,16.15) and (54.17,13.90) respectively. The resistance training group had showed performance with regard to sitting shoulder press exercise from pre to post test were the mean and standard deviation were (32.73,15.50) and (50.00,15.97) respectively. The participants of training group had showed performance with regard to sitting triceps extension exercise with mean and standard deviation were (41.43,18.62) and (70.67,26.15) from pre to post test respectively. The mean, standard deviation with regard to preacher curls exercise performed by the training group from pre to post test were (19.83,6.86) and (30.25,8.82) respectively.

Table 3. Table showing mean, standard deviation and p-value of the selected variables (High pulley, Incline chest press, sitting shoulder press, sitting triceps extensions, and Preacher curls), performance from pre to post test among participants

Variables	Test	Group (N=30)		
		Mean	S.D	p-value
High pulley	Pre	47.13	15.45	0.0000
	Post	70.33	12.73	
Incline chest press	Pre	31.67	16.15	0.0000
	Post	54.17	13.90	
Sitting shoulder press	Pre	32.73	15.50	0.0000
	Post	50.00	15.97	
Sitting triceps extensions	Pre	41.43	18.62	0.0000
	Post	70.67	26.15	
Preacher curls	Pre	19.83	6.86	0.0000
	Post	30.25	8.82	

Table 4. Table showing the improved performances from pre to post in form of percentages

Variables	**B1**	**B2**	**B3**	**B4**	**B5**
Improved performance from pre to post test in percentages	67%	58%	65.47%	58.63%	65.56%

From pre to post test pertaining to high pulley exercise improved by 67%, incline chest press exercise performance was improved by 58%, regard to sitting shoulder press exercise improved by 65.47%, sitting triceps extension exercise performance was improved by 58.63%, and lastly preacher curls exercise had improved with 65.56% respectively.

DISCUSSION

The results of this study suggested that twelve weeks of low to high resistance training program have a valuable effect in enhancing upper body strength among males. This is evident from the earlier studies that the resistance training increases the strength and also it depends on the intensity of the training schedule. This study is agreement with the findings of this study. (Fleck & Kreamer, 1997) stated that the strength development was the result of right resistance or intensity to the targeted muscle group with an effect on other training principles such as frequency, duration, and repetition The selected college males considered for this study were untrained and their scores were low in the pre test pertaining to all the selected resistance exercises for the upper body exercises. In the post test the participants had shows an improved performance in enhancing upper body strength in all the selected resistance exercises through low to high intensity of training protocol. This is evident that the low to high intensity of training program, two days of training per week, is also useful in enhancing upper body strength in untrained participants in twelve weeks duration.

CONCLUSION

It is concluded that the effect of low to high resistance training course in enhancing upper body strength among the college males had shows greater performance from pre to post test in all the selected upper body exercises, which is very encouraging and significant.

Acknowledgement *The Author thanks the authorities of King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia, and the subjects for the help in completion of this study.*

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STRESS SOURCES AND LEVEL OF PERCIEVED STRESS WITH PHYSICAL EDUCATION AND SPORTS TEACHERS

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Keywords: *teachers of physical education and sports; stress sources; level of perceived stress.*

The problem about stress in the work environment with teachers is the subject of a numerous scientific studies over the past few decades. Many authors define that teachers are a professional community whose daily labor is fraught with tension and stress. Teachers are ranked on one of the top places. The teacher's profession is the second risky one leading to burnout as a result of chronic stress[21]. Travers & Cooper (1993) reached to the conclusion that the tension felt by the teachers in their work is comparable to that of air traffic controllers and the general medical practitioners, but they do not receive the same public recognition [24].

One of the aspects of the stress problem with teachers is related to its ***sources.*** As a major source Kyriacou (2001) indicates the many and diverse requirements, teachers have to cope with often exceed their capabilities. Other researchers are focused on sources such as large class size, isolation and fear of violence, an ability to control the class [25], the low level of autonomy at work, accompanied by a lack of social support [11,26], frequent reforms in educations[10], leadership style of school guidance and their management skills [4,19], etc. Classifications in accordance with stressors are divided into physical and mental [17], primary and secondary [5]. Many authors make a more detailed distinction and treat them in four groups– psychological, structural, social and organizational [20,22,12,13,23].

Stress sources are an area researchers should devote their efforts in the future [16]. There is a real need for new research. It is determined by the social dynamics and its influence on education on both global and regional levels. When the social situation changes specific factors of working environment can also change their power of influence as sources of stress. There is a possibility for new stressors to come forward.

Traditionally stress levels in all teachers are examined. Still there is a limited number of those who evaluate the peculiarities of the stress among teachers, teaching specific subjects, such as ***physical education and sport teachers.*** Pedagogical activities of sports educators are too specific, both in terms of content and the means employed and the conditions which are realized in the educational process [3]. It is characterized by increased physical activity, emotional intensity of classes, specific environment (gym and playground) appliances and facilities. During classes one must consider the effects of weather, the risk of injuries and overloading. Each and every of those features can be manifested as a source of stress for physical education and sport teachers.

Current patterns of stress in the work environment reflect its relational nature and interpret it as the result of the interaction of the individual and the requirements of the external environment. Stress is the impact of the infringement on the balance between the requirements and capabilities of teachers to deal with them and/or to place it's under effective control. Personal evaluation of relationship according to requirements and coping resources influence the level of stress. Teachers stress is a "negative emotional experience being triggered by the teacher`s perception that their work situation, constituted a threat to their self-esteem and well-being"[16, p.28]. To a large extent it is a personal and subjective perception when definite situation events work conditions produce pressure and stress [15]. The subjective perceptions defines the development of the real stress process [18,7,9]. Projection of the

personal individuality, in view for the event, influences the adaptation process coming psychological and physical effects, health included [14].

According to R. Lazarus (1994), the individual subjective perception interaction with the environment is determined by a cognitive appraisal process. He examines the appraisal and the coping process as variable mediators of stressful experience which only arise when it's a potential stressful situation. Through the appraisal it is determined as a damage(loss), a threat or challenge (primary appraisal); personal and social sources of coping, choice of strategies according to their possibilities for achieving success and its cost (secondary appraisal).

The aims and the purposes of the present experimental study is to establish and evaluate the different stress sources of the work environment and their influence on the level of the perceived stress of Bulgarian teachers of PE and sport.

Tasks of the survey:

To expose qualitative and quantitative parameters of the stress sources in the work environment of teachers;

To establish the level of perceived stress at the end of the school year with teachers of physical educations and sports;

To establish the influence of different sources of stress on the level of perceived stress among teachers.

Object of the research are 63 Bulgarian physical education and sport teachers, among whom 40 women and 23 men. The survey was conducted in secondary schools from the capital and the country from April to May 2014.

METHODS OF RESEARCH

1. Stress sources Questionnaire for physical educations and sports teachers.

The questionnaire has been developed for this particular survey. We share the opinion of D. Dasheva and H. Koleva (2003), that the stress parameters in sports educators are of specific dimensions and using standard instruments for their study is not effective enough. The questionnaire includes 28 items to which are related to separate stress sources and 5-points Likert-type scale. The respondents evaluated each sources in terms of its power. Individual items are grouped into six factors with high internal correlation according to Cronbach's Alpha indicator. The factors are: students behavior (α=0,76); teaching conditions and comfortable working environment(α=0,74); work organization and relationships(α=0,72); amount of the work load (α=0,80); general problems of the teachers' profession (α=0,61); relation between working and personal life (α=0,83). Cooper's statement (1985;1988)the problems in personal life are well-based because they have impact on the perceptions and coping with labor obligations. The author points out the influence of the separate sources and the power of their complete impact is important, too.

In the questionnaire an item for assessing the work on the whole according to the stress and pressure it leads to is included. This integral evaluation has global character because it is formed in the process of the completed pedagogical activity of the individuals estimated.

2. Perceived Stress Scale (Cohen, Kamarck&Mermelstein, 1983).

They have been used Karastoynov and Roussinova-Hristova (2000) scale adapted for Bulgarian conditions [2]. It reports on the importance of the individuals estimated on important event every day trouble and stressors of the environment which are registered like strong or onetime stress events and chronic stress during the month evaluated. The assessment is connected with the perception of unpredictability, lack of control and overworking. The questionnaire consist 7 positive and 7 negative items. The people estimated use a five step scale to say how often in the previous months they have felt and thought in the way described in the items. They used the following alternatives: 1-never; 2- almost never; 3- sometimes; 4- often; 5- very often [6,2].

Statistics of the empirical data has been done in the method of variation analysis, factor analysis and correlation one. The data introduce in the present evaluation apart of a larger research project connected to the stress problems of Bulgarian teachers of physical education and sport.

ANALYSES OF RESULTS

The analysis one is connected with a teachers estimate about the impact of the separate stress sources in the labor environment. Variation analyses results show that a teachers assess a the most sources of stress of every day work ensuring safety of students during classes, large number of students in classes they teach in and the noise coast by uncontrolled emotional behavior of students. (**Table1**). Aggression and student violence and loading the teachers with administrative and not connected with the teaching process assignments show high average rating, too.

Ranging of these sources as the most important defines specificity the professional stress in sport educators. Differing from teaching other school subjects their main concern during classes is ensuring student safety to protect them from injures and trauma in the intensive physical activity characteristic for exercises and sport games. This is the reason there probably more sensitive than colleagues teaching other subjects to class sizes. Safety concern grows according to their number. Competition and contradiction between teams in sport games is the basis for a wide range of emotions students express in unrestrained way. The noise accompanies is the reason of the noise affects the activity of the teachers of physical education and sport. This dynamic and emotional situations are benevolent for difficult to control student activity violence and aggression included.

Table 2. Correlations dependency between sources/factors of stress and the level of perceived stress

Stress sources	Min	Max	M	SD
1.Volume and contend of tasks (daily and during the school year).	1	5	3,33	1,19
2. Time limit for completing the tasks.	1	5	3,29	1,20
3.Administrative work load and not connected tasks.	1	5	3,54	1,27
4. Number of students in classes	1	5	3,83	1,30
5.Presence of students with special educational need	1	5	2,84	1,32
6. Ensuring students safety during classes	1	5	3,94	1,16
7. Students aggression and violence presents	1	5	3,67	1,40
8. Discipline problems during classes	1	5	3,24	1,32
9. Noise in the school building because of uncontrolled emotional behavior	1	5	3,78	1,05
10. Presents of technical teaching aids devices training facilities necessary for a teaching process	1	5	2,84	1,36
11. Lack of appropriate premises for teaching classes (gyms, labs and ect.)	1	5	2,92	1,51
12. Working environment	1	5	3,14	1,40
13. A student motivation for better results for education	1	5	3,26	1,07
14. Subject status	1	5	3,13	1,34
15.Frequent educations reforms	1	5	3,46	1,23
16.Necesary for permanent qualification rise	1	5	3,00	1,32
17.Carrier development opportunities	1	5	2,63	1,29
18. Size of payment	1	5	3,19	1,62
19.Risk of lousing a teaching job	1	5	3,11	1,44
20.Parent teacher interaction and level of cooperation	1	5	3,13	1,42
21.Colleagues interaction	1	5	3,00	1,54

22.Management and school organization	1	5	3,16	1,46
23.Assessment of your work	1	5	3,02	1,38
24.Taking part in making decisions in the school process	1	5	2,82	1,31
25. Psychological climate in the working environment	1	5	2,89	1,38
26.Working personal and family coordination	1	5	2,86	1,37
27.Financial problems	1	5	3,41	1,39
28.Living problems	1	5	2,87	0,64
Summary of all sources	1,54	4,38	3,19	0,64
Work on the whole	1	5	3,41	1,32

Another stress source reported in different studies is assigning teachers not connected and administrative tasks. It is a Bulgarian tradition to relay on physical education teachers to solve organizational problems or unexpected daily complications.

Teachers define as sources with the lowest intensity career development opportunity, level of taking part, in making decisions for work and school, technical teaching aids and necessary equipment conditions presents of students with special education needs. Dasheva and Koleva (2003) report similar results of stress sources.

Stress sources analyses grouped in independent factors each of them formed from similar and identical items shows most important according to impact are problems with students and amount of the work load (**Fig.1**). Same results have been established in other evaluations but with teachers teaching different school subjects. Generalized factor analyses defines physical educations and sports teachers as any other subject.

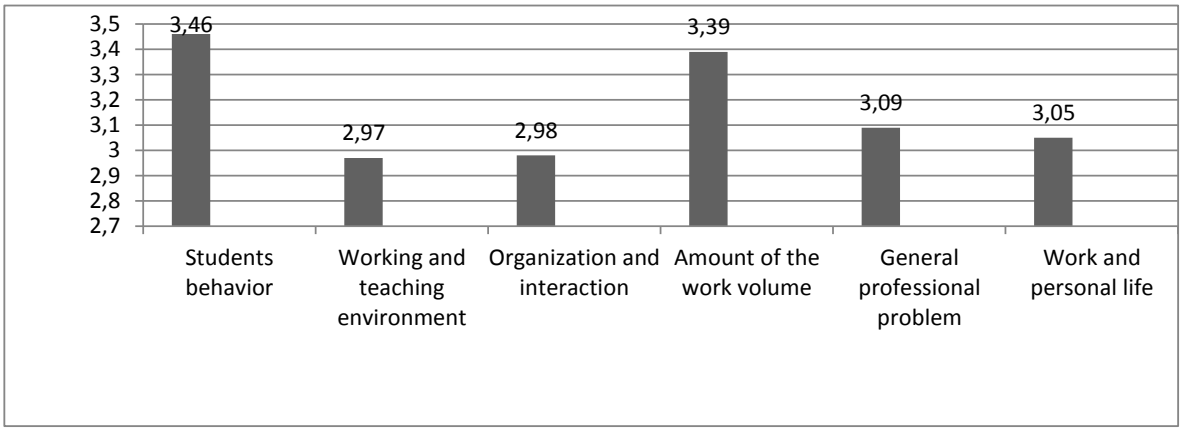

Fig.1. Average values of stress factors in the work environments of teachers in physical educations and sport

The global assessment in teaching reality has got a higher average value (M=3,41) compared to the summed one from the different sources(M=3,19). It is formed on the bases of a generalized cognitive picture and its level is defined by the strong influence of emotions.

Another direction of the analysis is connected with the level of the stress perceived in teachers and discovering the correlation connections with the stress sources. The present research established an average level of perceived stress M=38,63 (Min=23; Max=58; SD=8,60).

The present of a positive correlation dependency between sources and stress factors on one hand and the level of the perceived stress on the other marks that growing in intensity of every one of the sides in relation leads to an analogical change in the other part. Its creates the impression not all sources of stress influence the level of the perceived stress such as sources estimated by teachers like very important for example ensuring student safety and number of students in class (**Table 2**)

At the same time not so intensive source like discipline during classes and financial and living problems with of teachers have a strong influence on the level of the perceived stress. It is a indicator for

Table 2. Correlations dependency between sources/factors of stress and the level of perceived stress

Stress sources/ Factors	Level of perceived stress
Volume and contend of tasks (daily and during the school year).	0,32**
Administrative work load and not connected tasks.	0,31*
Students aggression and violence presents.	0,42**
Discipline problems during classes	0,51**
Noise in the school building because of uncontrolled emotional behavior	0,29*
Lack of appropriate premises for teaching classes (gyms, labs and ect.)	0,31*
Working environment-light, temperature, ergonomics, space safety.	0,43**
Frequent educations reforms	0,34**
Necessary for permanent qualification rise	0,30*
Carrier development opportunities	0,26*
Risk of lousing a teaching job	0,25*
Parent teacher interaction and level of cooperation	0,28*
Colleagues interaction	0,31*
Working personal and family coordination	0,34**
Financial problems	0,53**
Living problems	0,49**
Summary of all sources	0,57**
Work on the whole	0,26*
Factors: Pupils' behavior.	0,44**
Teaching conditions and comfortable working environment.	0,37**
Work organization and relationships.	0,26**
Amount of the work load.	0,34**
General problems of the teachers' profession.	0,43**
Work and personal life.	0,54**

**Correlation is significant at the 0.01 level

*Correlation is significant at the 0.05 level

the dynamics of the mediator changeable in the development in the stress process. It is higher when the environmental situation requires a new assessment or reassessment and a choice of appropriate strategies of coping. They have got an unexpected character and they development is unpredictable – it can be realized in different variance with a different impact of consequences. Student`s safety during classes their noisy behavior are strong sources of stress but teachers are prepared to cope with them. They have developed strategies for controlling these situations which are part of their daily routine. And the same time add of aggression and discipline problems are of an incidental character and can be due to different reasons. There are not like standard procedure situation. Similar explanation can be given about personal life problems which make labor environment stress more difficult to individual perceived.

The results of this research are the bases for forming of the following generalized ***conclusions.***

1. In the labor routine teachers of PE and sport dominating stress sources. They are connected with the specific character of their educational process.
2. The level of the perceived stress is influenced by such sources at situations which are unexpected at with different possible variants of development.

3. The development of the stress process in teachers in PE and sport is influence stronger by separate sources as a stress factors than by their complete perception of stressful in their professional labor.

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LANGUAGE AS A STIMULUS FOR SELF-IDENTIFICATION

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I. THEORETICAL INTRODUCTION

Foreign language teaching at the National Sports Academy is compulsory and has its proper place in the curriculum, though, because of certain academic rules foreign language classes are extremely insufficient.

Students at the National Sports Academy start learning foreign languages mostly from a low level of language knowledge, which they have acquired in their secondary school. The insufficient foreign language classes cannot help them to increase their knowledge and they could hardly achieve a higher level of language skills. In this really difficult situation of foreign language teaching, it is extremely important to increase the motivation for foreign language learning and to stimulate striving for better knowledge and self-perfection.

We consider that language with its signal power can provoke motivation and striving for a higher level of knowledge through raising self-esteem and stimulating the process of self-identification. Personal identity is connected with the system of values of the individual, with striving or lack of striving for self-perfection, for the achievement of better results and the development of qualities which could be publically recognized and which could bring personal satisfaction.

After a certain age, everyone aims at identifying oneself in different terms, tries ascribing oneself qualities and skills, wants to be somebody important, someone who matters, wants to present himself or herself through an idea, through belonging to a group or an activity, wants to be recognized through a typical sign and this way to win the respect of other people. There are hardly any people who do not want to belong to the group of those who are successful in life, the brave ones, those who always win and who are never scared. At the same time the low self-esteem, connected with insufficient knowledge in one or another field, in this case – with foreign languages, as well as other subjective and objective circumstances, which have led to low self-esteem, hinder the person’s strive for better achievements, for self- improvement, for developing qualities with a high degree of acknowledgement in society.

So, the personal impression that you have about yourself as an individual also plays the role of a motive for your behavior. People’s reactions depend directly on how they view themselves and on what they think about themselves.

In many cases people have difficulties to understand their own personality and to see themselves as belonging to one or another group. Self-identification can be associated with different semantic fields depending on the words and phrases used to express it.

The aim of the study is to build proper pedagogical strategies to cope with the lost of motivation for foreign language learning .

To realize this aim we have set the task to study the impact of language on personal identification. The choice of task is based on the assumption already stated, that the mental image a person has about his or her own personality determine the motivation to act in different ways.

II. PLANNING THE EXPERIMENTAL STUDY OF SELF-EVALUATION.

II.0 In our research we studied the semantic fields of “results”-“reality” and “process”-“potential”.

II.1. Planning the experiment.

II.1.1. Materials

For the purpose of our study we created a questionnaire with 3 tasks. [1]

Answering the questionnaire was anonymous. Each of the subjects of the research gave information about age, sex, special subject (for the sports students – the kind of sport), course, and faculty. A written instruction was applied to each task as follows:

In the first task the subjects of the research had to rank from 1 to 5 the groups they would like to belong to according to their desire (five represents the strongest desire). This task included 5 positive statements.

In the second task they had to rank the groups again but this time the same statements were expressed through negative sentences- the so called "marked sentences".

In the third task the subjects of our research had to choose from the pairs of marked/not marked expressions the one which best described the group they wanted to belong to.

II.1.2. Procedure of the study

II.1.2.1. Subjects of the research

The subjects of the research were 231 students, 145 of them - sports students male and female, and 86 students from the Technical University, Sofia and St. Clement Ohridski Sofia University, male and female, all aged between 19 and 21.

II.1.2.2. Methods of the research

A two factor plan was applied to study the influence of the independent factors: "sex"/ "type of student", "sex'/ "age", "type of student"/"age" and their interaction .

II.3. Hypotheses

II.3.1. It was expected that there would be a difference between the sports students and the other students in terms of risk taking, striving for victory, decisiveness and courage - more in the advantage of sports students who are used to the dynamics of competitions.

II.3.2. It was assumed that age would influence the choice of group - the younger persons will be more inclined to take risks and to strive to win.

II.3.3. It was expected that there would be a difference between male and female subjects in their inclination to struggle for victory, to take a risk, as well as in their striving for success and the achievement of real results.

III. RESULTS:

The statistical analysis has shown the following:

III.1. With reference to the first task – there was no significant statistical difference between sports students and other students in the independent variable "process/results". It was found that the impact of the "age" factor was not statistically significant. The impact of the "sex" factor, on the contrary, showed a significant impact, namely: women have considerably higher values on the scale in terms of "results" than men. (**Fig.1**)

III.2. Regarding the second task – marked expressions. There was no statistical significant difference between males and females and between the different age categories- with other words-the influence of the factors "sex" and "age" was insignificant. On the other hand the obtained results showed a significant impact of the factor "type of student" on the latent variable "process/results". The other students showed considerably higher results in terms of "process/results" than sports students. (**Fig.2**)

III.3. Regarding the third task – pairs of marked - not marked expressions. The impact of factors "type of student" and "age" was not statistically significant. The impact of factor "sex" is significant, namely: women prefer positive expressions to a much greater extent than men do. (**Fig.3**)

Fig. 1. The impact of factor "SEX" on the dependent variable "process/results".

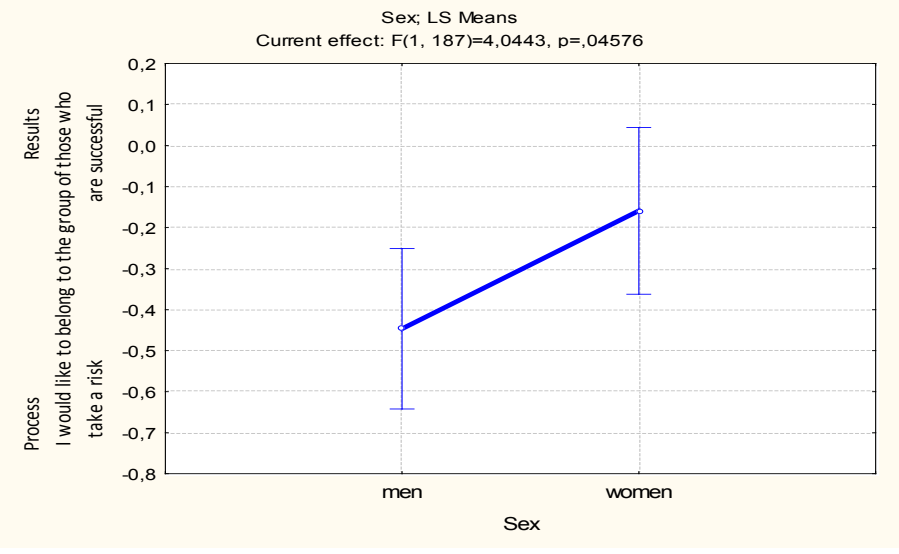

Fig.1 shows that women have significant higher values on the scale in terms of "results" than men.

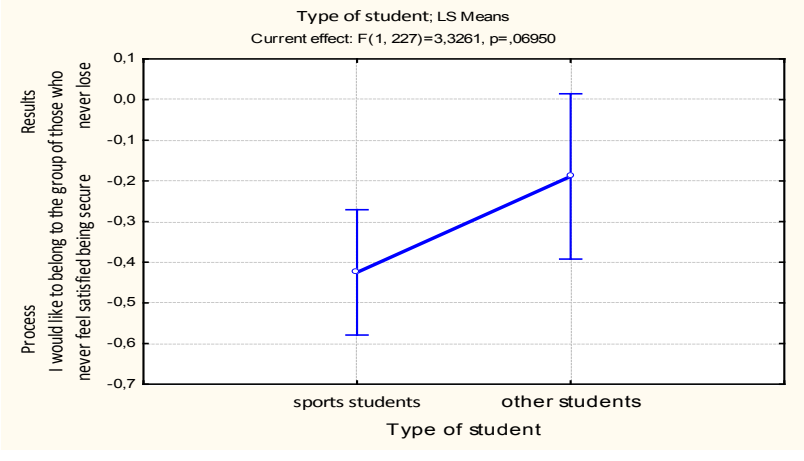

Fig. 2. The impact of the "TYPE OF STUDENT" factor on the dependent variable "process/results"

Fig.2 shows that the other students have higher mean values on the scale "process/results" than the mean values of sports students. The difference is close to statistical significance (F=3.32; p=0.07).

IV. CONCLUSIONS:

The obtained results give us reasons to make the following conclusions:

IV.1. Women in general strive to achieve results to much more than men do.

They prefer positive forms of expressions which give them the feeling of stability with predictable results: I can, I am successful, I win.

IV.2. Men strive more for the process which can help them to achieve results. They prefer to take a risk, to assert that they always can, to say they are brave, they never feel satisfied to play safe, they are never incapable, and they are never afraid.

IV.3. Sports students have difficulties to name the group they would like to belong to, if the marked expressions (negative sentences), which describe the group, are used. This could be explained by the fact that students, who do sports, are more disciplined and, they prefer short and precise expressions to describe their identity.

These conclusions are a small part of a much larger survey on language as a stimulus in the process of

personal self-identification. Nevertheless, they give us directions in our work on an experimental foreign language textbook for sports students.

The process of personal self-identification is dynamic and language, with its influence inspires, guides and stimulates people to be better, stronger, to go higher.

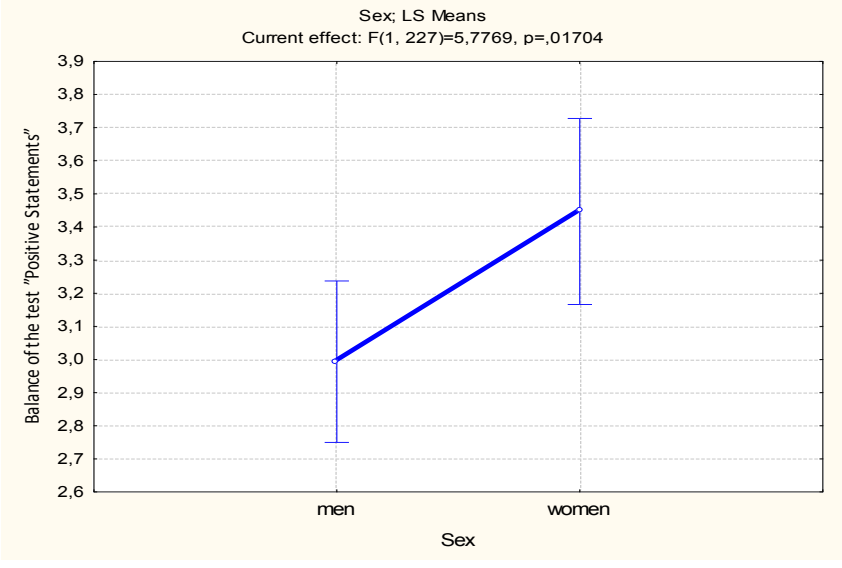

Fig. 3. The impact of factor „SEX“ on the dependent variable “process/result“

Fig 3 shows that the impact of factor „SEX“ is significant (F= 5.78; p = 0.017). Females have a higher mean value in this test than males. Obviously females prefer positive expressions more than males do.

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NECESSITY OF NEW PARADIGM FOR THE BULGARIAN SCHOOL PHYSICAL EDUCATION

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INTRODUCTION

Education is supposed to train and prepare people for effective life and successful professional realization. If in the near past it referred only to children and young people nowadays educational process is lifelong and concerns people of all ages. It is also supposed the education to foresee and be ahead in the future. This could happen only if the educated young or old people are included in this process of gathering of new knowledge and know how as direct and active participants. Physical education as directly connected with people's health goes beyond the tasks of the general education and these circumstances enrich its functions. Physical education is also seriously influenced by the contemporary changes in social life and this imposes a new paradigm for it in attempt for its better and lifelong effectiveness.

In physical education a new paradigm is necessary because of the fact that nowadays we ought to have a *holistic view* towards people and their existence. This concept upholds that all aspects of people's needs should be taken into account and seen as a whole. That means that a man is a totality of a body, soul and spirit, or he is influenced by psychological, physical and social features. Or, spiritual elements should also be taken into account when assessing a person's life or achievements. These revolutionary ideas find their support with the investigations of the quantum physics. Nowadays less is the number of people that have doubts about the human nature. Meanwhile, the holistic view means that we are interested in developing the whole person and that this person has different levels and not only body: physical, emotional, mental and spiritual level. A man is not just an intellect, but emotion, instinct, intuition, insight too. Teachers in all school subjects (including physival education) ought to have in their minds this new attitude to man.

METHODOLOGY AND METHODICAL ANALYSES

The Oxford English Dictionary defines the term *paradigm* as "a typical example or pattern of something; a pattern or model" (www.bg.wikipedia.org). According to the Merriam-Webster 1900 Dictionary the term goes out the boundaries of grammar where its first usage was. It enters the sphere of philosophy and other sciences. Very often (espetially in pedagogy) we meet the term in plural (И. Иванов/I. Ivanov, 2010) [1]. During the 60s of former century starts the mass usage of the term.

Thomas Samuel Kuhn (1922 - 1996) gives the contemporary meaning of the term. In his book "The Structure of Scientific Revolutions" he defines paradigm as: "universally recognized scientific achievements that, for a time, provide model problems and solutions for a community of practioners" (T. S. Kuhn, 1962) [7]. Nowadays the interpretations of the paradigm may vary among individual scientists [7, p. 44].

Monitoring about paradigm in school physical education in Bulgaria shows that patterns can be numerous as physical education depends on too many factors in horizontal and vertical plan. Because of this in recent years paradigm in physical education was a subject of thinking by some scholars. Н. Маврудиева & С. Маврудиев/N. Mavrudieva & S. Mavrudiev (2005) [3, pp. 97 – 101] pay attention mainly to the use of verbal pedagogical means, and technical means as well in the lessons of physical education. Authors conclude that technical means "never can displace the pedagogue but they

may help the vizualization of the process of education". We live in the new and so called "information century"where accent is put on the "information culture" and all this is connected with the mastery of man to work with information. This new culture demands information competences in the professional sphere of the teacher [3]. С. Маврудиев/S. Mavrudiev develops further his views in this attitude in another article in collaboration with Е. Ценева/E. Tseneva (2007) [4].

In the beginning of 21st century the content of physical culture (including physical education) enlarged. Nowadays it is supposed physical education to be not only a self-dependent social phenomenon and a part of physical culture but a feature of the personality as well (В. А. Стрельцов, Н. В. Пешкова, В. В. Апокин, 2007)[5]. And this tendency more and more gains priority.The purpose is seeking of modern approaches to designing the content of physical education and the expected results ought to be full realization of the humanistic potential of people.

As a possession of personality culture is supposed to have four components (И. Я. Лернер/I.Y.Lerner, 1995)[2]:

- Knowledge
- Ways of activity
- Creative experience
- Emotional-integral relations

By analogy we can accept that people engaged with physical education (as a part of physical culture) as their profession ought to carry and develop in themselves the same four components of personality.

Knowledge is the educational content of physical education on the base of state documents in our country. The main document is the "National standards for educational content"[8] published on 15 June 2000 and with two additions since that time. The corresponding document in English language countries are the National Curriculums. In the National Standards and on this base in the Educational Programmes for physical education are defined three main sports (track-and-field events, gymnastics, sports games) and additional sports (tourism, national dances/horra, water sports/swimming, fitness, bodybuilding, etc.). Drawing a parallel between educational content of physical education in Bulgaria and Great Britain (retrieved on 11 September 2013) can be found greater width and even depth in British demands to knowledge, skills and understanding of the motor activities (http://webarchive.nationalarchives.gov.uk + http://www.education.gov.uk/ schools/teachingandlearning/curriculum).

Putting into practice the motor activities (physical exercising) from the educational content we go to the second component of personality's culture and that is *ways of activity* where we are confronted with different procedures.

If a half century ago in the 60s and 70s of former century (where is the starting appearance of the three main sports as educational content in the Bulgarian school) the effectivity of physical education lessons was very high, today matters changed radically. Initially the three sports activities (track-and-field events, gymnastics, sports games) had equivalent part (equal to 33 %) in their presence in physival education programmes for all classes from 1st to 12th. Today things changed and as if this fact is not seen. The impression is for formal and bureaucratic approach to physical educations in school. In this attitude is necessary a new meaning to the content of physival education lessons to be given.

Regarding use of track-and-field events at schools

A great percentage of the schools in Bulgaria do not have the necessary tracks, pits for landing, other equipment too for qualitative exercising the track-and-field methodological units. Furthermore, it is accepted as a fact that 7-years-old children cope well with the technique of the exercises, or that all children of this age already are good in running, jumping, throwing and catching. Also they have good balance and co-ordination of movements but is this really so?

The mode of living of nowadays generation is quite different from the the mode of living of the people some decades ago. Today play and games in the street or near the living place could be hardly seen somewhere. A great part of the Bulgarian population lives in the big towns in small flats and this cir-

cumstance influences the motor activity of all people, it does not matter what their age is (Townspeople during the last census in February 2011 is 72, 5 % -www.nsi.bg/census2011. The inhabitants of Sofia according to the NSI retrieved on 31 December 2013 are 1 249 665 and this percent represents 16, 4 % of Bulgarian population – http://bg.wikipedia.org/wiki).

Today all technical acquisitions are in help to society but wise attitude to you needs struggle against lack of movements and lack of exercise as they are the human disease of our time. The development of mechanized labour, transport of modern man, etc. took much of his natural movement, immobilizing him. To have enough physical loading for the day is a personal task but today people are increasingly sedentary. In school must be kept the balance between the psychological/mental and the exersicing and physical work. The habit to plan your daily physical activity must be built since one's very early school-time.

Running, jumping, throwing and catching are basic human movements and educational content of physical education lessons as well. The acquisition of these locomotion movements is base for the future general motor culture of everybody. But what is the quality of mastering of these movements in little childen at school entry is not examined toroughly. This is necessity for the physical education teacher when he/she for a first time meets little pupils. But does physical education teacher have enough time to cover all gaps in these basic movements? And if the number of unskillful children with lots of gaps in locomotions is very high, then what has he/she to do when a concrete educational unit is waiting to be studied and learnt.

One other ability in little children also on a mass scale is accepted as a fact. We assume that all little children in preschool age have correct posture and flowing gait. Later in the years when the problem with the *spinal curvatures* becomes evident physical education teachers, kinesitherapists and sometimes to physicians can do nothing else but lead statistics about the percentage of pupils with spinal curvatures. This serious problem in school age can be escaped if due prevention by physical exercising is done. The habit to built correct posture and gait ought to be built in early age with enough patience, steady and eager work by the side of the physival education teacher and not only this teacher but parents, other teachers too.

Posture and gait must obligatory be methodological units in the lessons whose educational content is gymnastics. Otherwise we are going to register that "in Bulgaria one quarter of the students aged 8 to 15 have mild to severe scoliosis or other spinal curvatures problems. This has occurred because only one third of the children and youth aged 7 to 19 are vigorously active" (B. Peneva, V. Ivanova, 2014[10]).

Regarding use of gymnastics at schools

After the 90s of XX century the gyms totally were emptied from the different and with enough number gymnastic apparatuses. The reason is the new politics the games to prevail in the physical education lessons because children like to play and they ought to be left to play. Really games are full with emotions but in practice this understanding was a misunderstood democracy in the educational space. Gymnastic exercises are difficult to be mastered by a great part of the pupils. This is because lots of them have the problem "overweight"and this circumstance makes acquisition of techniques, on one hand, and teaching, on other hand, very difficult. According to the National Center of Public Health Protection (2011), 30, 2% of school-aged children have overweight problems and 12, 7 % of pupils are obese"– http://ncphp.government.bg/.

Going out of this situation is possible if some of the methodoldgical units are teached in primary school (7 – 11-years-old) when pupils are not so heavy. On the other hand, at this age usually general teacher leads education in all subjects and we cannot be sure what are his/her competences and skills in teaching gymnastics. So, we can be confronted with a vicious circle and in practice this does not happen. Starting from the 90s of XX century and because of the authonomy of the schools, the general tendency is not a specialist but the general teacher of the class to conduct the education in physical education in 1st to 4th class. The importance and the competences of the specialists are realized and the new wave is

specialists to teach physical education still in primary school and this happens in the capital Sofia and the big towns.

The problem with the gyms is also important though today there are not schools without a gym. Many of the schools have even two gyms (one of them is smaller) but we meet with the irrational use of the gym. Sometimes two classes have lessons in physical education at the same time. Sometimes the gym is empty (especially in the first for the day lessons). The phenomenon "two classes in the gym" hinders the high quality of the lesson.

Regarding use of games at schools

In Bulgaria will come time when secondary school pupils (9th to 12th class) will play without inner wish even basketball as one ought to run after the ball. "Fervour to movement" so typical for the little children as if has disappeared in a great number of the pupils. On the other side is the uneasiness from the own body, so characteristic for the period of puberty. Already big girls and big boys constantly think or feel that somebody watches them and this is quite possible not to be true. The preference is to volleyball but can always this sport secure multilateral physical development of pupils?

Another irrational situation emerges. Unnoticeably, instead of starting volleyball education in upper class, e. g. 7th class, because the teacher has the freedom to choose, he/she offers this game to pupils still in 5th class when the skeletal system is still immature and not ready for the heavy attacks and receiving of the ball. Furthermore, we are witnesses of industrial production of light and obviously harmless balls. Situation is debatable as another threat can come: pupils to be tired of playing volleyball as this sport is dominant in schools today.

Handball left schools long time ago though this sport is offered even in the variant mini-handball. Bulgarian Federation of Handball makes serious efforts to cause the interest of pupils to this sport (schools receive free of charge handball balls) but the results cannot be defined as successful.

Football is preferred by boys but there are also girls that like this sport. But does education in football always pass through the adopted methodological sequence or pupils are left simply "to kick the ball". Great Britain pattern includes many other sports games in the physical education programmes (cricket, hockey, netball, rugby, etc.) but in Bulgaria these games are known only to the specialists.

Another important moment that needs rethinking in the approach of education is connected with the 10 – 15 minutes competitive game in the frame of the 40/45 minutes lesson. Bit by bit the competitive game as if became obligatory. But did pupils have enough time to exercise and master all elements of the game's technique? And if they start competition before their good acquisition of the technique, will it not be harmful for them?

Physical education teachers rather ought to have more time for exercising of pupils and to eliminate their mistakes. And yet the physical education teacher is a specialist in the educational methods and not a sports referee.

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In our analysis we will go to the third component of personality's culture and it is the *creative experience* of the physical education teachers. Maybe it is strongly critical but our national documents concerning education and content of physical education as if give less freedom for choice. Maybe it is much more expected reproduction than creative work on behalf of the teacher. The "creative experience" in practice is the choice of the teacher of the kind of sport in which pupils to be taught and exercised.

Follows a fluent transition to the fourth component of the personality's culture and it is reflected in the *emotional-integral relations*. Recently not only in the pedagogic sciences but in all other spheres of social life (including economy) often is spoken about the importance of the psychological factors for

the final effect of the activity. Persistently is spoken about team work and team building. To what extent the physical education teacher manages to cope with this modern problem is his/her responsibility. Imperceptible remains the ability for good communication with the pupils but purpose is creation of self-confidence and self-consciousness in the pupils. Last but not least is the *emotional education* of the children and here the motor activity gives good results when exercising is responsibility but also fun at the same time.

Holistic approach imposes attention to the interdisciplinary education and here we ought to mention the importance of the Olympic education – a very old idea that burnt up during the Summer Olympic Games in Beijing (China – 2008). Purpose is a new world outlook and philosophy of young generation. (M. Krüger**,** 2007[6], A. Rychtecky**,** 2007 [11], B. Peneva, 2010 [9], etc.).

CONCLUSION

A new paradigm of Bulgarian school physical education is necessary because of the constant changes in the contemporary social life during the last decades. As social life is very dynamic, changes in paradigm ought to be done according to the new circumstances with aspect organization, conduct and control of the physical education of the pupils. Modern approaches to designing the contents of physical education have the purpose of the full realization of its humanistic potential. In the context of the humanistic paradigm in the process of constructing and realization of the teaching material teacher's personal features are proved as decisive for the final result. In this aspect ought to go in great detail the following moments of the physical education of the pupils:

1. Extention of the educational content with opportunity for the teachers for greater choice. As an example can be the curriculums of Great Britain and other countries.
2. In aspect "Educational content" there is another opportunity too with two suggestions:
   (a) To restore in practice (not only in documents) the 1/3 presence of the track-and-field exercises as locomotor movements are the necessary base for good following education in all sports techniques,
   (b) Gymnastic exercises also need adequate and equivalent 1/3 presence with accent on their preventive and curative effect.
3. To be secured for little pupils from primary school enough time and regimen, enough attention too, for acquisition of correct posture and gait and full and good mastering of the locomotor movements (running, jumping, throwing, and catching).
4. Physical/Motor education has to go hand in hand with emotional education. Teachers and parents must not forget that (a) children are not a minimized mature man, (b) the person is unity of body, sole and spirit, and (c) all three want the necessaty attention during the educational process.
5. Pupils to be teached on self-dependence, alone to assess the quantity of their exercising, to show what has to be done for betterment of their achievements, etc., and all these to be under systematic control. .

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SCHOOL REFORMS AND THEIR INFLUENCE ON PE CURRICULUM DEVELOPMENT IN SLOVAKIA

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Key words: *curriculum, physical education, Slovakia, school reform*

INTRODUCTION

Various education systems in many countries have recently been challenged with the fundamental task of education. Every country tries to develop its own education system to achieve the best results with children and youth. However, as the world economic systems are facing the crisis, education systems must be ready to prepare pupils and students for the world around. Therefore, "school reforms" are performed as often as never before (Pupala, Kaščák, 2011).

In the past school reforms were usually forced by the emperor in a more or less successful way (e.g. one of the most known education reform of Maria Theresa in 1775) and with a clear purpose and goal. Nowadays school reforms can vary in their reasons. Some authors believe that a school reform can be called a reform only when performed in a complex of measures including financial policy, curricular changes, teacher's training etc. (Humajová, Pupala, 2008). Other authors suggest differentiating reforms in categories as for example a standards-based reform, a comprehensive reform or a student centred reform (Silver, 2004). We believe that the second explanation is more in coherence with the school reforms that have been implemented in the past few years in most of the countries.

The situation in Slovakia regarding the education system is in many ways specific in comparison to Western European countries. The two milestones that were crossed in building the new system were in 1989: a change from a communistic regime to democratic and in 1993: former Czechoslovakia split into two separate countries the Czech and Slovak Republic. Those political and social changes influenced also the situation in education system. From 1993 to 2008 the government tried to implement a new strategic education reform, inspired by Western European countries. However, due to various circumstances none of the attempts was as successful as the school reform in 2008. This reform was characterized by a new School Law and by decentralization of schools (Humajová, 2008). Decentralization of schools should have been achieved by two levelled curriculum, the National Education Programme and the School Education Programme. This change influenced also the curriculum development in physical education. Many Slovak authors (Antala, Labudová, 2011, Šimonek, 2008, Kršjaková 2008) analysed curricular documents and supported the idea of more health oriented curriculum. The new system of education programmes offered to schools the possibility of choosing their own content (with respect to the National Education Programme) or to adjust the content to particular school conditions (a possibility to include non-traditional sports or physical activities).

In 2013, five years after the reform, a new revision and innovation of curriculum started. At the beginning the purpose was only to revise and innovate the National Education Programmes. However, this revision could be now described as the second (smaller or continuing) school reform because some of the changes in curricular documents required also changes in the School Law[1]. Although the revision is not yet finished we would like to present some of our findings that are already available, especially with the context to the influence of the reform on PE curriculum development.

METHODOLOGY

The research was performed in two steps. Firstly in 2013 there was used a questionnaire for physical education teachers (n= 158), that was focused on the school reform in 2008 and its implementation.

[1]Amendment of the School Law has been in force since 2014

In a questionnaire we asked teachers questions about the implementation of the reform, about the changes in schools and in teaching physical education. For evaluation of the data we used standardised quantitative statistic methods together with logical analysis.

The second part of the research was an analysis of data obtained in 2013 from PE teachers and PE and sport associations who had raised comments to the new curricular transformation. Those comments (n= 27) were collected and evaluated by means of a qualitative description method using categories. The comments were sent by teachers on voluntary basis and that is probably the reason for such a low number of comments collected.

RESULTS

Teachers' opinions regarding the school reform in 2008 and its influence on the PE content

After the school reform in 2008, teachers faced a new challenge. They could not imagine preparing their own school education programme, especially because it was in contrary to a previously centralized school system, when every school had taught the same content. This was not confirmed by the teachers, when 62% of them answered they thought the changes had been positive (fig. 1). However most of the teachers (53%) missed supportive material or education programmes (as explanatory support) to be prepared for new curriculum content (fig. 2). They argued that their pre-service training did not prepare them for teaching non-traditional sports and physical activities such as floorball, ringo or zumba.

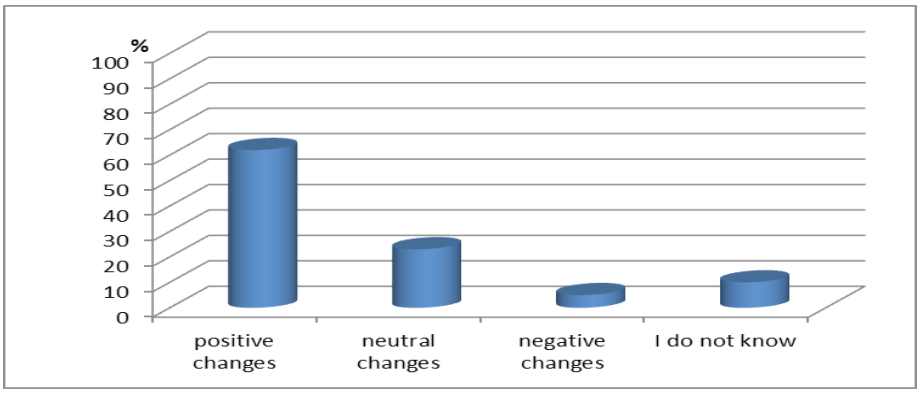

Fig. 1. Teachers' opinions regarding the changes in PE curriculum

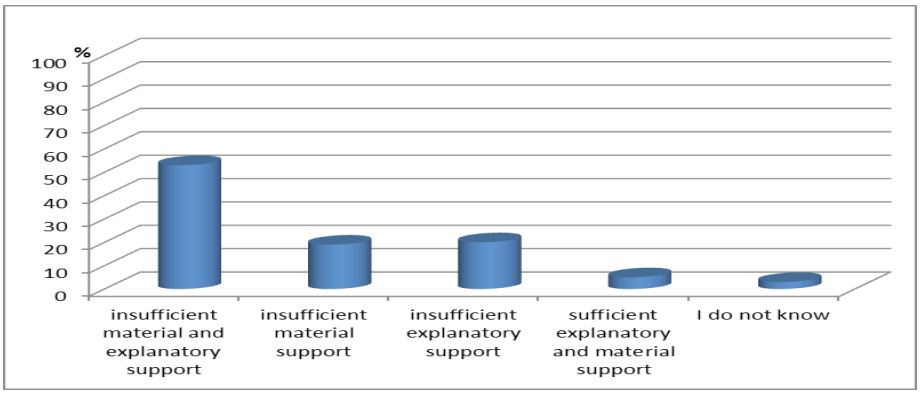

Fig. 2. Information and preparation before the curricular changes

The positive changes of the new curriculum were according to teachers mainly in supporting creativity of the teachers (35%) and the possibility to increase teaching hours in the School Education Programmes (23%). However, the second mentioned was criticised in the Concept of state policy in sport – Slovak sport 2020, that schools do not use this possibility enough. Mostly the school management preferred increasing hours of mathematics or languages.

Teachers' comments regarding the revised education programmes (currently in the process)

During the current process of curriculum development the proposal of curriculum was made public with the purpose to receive written comments from teachers and professionals on the curricular changes. This public discussion took almost half a year (July 2013 – November 2013) and during this period the National Institute of Education collected comments on the material[2]. Despite the fact, that the revised curriculum included new or changed standards, teachers did not focus in their comments on the content or standards in curriculum. Their comments could be described by means of the following categories (Tab. 1).

Table 1. Categories of teachers' comments regarding the revision of curriculum in PE

Category	PE teachers suggestions
increasing the number of teaching hours	teachers suggested 3-5 hours per week
revision of sport classes[3]	teachers in sport classes suggested clarifying school conditions for sport classes
curriculum divided into years not education levels[4]	teachers in primary schools suggested dividing the curriculum into each school year (they were teachers not specialized in PE)
low level of standards	some teachers suggested strengthening the standard criteria
high level of standards	some teachers suggested to lowering the criteria

The increase of teaching hours was during the public discussion supported also by sport organisations and associations, that cited the Concept of state policy in sport – Slovak sport 2020 (2012) approved by the Government, with specific measures to increase the number of PE teaching hours by the end of the year 2013. This has not happened yet, but there is still a possibility to achieve this goal, because the number of teaching hours in Slovakia was also criticised in the Report of European Commission (Eurydice report, 2013). An interesting discussion started among teachers about the period, when to achieve the standards given in the curriculum. Especially teachers in primary education suggested achieving the standards after each school year, however secondary teachers would prefer having more time for standard achievement e.g. after primary education or lower secondary education.

The standards are a specific issue and some professionals argue about the definition of a standard (Vlček, Masaryková 2013). But in case of not taking the definition into account, some teachers believe that the standards in revised curriculum are too high, the others believe they are too low. Nevertheless, a professional discussion is needed and it is not the purpose of this paper to analyse the standards.

DISCUSSION

The curriculum development is not a one way process. Our second part of the research proves that teachers do not really want to comment on the process of curriculum development (only 27 comments received). Based on our experience in teacher trainings, teachers do not believe, that their comments can change anything. After the reform in 2008 they mentioned in the questionnaire the problems they had with curriculum implementation. But in 2013, when the public discussion about the new curriculum started, very few comments regarding the content or standards were received. The question is, why? Are the teachers afraid of raising comments? Are they tired of all the continuous changes? Are they sceptic about the system and they just resign to it? Probably all of these questions are right. However, if we want to improve the school system, the reforms must be performed in a more complex way.

[2]The author of this paper is a research worker in the National Institute of Education, so there was the possibility to collect and evaluate received data.

[2]Classes specialized in sport .e.g. gymnastics, swimming, football, athletics

[3]The curricular content and standards in PE are given for the whole level of education (e.g. primary education) not school years (1st, 2nd etc.).

As for instance the universities preparing teachers[5] have not included all the changes in curriculum in their study programmes. And if they have done so, the first graduates will be prepared for implementing the curriculum valid from 2008. However, this year a new curricular document is planned to come in force. So, this means that the teachers could have been prepared to teach other content, with other standards. And this is only one of the problems that may occur during the curriculum implementation.

CONCLUSIONS

The purpose of this article was to present some findings that point out the importance of cooperation of teachers, institutions responsible for curriculum development and universities. An open discussion about the problems in teacher practice and in developing the curriculum can help to avoid mistakes that often occur if this kind of discussion does not exist. In Slovakia teachers had the possibility to raise comments before the curriculum comes into force. However, as they are not used to being heard, they did not feel the necessity to do so. We believe that physical education can gain a new status in the future when the PE teachers will participate in curricular discussions, because they should be prepared to implement it into the practice.

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[5]Teachers in primary and secondary schools in Slovakia are only qualified after receiving Master Degree from University.

SPORT AND RECREATION ACTIVITIES AT THE "GOCE DELCEV" UNIVERSITY SHTIP, REPUBLIC OF MACEDONIA – DIFFERENCES IN STUDENTS OPINIONS FOR ITS REALIZATION IN DEPENDENCE ON CERTAIN CHARACTERISTICS

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Key words: gender differences, students opinion, questioner sport and recreation.

INTRODUCTION

Starting with the pre-school system of education, through the primary and secondary education, the sport at the universities presents a logical consequence in the educational system in the process of sport education of the youth. In this regard, physical education as a source of positive changes in the developmental characteristics, starting from the early childhood until the late adolescence, via the period of maturity and what denotes a process of a life-long learning have one main imperative - formation of *a physically educated person*. In other terms, the physically educated person translates as a person with adopted abilities of engagement in various and numerous physical activities which provide easier maintenance of good health and wellbeing throughout the entire life of the person. It is a person who engages in physical activities on regular basis because they are highly enjoyable and because of the pleasant feeling they bring, as well. This person also understands the values of the physical activity, as well as the gains derived from the active and healthy manner of life [8]. In this regard and in compliance with the presentation elaborated in the White document for Sport of the commission of the European Communities, "the values which have been gained through the sports contribute to the development of the knowledge, motivation, abilities and the readiness for personal achievements.

The time spent in the sporting activities in both the schools and the universities provides educational and health-related gains which need to be improved further more (European Communities 2007)[14]. This means that the sport and the physical education implemented within the educational system present a springboard for inclusion and practice of the sport and the physical activity during the entire life.

On the other hand, according to the reports of the World Health Organization, the physical inactivity has been identified as fourth in a line risk-factor for mortality in people, with a total of 6% mortality rate at the global scale, which is right after the high blood pressure (13%), the tobacco use (9%), and the high blood glucose (6%).

Approximately 3.2 million of people die each year as a result of physical inactivity. The physical inactivity is the key risk-factor for occurrence of cardiovascular diseases, cancer, and diabetes. The increased body weight and obesity, which are very often responsible for 5% of the mortality in people at the global scale, are frequently a result of the physical inactivity. The level of physical inactivity notes a continuous incensement in many countries with great implications over the overall health of the worldwide population. Globally, one out of three adult persons are insufficiently active [21].

The student population has been more and more often calculated within the group of physically inactive persons. The university transition brings about many developmental changes and stresses. The life of the students is being significantly transformed from and academic, social, emotional, and motoric aspect. Both the academic obligations and responsibilities are being increased; the lectures and the studying demand more efficient management of the time. In the field of the social life, the student find themselves in a new surrounding, they leave their home, the parents, and the old friends, make new contacts and friends. This often leads to insecurity and loss of the self-confidence. The students often complain on loneliness, nostalgia, conflicts and disorders in the communication with their peers, as well as an increased stress [19]. From the aspect of the motorics, many of the studies point out to the

decrease of the physical activity in the period of taking the university studies [3, 13, 15]. This decrease has been more stressed in the female population of students, compared to the male population of students, and is co-related with the previously held habits for movement [3, 13]. The initial period of commencing the studies and the decrease of the physical activity, in particular studies has been positioned in a positive relation to the increased volume of sedentary activities, such as watching television or working on a computer, but also related with the use of alcohol, tobacco, and drugs. The same variables have been in co-relation with the attitude towards the Physical Education subject, the teacher, and his/her attitude toward the students [13].

The results from these and many other studies, as well as the data from the WHO, point out the period of adolescence (15-19 years) and the period of young adults (20-25 years) as critical one in which there is remarkable drop of the physical activity and engagement with sports. This realistic condition is opposite to the developmental postulates according to which the student population, which has been a subject of interest to this paper, in compliance with the developmental characteristics and tendencies, and ontogenetically it is located at the top of its physical, motoric, functional, and psychological development [9, 10]. In the literature, the period of late adolescence (after 17th year) and the period of young adults (20-25 years) is the so-called period of higher performances and perfections of the skills [6], i.e. it presents a period of full motoric efficiency [7]. In this period, all of the developmental processes have been completed, the functions have been stabilized, and the maximum in the manifestation of all human potentials- both intellectual and physical - is being reached [10]. What is characteristic in the field of motorics is the harmony of movements and maximal motoric efficiency which lasts until the 21st year for females, i.e. 25 years for males. The motoric abilities, such as strength, speed, coordination, and the rest of the motoric abilities achieve their peak in this particular period, provided the trainings have been conducted on regular basis. As aforementioned, the lifestyles, nutrition, as well as the engagement in a particular bodily exercise condition the changes in the motorics, as well as the movements in this given period.

In order to continue the trend of regular physical activity within the realm of the institutional educational system with a main goal to stop the tendency of interruption of the physical activity typical for the period of the beginning and duration of studies, while in compliance with the Bologna Declaration and the Credit-transfer system of education and the new curricula and programs of the faculties at the Goce Delchev University in Shtip, Republic of Macedonia, starting from the school year 2010/2011 the subject Sport and Recreation has been introduced as an obligatory subject for the students of the first year of university education.

The Sport and recreation subject is represented with 0+0+2 classes planned with the curriculum. In other words, the students have only practical exercises. The subject is obligatory for the regular students in the first year of university education; it does not obtain credits nor is being assessed with a mark and a final exam. The introduction of this subject is required aspect seen through the students' needs for physical activity. The basic aim of the Sport and Recreation curriculum is fulfillment of the basic student's needs for movement and physical activity, in compliance with their own personal abilities, needs, and affinities (Plan and program of the Sport and Recreation subject). Exposed in this manner, the general goal is being based upon the realistic needs of the students. Hence, the Sport and Recreation education has a task to enable the student to fulfill their needs for movement via planned and dosed physical activity in order to be able to conduct certain transformational changes. In this way, conditions for continuation with the sporting activity are being created, as well as improvement and maintenance of the motoric abilities and the physical readiness at a satisfactory level in every segments of the anthropological status of the human, encouragement of a healthy and active life, formation of healthy lifestyle habits, as well as prevention of illnesses related to the physical inactivity and a sedentary way of life, which is typical for the student population.

For the purposes of the conception of this study, we started from the acknowledgements of the studies which have been conducted so far regarding the differences between the male and female students in relation to the degree of participation in a physical activity, the choice of sporting contents, as well as the lifestyle habits of the students. Subject to this study are the students of the first year from thirteen

faculties at the Goce Delchev University in Shtip, republic of Macedonia. The research aims to determine whether there are still differences in the attitude between the students of opposite gender in relation to the place, manner of realization, and organization of the Sport and recreation subject, furthermore its representation in the curriculum, the offer regarding the content, etc. Based upon the defined aim, the following basic hypothesis has been set: X – there are differences between the attitudes of the students from male and female gender regarding the place of the university sport as an obligatory educational subject (its justification for being introduced in the curriculum as a subject, the manner and conditions for its organization, the selection of contents, the current program, the preferred contents, as well as the assumed effects of this type of education).

METHODS

The research has been realized with a total number of 670 respondents, full - time students of the thirteen faculties at the Goce Delchev University in Shtip (Faculty of Educational Sciences, Faculty of Medical Sciences, Faculty of Philology, Academy of Music, Faculty of Law, Faculty of Agriculture, Faculty of Informatics, Faculty of Natural and Technical Sciences, Faculty of Economics, Faculty of Tourism and Business Logistics, Faculty of Technology, Faculty of Electrical Engineering, Faculty of Mechanical Engineering) who regularly attendant Sport and Recreation classes during the winter and summer semester in the school year 2013/2014. From the total number of students included in the research, 41% (275 students) are male, while 59% (395 students) are female. The research has been conducted anonymously and it was realized in the last teaching week (December, 2013 and May 2014, respectively), depending from the attendant semester. Opinions from both male and female students were determined using questionnaire designed especially for these cause. Beside the general questions (gender, age, and university) the questionnaire was conducted from 11 questions or 7 three-item questions, i.e. with three choices, two four-item questions of which one (the seventh one) is comprised of five sub questions and two questions which give ten optional answers. The questionnaire used in this research is modified and adopted version of questionnaire used in similar research realized by Šeparović & Užičanin [18]. The obtained results have been processed with frequencies (f) and percents (%). The significance of the differences of the attitudes among the respondents regarding the gender has been tested by an application of the Bartlett's x^{2-} test. The gained results are also presented graphically.

RESULTS:

From the total number of examined students, 41% are male, while 59% are female students (Graph 1). From a total number of 670 respondents, 375 are aged 19, 124 are 18 year old, while 102 are 20 year olds (Graph 2). The rest of 87 examined students are at the age of 20 years and above. First question reveals students attitude for support or dissupport for the idea of introducing Sport and recreation as obligatory university subject. According the results, 74.55% male and 66.33% female students have a complete support for sport and recreation, 17.10% male and 21.77% female students partially support the idea, while an insignificant number of respondents (8% male and 12% female students) do not approve the introduction of Sport and Recreation as an obligatory university subject. The received values for the chi square test $x^2 = 5, 28$, df = 2 < p 0, 05 = 5,991 и < p 0, 01 = 9,210 show that the gained differences between the respondents are statistically significant at the level of p= 0.05 и p=00.1

Upon the second question "What does the Sport and Recreation subject mean to you?" analyzes of obtained points out that for nearly half of the male students (51.6%) it presents an humans` everyday need, while for 32% of them it presents a good opportunity for recreation. The selection of female students for these two categories is approximately same, i.e. for 41.5% it presents a humans` everyday need, while for 43.5% an opportunity for recreation. Only a small number of respondents (10.9% male and 8.9% female students) anticipate Sport and recreation from an academic point of view, i.e. as a constitutional part of the educational process. An additional obligation is the response of 5.5% male and 6.1% female students. In compliance with the gained values for the chi – square test, $x^2 = 9, 91$, df = 3, < p 0, 05 = 7,815 and > p 0, 01 = 13,277, the obtained differences between the two groups of respondents are found to be irrelevant.

As expected, the greatest differences between the genders appear upon the question of the offered and preferred contents. Regarding the selection of sport of a choice offered in the current program, the largest number of the male students, i.e. 40%, have chosen basketball, significantly smaller number prefer table tennis and general physical preparation 13.5%. The female students have different interests. Namely, they have displayed equal interest in basketball (22.3%), volleyball (21.3%), and aerobics (21%). The least preferred activities for the both groups are the elementary games (0.7% males and 1% females), folk and modern dances (2.5% males and 2.3% females), as well as badminton (1.1% males and 3.3% females). One of the most liked content for the males is the aerobics, chosen by only 2 out of total of 275 respondents of male gender (0.7%), and martial arts chosen by only 8 out of total of 395 respondents of female gender (2%).

From the list of ten sports activities which could be included in the Sport and Recreation curriculum, male students shown the greatest interest for football (42.5%), while the majority of female students prefer fitness (28%). Next on the list of selection for the male students is swimming (15%) as well as the tennis (14.5%). On the other hand, the female students have broader sports interests and almost equal number of them prefer swimming (13.4%), tennis (13.7), hiking (12.7%), and rollerblading (10.1%). The male students show the least interest in gymnastics (1.8%) and athletics (2.05%), while a very small number of female students are interested in skiing and football (2.3%).

Differences between the male and female students were also determined regarding the questions related to the status of the Sport and Recreation as a teaching subject, it`s representation by years, weekly number of classes, as well as the possibility of having theory classes. The current number of classes for Sport and Recreation is once per week in duration of 60 minutes, and it is being supported by 38.5% of the male students and 52.4% of the female students. The number of 2 x 45 minutes classes is being supported by 35.3% males and 37.5% female respondents, while the number if 2 classes per week in duration of 60 minutes has been approved by 26.2% males and 10.1% female students. The gained differences, According the values for chi – square test, $x^2 = 32, 76$ for df = 2 on level > p 0, 05 = 5,991 > p 0, 01 = 9,210 differences between male and female students are obtained referred to gander are statistically important at both of the levels of significance. Numerically (and statistically significant differences between the respondents of different gender $x^2 = 43,66$ for df = 2 > p 0,05 = 5,991 и > p 0,01 = 9,21 are also obtained have been also determined upon the question for the realization of Sport and recreation classes in relation to the years of studies. The male students think that Sport and Recreation needs to be represented in all years of studies (54.2%). This is also the opinion of 28.90% of the female students, while almost half of them (49.10%) approve the current representation only in the first year of studies. This attitude has been accepted by 30.9% of the male students.

Numerically very similar, yet statistically significant results have been obtained upon the questions for placement of the subject Sport and Recreation on the list of facultative (selective) subjects and the need of theoretic lectures within the current number of classes or as an additional number. The majority of the surveyed respondents (62.2% m and 60% f) think that Sport and Recreation should be placed on the list of facultative subjects, while 18% of male and an equal number of the female students do not support this attitude. Regarding the question for additional theoretic lectures, 24.2% males and 25% females have stated a positive opinion for their realization as an additional number of classes in the curriculum, while realization of theoretical lectures in the range of existing number of classes is approved by 40% males and 48.10% of the female respondents. According 35.6% male and 26.9% female students, there is no need of additional theory classes.

Student's opinions about the influence of realization of Sport and Recreation contents over the quality of life, i.e. the physical performances and the mental health, have been determined within the five categories of the seventh question. They regard the influence of Sport and recreation curriculum over the lessening of the psychological fatigue and stress, the incensement of the positive emotions and concentration, as well as improvement of the physical strength and condition. The results for each of the aforementioned sub categories have been displayed in the Graphs 9, 10, 11, 12, 13, and 14. According students opinions, participation in Sport and Recreation activities helps in the process of improvement

of physical strength (53.2%), lessens the stress (56.4%) and the psychological fatigue (56.4%). According the opinions of female students' this type of teaching activities helps in lessening of the stress (60.5%) and the psychological fatigue (63.5%), improvement of concentration (61.5%), as well as the positive mood (53%). For 49.5% of the surveyed female students, the realization of the Sport and Recreation exercises aids immensely the incensement of the physical strength and condition, while 45.3% think that it helps in direction of improvement of the physical performances. The values of the x^2 test on both levels of significance applied from all five sub questions are statistically significant.

The last two questions relate to the technical side of the organization of Sport and Recreation teaching process, in particular to the concordance of the existing time table and the conditions in which the curriculum is being conducted. Out of the total number of respondents, a sum of 54% of all faculties find that the time-charting for the Sport and Recreation is suitable to their timetables, while 15% do not find it suitable. Compared by gender, 61.8% m and 49.4% f completely agree with the suggested time table, 24.7% m and 35.4% f think that the time table needs a better concordance, while the given time table is not suitable at all for 13.5% m and 15.2% f respondents. Regarding the facilities and other material conditions for realization of Sport and Recreation teaching process, 57.8% m and 45% f are found to be completely satisfied of them, 33.5% male and 41.8 female students are partially satisfied with the conditions, while 8.7% m and 12.2% female respondents are dissatisfied with the given conditions. The values of chi - square test upon this question $x^{2=}33,14$ df = 2 >p 0,05 = 5,991 > p 0,01 = 9,210 display the fact that the numerical differences obtained between the two groups of surveyed respondents have been statistically significant while tested on both of the levels of significance 0.05 and 0.01.

DISCUSSION AND CONCLUSION

The analysis of the answers obtained from a total number of 670 respondents and the comparison of the differences between the two groups of students via analysis of the values on the x^2 test, leads toward the conclusion that the students of a different gender have different opinions regarding the placement, manner of realization and organization of the Sport and Recreation, as well as its realization expressed in number of weekly classes, etc. The relatively small number of students (8% m and 12% f) do not approve the idea for introduction of Sport and recreation as an obligatory subject during the first year of studies, opposed to the high percent of students of both genders who completely support this idea (74.55% of the male and 66.33% of the female students). These numbers and based on them, the results from analysis, justifies the decision for implementation of Sport and recreation as a university subject. The gained results are found to be very similar to the results of obtained in the research conducted for the opinions of their colleagues which have been surveyed in 2010/2011 Stojanova, Popeska, Mitevska-Petrusheva in 2011 [16] and point out to the formed consciousness of the students about the physical activity as a part of the lifestyle. From an aspect of gender differences, a stronger affirmative attitude has been noted within the group of male students, compared to the group of female students, which has been partially expected. Similar results have been obtained in other conducted researches, also [12].

The initial motives for implementation of sport at the universities as an obligatory subject of studies have been directed toward creation of conditions for continuous sports activities, improvement and maintenance of the motoric abilities, as well as keeping the physical condition at a satisfactory level which would be adequate for each individual respectively, encouragement for active an healthy lifestyle, as well as a role in creation of the menu. These have been recognized on behalf of the students, which has been confirmed by their answers on the second question according to which for 51.6% male and 41.5% female students it presents an everyday need of a person, while for 32% male and 43.5% female students it presents a possibility for a recreation. For a very small number of the students see this educational activity from an academic point of view, i.e. as a constitutional part of the educational process. The obtained results refer to the formed consciousness of the students about the significance of the physical activity as way of life. .

Students' affinities toward a particular sport are significant for their involvement in the realization of the curriculum. Hence, the questions given in the questionnaire refer to the preferred contents. From the current program, male students mostly prefer basketball (40%), significantly smaller number prefer table tennis (16%), and general physical preparation (13.5%). As expected, the female students had different choice compared to the one of their male colleagues, i.e. they selected basketball in 22.3%, volleyball (21.3%), and aerobics (21%). These choices of the students and the differences regarding the gender have been also confirmed in many other researches [4, 11, 12, 16, and 18]. The selection of contents shows that the students are interested in activities which, above all, have a competing spirit or are directed toward improvement of the motoric performances and functional abilities. The students have been less interested for the elementary games and the folk and modern dances, which can be explained by the lesser intensity these activities have, as well as the perception of the dances as a dancing category which has little influence of the improvement of the motoric efficiency. This, again, in compliance with the opinions of the respondents, is one of the basic motifs for realization of this curriculum. The badminton as a content from Sport and Recreation is relatively unfamiliar sport, because it is not part of the PE programs in the elementary schools, i.e. sport and sporting activities curriculum in the high school. Additionally, the realization of the aforementioned contents, most often as additional forms to the class and their small time representation are probably one of the many possible reasons for the little interest they have among the students. The students' answers for the preferred contents which are not part of the current program are of special significance, because they point to the contents which can enrich the program, as well as the possibility to set a differential program for the male and female students respectively, in accordance with their affinities. In this regard, there is no doubt whatsoever that the programs should be enriched with football (42.5%) for the male students, and fitness (28%) for the female students. Beside this, the material conditions for realization of the swimming and tennis must be met, as well as for the mountaineering tours as particularly attractive recreational activity for the students.

The answers given to the questions regarding the status of the subject Sport and Recreation, its representations per study years, the weekly number of classes, as well as the possibility for theory lectures point out on different opinions between the male and female students. The obtained results point out that the male respondents have interest in quantitatively bigger representation of the university sport regarding its realization with 2 x 60 minutes per week, and a realization in all the years of studies (54.2%). In comparison, 54.2% of the surveyed respondents think that the current representation of the subject with a weekly number of classes 1 x 60 minutes is enough and that it should be introduced only in the first year of studies (49.1%). The introduction of theory classes within the existing number of classes (40% m and 48.10% f), as well as the possibility of being set on the list of facultative university subject's (62.2% m and 60% f) are directions open for possible changes in the subjects placement. Students opinions obtained in this research are also confirmed in other similar surveys [1, 12] Sport as a facultative university subject in each year of studies, accompanied by an analogous number of theory lectures and a weekly number of two classes, participating in a sport selected according students` affinities, stimulated by a particular number of credits according to the ECTS would denote a solid basis for a continuous influence over the students, regarding the adoption of habits for an active and healthy life, as well as regular physical activity. Thus, greater benefits from the physical training would have been achieved, along with the intensification of this type of education, the possibility for a differentiated program, and the participation of the students according to their affinities.

The summarized results from the students' answers upon the question of the influence of the contents in Sport and Recreation curriculum upon the quality of life, i.e. the physical performances and the mental health denote a firm and positive attitude regarding the benefits from the regular physical activity. The differences between the male and female students have been noted in relation with the selection of the categories which aid the improvement of the physical condition, concentration, the positive disposition, lessening of the stress and the psychological fatigue. If the selections of both student groups are summarized, the most frequently chosen answer to the question upon the influence of the physical

activity would be 'helps' and 'helps immensely', which derive a value ranging from 88% to 94%. This leads us to the conclusion that the students have sufficiently enough acknowledgements, as well as an exceptionally positive attitude toward the influence of the physical activity and its health benefits.

The last two questions refer to the technical side of the organization of the subject Sport and recreation as a university subject, in particular to the concordance of the existing timetable with the other lectures, as well as the conditions in which the education is being conducted (space, number of students per group, paraphernalia). These time-schedules are completely suitable for more than half of the surveyed respondents, while 13.5% male and 15.2% female students find them inconvenient. Compared by a faculty, the biggest discrepancy is found between the faculty of Philology and the Faculty of Informatics. The large numbers of student groups, the large number of students which commute on a daily basis and the overbooked timetables with lectures from the parent-faculty are probable reasons for this situation.

Differences between the male and female students are also determined toward the question for the facilities for realization of Sport and recreation activities. Having in mind that the Sport and Recreation teaching process is being conducted in 13 cities, in well-equipped gyms and groups limited up to maximum 35 students, the students' answers come as expected regarding this particular question. Generally, larger percent of the students are completely satisfied with the given conditions (57.8% males and 45% females), although the male respondents have displayed greater contentment in comparison to the female respondents. Compared by faculty, the greatest dissatisfaction by the conditions for realization of the curriculum has been displayed by the students of the Faculty of Technology and Faculty of Electrical Engineering (25.2%) and the faculty of Agriculture (16.2%). The expressed dissatisfaction is a result of the inability to practice football in the gym. This comes as a self-imposed explanation by the students, given in the greatest part of the questioner.

The obtained answers and the summarized results from the gained values from the applied x^2 test are in direction of confirmation of the set hypothesis, i.e. there are differences between the opinions of the male and female students regarding the placement of the university sport as an obligatory educational subject (justification for introduction of the Sport and Recreation subject, its implementation, the manners and conditions of its organization and realization, the selection of contents, the current program and the preferred contents). On the other hand, the obtained results give us the directions for further organization of different sports at the university, in compliance with the students' opinions. This, in particular, denotes that the students recognize the need for sport and physical activity during the course of their studies, as well as the significance the sport has upon the quality of their lives. In this direction, they support the idea of implementation of the sport as an obligatory subject in the first year of studies, with a possibility for an additional implementation of the sport as a facultative university subject in the rest years of studies.

Regarding the contents, the interests of the students are directed toward the introduction of the football as content preferred by the majority of the male respondents, and the fitness with the aerobics as content preferred by their female colleagues, respectively. The introduction of these contents, as well as the introduction of tennis, swimming, and mountaineering as a mutual choice of the students from both genders, the realization of the university sport in each year with two classes per week, as well as the introduction of credits for regulation of the students' obligations, would allow students' participation in the sporting activities in compliance with their affinities. This, on the other hand, would increase the motivation for participation in the selected sporting content and thus guarantees greater efficiency and health benefits, as well. These changes stress the role of the university in the creation of complete individuals via creation of conditions for obtaining habits for a healthy, active, and quality life through an offer of various sporting programs, as well as provision of suitable and convenient spatial and material conditions and possibilities for each student to be able to engage in a physical activity and sport to the degree and form convenient for the student.

Thus, the Universities impose themselves as a logical link in the system of a continuous physical education as a strategy which would aid the physical education to perform its role in the magnification of the

physical activity level, as well as for a promotion of the health through obtaining habits for a healthy and active lifestyle [10].

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SPORT PSYCHOLOGY – PSY

PSYCHOLOGICAL PREPARATION FOR THE PARALYMPIC LONDON GAMES 2012

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***Key words**: Psychology service, Paralympics, Skills, Preparation*

The Olympic and Paralympic Games are a unique, quadrennial highly publicised event. The main emphasis of this article is to compare the amount and type of psychological consultancies from the Irish Paralympic team in Beijing 2008 to London 2012. There were significant operational and delivery changes in the strategy and framework for psychology to athletes, coaches and support staff during this cycle and recommendations are made for future psychologists' skill training.

The Paralympic Games are the largest multisport event in the world for elite athletes with physical, mental and sensory disabilities. There has been a huge increase in the number of competitors, from 400 athletes representing 43 countries in 1960 to 4000 athletes from 146 countries in 2012 (1). The Olympic and Paralympic games are the pinnacle of sporting achievement and recognised as the ultimate accolade of a successful athletic career (6, 7). The games which take place every four years can be an 'intense, exciting, unremitting emotional rollercoaster. It is also unforgiving and abrasive' (Katz 2006, p. 25). The intense interest from media once the team is announced, right through to the homecoming is full of both pleasure and also pain, from an individual and logistical perspective. What is omitted in all this concentration to the forthcoming games is the duty of care for the athlete in their competitive environment and context. The heightened attention of the Paralympics in media was accentuated for Ireland due to the closeness of the games being staged in London 2012. In fact it was considered by Ireland to be their Home Games due to its close proximity. Psychological research and applied consultancy work in sport has been slow to emerge in Ireland and within the Paralympic movement and context, despite the increase in sports science knowledge and application (4, 5).

Sport psychology has been popular and grown considerably during the last two decades in applied practice and as an academic discipline and no-one would argue its importance and significance in all sporting contexts. Nevertheless, recent research has shown that many athletes, coaches, and sporting administrators are still quite reluctant to seek out the services of a qualified sport psychologist, even if they believe it could help (3, 10). In fact it has been undervalued and poorly received by certain key stakeholders in the performance environment of sport (7). This may be due to a lack of understanding of how sport psychology operates in comparison to its counterparts in the sports science domain. It may be that administrators, some coaches and performance managers can only see the tangible results of physiology and performance analysis. They are reluctant to see the long term positive effects of building an understanding and a relationship between psychologist and individuals around that team as perhaps they see that as not part of the psychologists' role. Anything that effects the well-being and performance of athletes are everyone's concern. But professional helping relationships of the personal nature are not clearly or closely associated or linked to the tasks and operations of the organisation, where perhaps it suggests failure as opposed to development. It may also be that these doubters of the benefit of sport psychology are restrained by financial, visionary and pressure put upon them by National Governing Bodies (6, 7).

Literature on psychological delivery in the lead-up to the Games and within the village environment illustrates different approaches from a humanistic perspective to a descriptive narrative (4, 11, 16). However, it rarely centres on contextual practice, where the psychologist amongst others act as a figure of calm for athletes, coaches and support staff in what has to be one of the most stressful sporting events athletes and coaches experience (9, 10, 12). The Paralympic events have time demands and delays where they are first on, last off. They have equipment, luggage and support needs and challenges in comparison to their able-bodied counter-parts. All these unique scenarios have an effect on their life and subsequently their performance. How and where we work at times poses different challenges. Hence context knowledge and experience is vital to effective psychological support (16).

A major dilemma that athletes typically face when preparing for and performing at pinnacle events such as the Paralympics is that importance inevitably gets weighted towards medals, finishing order and comparative standings with the nation, media, sporting organizations, supporters and athletes themselves getting deeply drawn into this line of thinking (14). While this can be inspirational to some, to others it can lead to heightened stress and even the very best athletes struggle to handle such pressure. Mental skills training and psychological support should enhance performance. This is why psychological skills training should be fully embedded in the elite performance model of training, but the integration of the planning of mental and psychological skills has rarely been tested or assessed (2). Paralympic and Olympic organisations have a tendency to perceive psychology to be in high demand the closer the Games approach and hence see psychological support 'at the games' to be of the utmost benefit. A large amount of athletes, coaches and performance managers want a 'quick fix' for immediate performance effects and evidence has been inconclusive of the effect of such a strategy on both an athlete's performance and their self-confidence (4, 9, 14). For Olympians and Paralympians, the one-off quick fix certainly occurs, but the benefits are debatable. Athletes have requested more self-confidence and affirmation sessions in short bouts close to the competition, as the event can be their once in a lifetime experience (2, 9, 13). At the Olympic Games, everything becomes a performance issue (12) and this contention suggests that sport psychology at the big event is not about preventing problems or challenges, but helping athletes and teams preventing the problems becoming critical. While this is not a 'quick fix' remedy, the psychological issues are dissolved and set aside until the games are over. However seldom are the issues ever resolved despite a costly and time-consuming de-briefing process. Thus getting the 'when' of psychological skills training is worth considering as well as whom (personnel) and what (service delivery). However, planning and routine building within the sport and between athletes, coaches and sport psychologist is normally the best way (5). This is best achieved with time at practice, competition events and social gatherings within the sport. Planning and building relationships and rapport in a multi-sport environment is not without hazards and what inevitably occur are other interpersonal and intra-staff psychological issues that arise under the pressure of the Games. This manifests itself at big events and hence the timing has to be simulated at previous competitive environments. If these are dealt with, without personal conflict being involved, the event will run itself and the long term potential facilitates a better team culture (14, 15). But there are still many theoretical questions over the psychological application with teams and individuals and with support staff (8, 15) and there is a distinct lack of adequate guidelines on the optimal approach to implementing an effective psychological programme which deals with all contexts and variables. This is because there are so many situations, such as demanding competitive and practice schedules, delivery issues such as consultant knowledge, access to athlete and coach and coach /athlete reluctance to name but a few. Research then is stifled as only anecdotal and descriptive accounts and evidence can be collated due to the restraints of accessibility, ethical and logistical confounds on gathering information. This can be amplified within the Paralympic domain, as their identity, their disability and the circumstances that enables them to perform are all individual and unique. This knowledge and how that affects them and their context is a significant factor in providing specific psychological support (16).

The stressors at Olympic and Paralympic games have been well documented (9, 10, 11, 12, 13, 14, 15) and a summary of these are listed in **Table 1**. Included are issues that have been identified from previ-

ous Games and should be used as a framework for consultancy if selected for major sporting events as a sport or performance psychologist. Psychological resilience, interpersonal conflict, pre-event preparation and stress management are some of the key components and pre-requisites for the big event psychological toolbox.

Table 1. .Common stressors at the Olympic and Paralympic Games

Pre-event preparation, selection, distraction, 2nd week blues
Games wobbles, 1st Games, Village experience
Stress Management, Planning for Competition day
Expectation and performance
Interpersonal Conflict/- Communication- coach/athlete/manager/ PD/ support staff
Team culture and Identity
Psychological resilience – competitive, personal and organisational

In this article, the main emphasis will be to explore the differences between 2008 Beijing Games and the 2012 London Games when working in the sport psychology area with Olympic and Paralympic athletes. Data for this article were collected from case notes, self-reflective logbooks and consultancies before, during and after the 2008 and 2012 Paralympic Games. This study is a descriptive account from a registered and accredited sport psychologist entering into the high pressure world of international Paralympic sports.

Consultancy frequencies were used to compare the amount and type used during 2008 and 2012 with all operational staff (athletes, coaches, performance managers, support staff, sports science team and family). **Table 2** illustrates that the differences in both the amount and the type of psychological input from 2008 in Beijing until the end of the games in London 2012.

Table 2. Difference in type of Psychological Service Frequencies and %

	2008	%	2012	%
Anxiety	22	10	8	6
Imagery	8	4	6	4
Confidence	18	8	12	9
Routine	25	12	14	11
'What if'	33	15	28	21
Clinical	12	6	14	11
Identity	20	10	6	4
Expectation	12	6	22	17
Time mgt	10	5	4	3
Conflict	52	24	18	14

Post 2008 psychology became a significant part of the planning process, all qualifying competitions where logistically and financially feasible in conjunction with the sport were used to ascertain how each sport, individual, coach, manager and support staff operated were observed and discussed and

when travelling there was a relationship building framework with athlete/coach/family/support staff to investigate how the sport functioned. Discussions and sport recommendations were done in formal, informal and social gatherings. This information allowed the team supporting the athlete to know when to intervene and what to do if certain situations arose during the latter cycle (2009-2012). Specific competition day plans were devised and this was to be practiced on the lead up to the Games and tested empirically to see what works best for each athlete and support staff. Conflict was reduced considerably over the four years because of the knowledge gathered and the relationship strengthening that occurred between psychologist, athlete, and coach and governing sporting body. This was enhanced by attendance at major qualifying events and team camps over the cycle and workshops looking at case studies to share and promote positive inclusive practices for all members of the support team. There were no real significant differences in the frequency of consults in regards to psychological skill except expectation. Opening channels of communication between athlete and coach and performance directors where agreement is shared and communicated rather than being assumed or mismanaged by the media can facilitate anxiety and instil confidence in the systems and promote positive calmness amongst a multi-sport team. Identity and team cohesion in the village was enhanced by individual pictures on the balconies of the accommodation and the use of carefully prepared psychological messages within dvds shown at camps and the holding camp allowed a sense of togetherness and promoted trust within the team. There were significant changes in the type of service, from Beijing to London over the four years which had a significant effect on outcome. The medals increased from 5 to 16 and Ireland finished 19th overall in the 14th summer Paralympics. When this is adjusted for population and GDP, Ireland finished in 4th position (3). Managing expectation before and during the Games increased significantly over the Paralympic cycle due mainly due to the geographical proximity of London to Ireland. The same culture yet bitter rivals was seen as a positive in the lead-up to 2012. The expectation was internal and external, as one of the strategic objectives of Paralympics Ireland was to compete, perform and win in 2012 as opposed to the IPC vision of achievement, inspiration and excitement. The cultures were becoming increasingly diverse the closer the Games approached and sporting administration systems place a great deal of stress on competitors, coaches and support staff without realising its effects. Outcome and results as opposed to emphasising people accentuates pressure, as opposed to interpreting the event as something gained from as opposed to something to lose. A discourse and dialogue between all stakeholders involved in the competition process is required to promote confidence and awareness of each other's goals in the future Games.

In concluding, the 'pressure to deliver instant and unfaltering success is increasingly severe' (Cruickshank et al 2013, p.7) and a holistic approach which has training implications that promotes interpersonal relationships and a shared organisational culture will endorse a successful person-orientated team culture and refrain from developing what has been increasing in sport of a performance focused ruthlessness where the prioritisation of others emotional investment has been sharply over looked as part of a no compromise approach (4, 6, 7, 15).

A sport psychologist is therefore required to appreciate the organisational, social and interpersonal processes of the sporting context they are working within and either work alongside the key stakeholders, such as management and governing bodies of sport and attempt to address the psychological issues that many of these structures impact on performance based on a duty of care to the athlete philosophy rather than an outcome medal glory approach. The role of the psychologist should be to provide a barrier-free physical and communication environment in which clients with disabilities may access psychological services. The psychologist should also strive to understand both the common experiences shared by persons with disabilities, and the factors that influence an individual's personal disability experience.

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ATTITUDE OF STUDENTS FROM THE NATIONAL SPORTS ACADEMY TO FOOTBALL HOOLIGANISM

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Key words: *students, attitude, football, behavior, measures*

Introduction

The contemporary professional sport changes its appearance and character influenced by many social factors and phenomena such as the processes of commercialization, internationalization and globalization, linking of sport with economics and intensive development of business realities, etc. [3, 4]. Along with the positive trends, in the field of high level sport have been observed numerous negative phenomena related to violation of the sport morality and ethics [3, 4]. In the specialized literature is underlined that moral degradation in sport is connected with "the moral sunset of the society" [6, p. 14].

It is explained opinion that "today in the era of the developed civilization and over modern technologies the moral aspects of sport are in doubt" [7, p. 27]. One such negative moral phenomenon is football hooliganism, which conflicts with the humanitarian nature of sport and the Olympic idea.

The football hooliganism is defined as a kind of behavior of football fans, which is characterized with disobedience and destructiveness [8]. There are different theories and concepts about its origin, as most often they are social and psychological theories.

The football hooliganism has been expressed in various activities such as physical aggression - fighting, aggressive behavior, making racial abuses and xenophobia, collisions on and off the pitch, beating judges and fans, vandalism, throwing fireworks, bottles, stones, and other negative events [2, 8]. As a result the various manifestations of football hooliganism lead to social rows and conflicts. Excesses and violence in the stadiums sometimes assumed menacing proportions. These phenomena are contrary to sport ethics and to sportsmanship behavior of players during the football matches.

The football hooliganism is not an isolated phenomenon, but is widespread in many European countries, including in Bulgaria. Due to this reason a number of measures for overcoming of the football hooliganism have been taken on the European level. For example, in the motherland of football, England numerous legislative measures have been adopted to cope with football hooliganism. Such are the following acts: Sporting Events Act (1983), Public Order Act (1986), Football Spectators Act (1989), Football Act (1991, 1999, 2000), Criminal Justice and Public Order Act (1994) [2].

It is an undeniable fact that the protection and the welfare of the spectators at football matches is a major priority for the organizers of sports events. In this context numerous documents and conventions governing the fight against the football hooliganism have been adopted such as The European Convention on Spectator Violence [9].

The European Convention on Spectator Violence aims to prevent and to control spectator violence and misbehavior as well as to ensure the safety of spectators at sports events. The Convention's contents focuses on three main topics: prevention, co-operation and repression. The text underlines the development of social and educational measures to prevent violence and racism (develop fan embassies, improve club-supporter relations, promote fan coaching and stewards, etc.) [9].

The Convention also highlights the importance of co-operation between the sports clubs and police authorities of all countries concerned during the organisation of major international sports events in order to identify the possible risks and be able to prevent them.

In Bulgaria the situation is different. The term "football hooliganism" is not determined explicitly as a crime under the Bulgarian national legislation [2]. But the lack of rule does not leave the phenomenon without legal regulation. The term includes different types of acts that can be classified in various ways. This is reflected in the Protection of Public Order Act during sporting events, adopted in 2004 [1]. The objectives of the act are aimed at protecting the public order during performance of sports events; prevention, cessation, detection and punishment of antisocial behavior; ensure of cooperation between the state bodies and public organizations to prevent all forms of antisocial behavior at sports events.

The aim of this study was to investigate the attitudes and perceptions of students from the National Sports Academy "Vassil Levski" in Sofia to football hooliganism in its various manifestations.

METHODS

Subject of the study were 113 students from the Coaches Faculty, from the Teacher's Faculty and from the Faculty of Kinezitherapy, Tourism and Sports Animation with specialty "Sport", "Sports Animation", "Sports Management", "Adapted Physical Activity and Sport" and "Physical Education". From the respondents 75 (66.4%) were men and 38 (33.6%) were women. Respondents were fans of different football clubs in the country and abroad.

For the purposes of the study a special questionnaire with closed questions was developed as the answers were scaled and alternative. One of the questions required a free expression of the opinion of the respondents. The questions were directed to the following moral dimensions in sport:

- attitude towards football hooliganism;
- manifestations and severity of football hooliganism in the country;
- prevention of football hooliganism.

The results were processed using the following statistical methods: alternative analysis, content analysis, and U-Student criterion (for comparison of the relative share of independent samples as the difference in the responses of the respondents on gender indicator were outlined).

RESULTS AND DISCUSSION

The current analysis presents continuation of our researches on the theme of football hooliganism [5] and focuses on its concrete dimensions.

On the question whether the respondents had witnessed acts of hooliganism at football matches answers are mixed. The highest relative share has the group, which often observed similar events - 39% and 21.2% of those questioned said that they from time to time had witnessed these events. These students are probably fans of different football clubs and some of their fan groups. While 15% of the respondents had not witnessed acts of hooliganism at football matches. We assume that these respondents are students who are not supporters of the football game and therefore do not often attend football matches.

Interesting are the answers to the question about specific acts of football hooliganism in Bulgaria. Responses are multidirectional which directed to the diversity of the studied phenomenon. According to the young people the most prevalent forms of hooliganism in football are throwing fireworks (firecrackers and bottles) in the stands and beating the fans with a very high percentage - 82% (**Fig. 1**). According to the students breaking and burning seats in the stands are widespread acts of football vandalism - 80.2%, along with the racist insults addressed to football players and fans - 65.8%.

Negative is the fact that 36.9% of respondents identify as acts of football hooliganism beating police officers and journalists. This is a part of the Bulgarian football reality that could not be ignored. Other acts of hooliganism in football are indicated - 6.3%. As such are stand out illegal actions of the law enforcement officers and vandalism on and outside the stadiums.

More than half of the respondents - 53%, believe that the acts of football hooliganism in Bulgaria take place more often compared to other European countries (**Fig. 2**). This response is a direct re-

flection of the football environment in the country in which excesses and aggressive behavior at football matches are common. Compared with other European countries, Bulgarian authorities still do not paid sufficient attention to this negative phenomenon. While 17.7% of respondents believe that football hooliganism in Bulgaria is expressed to the same extent as in other countries in Europe, and 14.3 percent even state that as concrete manifestations it is less pronounced. It is noteworthy that 15% of students have no opinion.

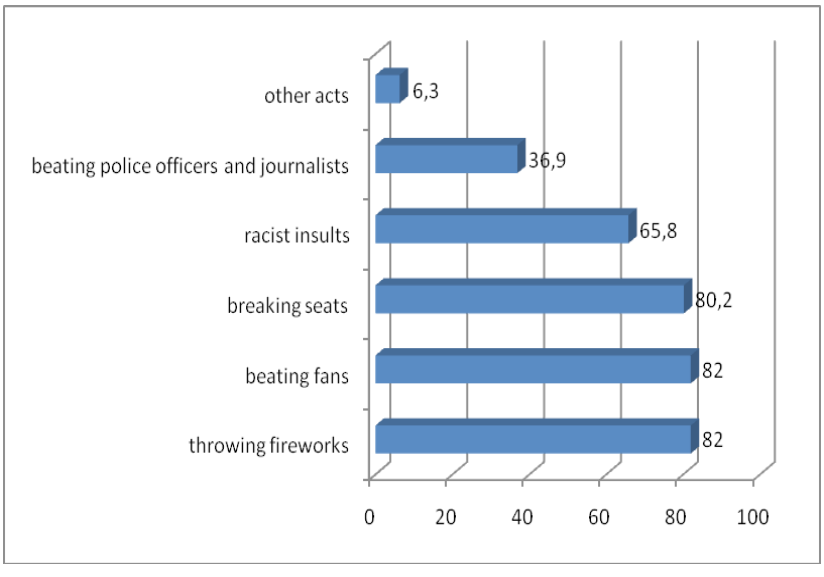

Fig.1. Acts of football hooliganism in Bulgaria

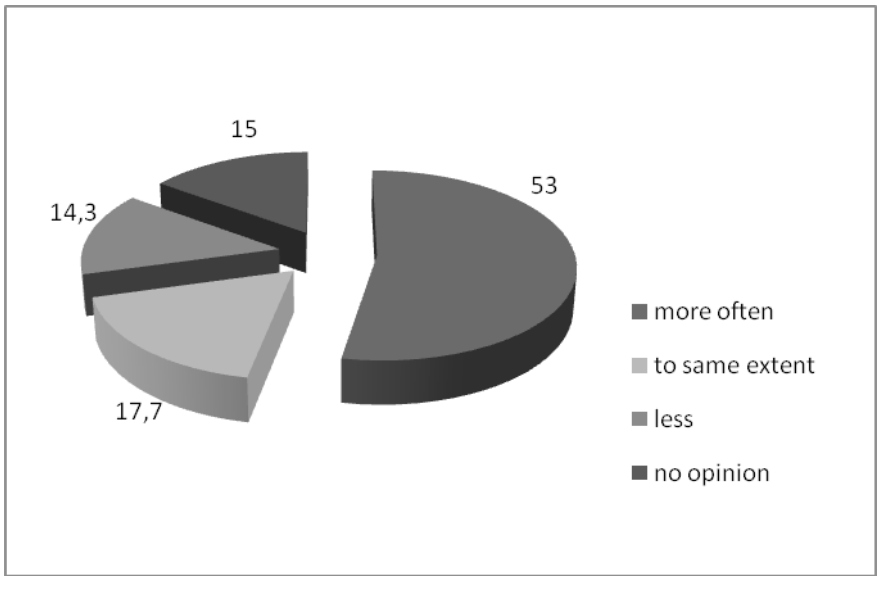

Fig. 2. Football hooliganism in Bulgaria in comparison to other European countries

In these case have been observed significant differences in the answers of the respondents by gender as women in more extend give answers no opinion and is less pronounced for football hooliganism. Indicative for the adjusted reflections are the answers of the question to what extent the football clubs in Bulgaria take concrete measures for overcoming of football hooliganism. The biggest is the group which considered that the clubs only to a small extent counteract this phenomenon - 42% (Fig. 3). It is relatively equal proportion of respondents who said that the football people to some extent take specific measures – 28.5% and do not take such actions - 26.8%.

It is a fact that the most football clubs in Bulgaria ignore this destructive phenomenon. They do not

perceive it as a threat to development of football in the country. The responses to the question whether the institutions responsible for the development of sport in Bulgaria take concrete measures to cope with the football hooliganism are similar to the previous question. 40.2% of respondents indicate that Bulgarian institutions only slightly care for solving the problem with football hooliganism. The fact that 25.8% of the respondents state that institutions in Bulgaria do not take any legislative measures to deal with this phenomenon can be interpreted as a negative. It is known that in many European countries have been adopted strict laws, regulations, penalties to restrict acts of violent behavior and these measures minimize the hooliganism at football events.

Students from the National Sports Academy confirm the idea for the development of comprehensive strategy in Bulgaria for overcoming of the football hooliganism, as 83.9% of the respondents accept the idea. It is worth mentioning that 10.7% of respondents refer indifferently to such an idea, as probably these are students who have no direct relation to the football game and are not its fans.

Low is the percentage of respondents who do not accept the strategy's development - 5.4%. We assume that this is a result of the difficulties that exist in the society and the lack of specialized institutions to work together in a similar direction.

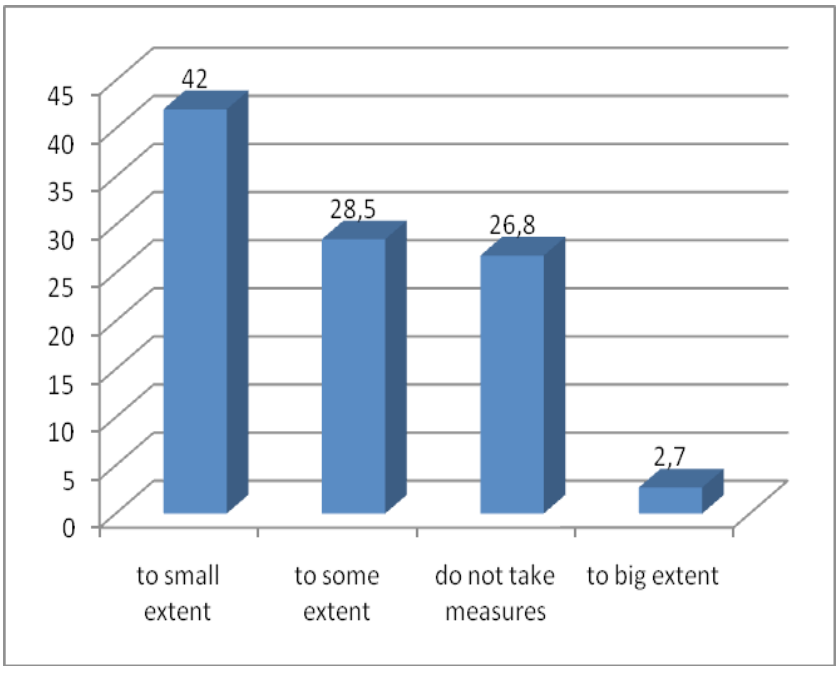

Fig. 3. Measures of institution to cope with football hooliganism in Bulgaria

CONCLUSIONS

Based on the results of this study the following conclusions can be outlined:

1. Manifestations of football hooliganism in Bulgaria are diverse as among them stand out throwing fireworks, beating fans, breaking and burning of seats in the stadiums.
2. Football hooliganism in Bulgaria is more pronounced compared to other European countries.
3. Institutions and sports clubs in the country do not counteract sufficiently to football hooliganism by specific legal action.

RECOMMENDATIONS

The competent institutions are required to develop a comprehensive strategy for dealing with football hooliganism in Bulgaria which will become a basis for adoption of a special law on football hooliganism.

The state institutions to join forces with the management of the football clubs for the development and prosperity of the Bulgarian football.

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ANTI-STRESS HEALTH PREVENTION THROUGH AQUASPINING

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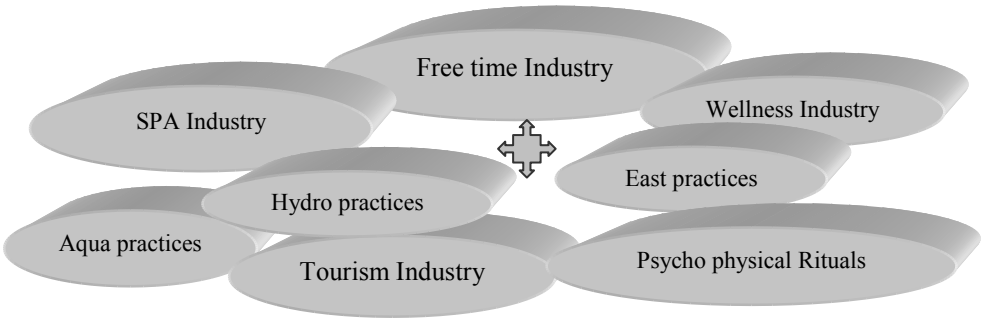
Introduction: The fundamental is the question of the formulation of national priorities for development of the industry Leisure. Important aspects for the determination of the free time industry are tourism, sport, entertainment and pleasant experience like SPA and Wellness[1]. **Scheme 1** would suggest a substantive hierarchy:



Scheme 1. The hierarchy of the leisure and free time Industry

Bulgaria has a rich tradition in using the Thalasso aqua influences from ancient times to today. Statistics show that in the last few years in our country have created more than 2,200 specialized centers in summer and winter tourist complexes and resorts [1]. Unfortunately, only 10% of the personnel in these SPA centers have a higher special education. We made an attempt to systematize the expertise of leading international scientists. Some authors define free time as an important social factor, because each of us needs time to relax. They prove scientifically that the effective use of aqua relaxing influences and programs helps to alleviate the social and professional stress, recharge the body, mind and mental health. Free time is important because life should not be spends only in work; it takes pleasures and charge with positive energy. According to certain national traditions man does not lived to the full, if not include little pleasures in everyday life or selects the preferred “…clusterized destination…” [12]. So is emerging SPA & Wellness industry to improve the quality of pleasure through various influences for eliminating the professional and social stress with aqua methods for prevention and health promotion. SPA & Wellness & Thalasso methodologies and practices can be seen as „... creating polyvalent SPA culture …“ [4], it is important to “... discuss problems recuperation significance of physical activity in the aquatic environment and the direct link to improving the quality of life and health status of the practitioners …“ [7], that are generated by “the immaterial aspects of the innovations ...” [11] through the implementation of the SPA&Wellness culture. In Bulgaria, SPA & Wellness & Thalasso effects are completely new direction in tourism, regulated by the Law only in the month March 2013 natural resources mineral or spring water, which is „... a gift from the gods ...“ and „... today perceive water as a vital and we can not imagine existence without it…“ [6] used for various recreation and relaxation practices that are unifying factor in this new social and personal preventive health culture - „Salus per Aquam“. The most common are two kinds of leisure activities – active and passive. Active leisure activities involve vigorous activities even need to use “mental and physical energy” [3]. Passive leisure

1SPA – Salus per Aquam / Wellness – healthy lifestyle / pleasurable experience

activities can be watching a movie with friends, sungeyzing or reading a book. In the last 3-5 years the physical activity in water enjoys with growing popularity in all Europe. That is why our scientific interests are focused, for studying the Bulgarian market for the special interest of customers to aqua practices. Among the numerous possibilities for recovering and revitalizing physical activity in water the aquaspinning have the best efficacy. For its transformation into the preferred aqua practice is necessary to outline the issues that accompanying this practice in Bulgaria. First issue is associated with identification of the type and quality of the modeling aquaspinning programs. The second is focused on adapting them to the individual customer needs because "…Spa is something old and wonderful - the best alternative to the modern stress and its effects on human health where SPA&Wellness modern methods are alternative to social stress…" [5] and its financial capabilities. And the third concerns the creation of "…new marketing&managment strategy to promote it in the free time industry on the entire Balkans region... " [9]. In the terms SPA, moderns man puts on recreational health&beauty or health prevention trough "…personal time for relaxing..." [8]. But in our opinion is very important to know that the "… Spas are frequented for health by healthy people…" to "…recover from social and professional everyday stress…"[10].

Material and methods: Our **working hypothesis** is based on the assumption that the usual activities with Aqua practices (in particular aquaspining) adapted with the individual type of „social dynamics or social stress" are pleasant, relaxing and remove the monotony that neutralizes situational anxious, anxiety and psychical tension and"…contributes to the tired people to have rest by taking active leisure…" [4]. SPA&Wellness&Thalasso impacts „... improve the quality of life when used in everyday life and the quality of recreation when placed in the tourist packages…" [8]. The **aim** of this study is to present the potential of aquaspining as alternative of the social or professional stress and for prevention and health promotion. The **target group** of the study was 63 females, 25 of them with little experience we have assumed for beginners, while 38 persons – with more advanced preparation that participated in the main experiment. **Specific methods are**: 1. Questionnaire especially created by us, with open and closed questions. Highlights - on age, work experience, anthropometric data, the motivation to participate in organized activities, the number of weekly visits to classes, regular physical activity, participation in sports events in the past and currently, diet and interest Aqua practice-self-awareness through literature and Internet information. 2. Psychological test for subjective assessment of current situational anxious of the participants in the advanced group. We chose the test of Spilbargar (STAI). It consists of 20 questions, of which four point scale, registering subjective assessments of feelings, experiences, stress and anxiety befor and after the aquaspinning practice. Test be completed in person immediately after the hours. The responses were processed with the key of Spilbargar and evaluated according to the standard rate - the values for women within 33.99 the ball. **Results and discussion:** The SPA time provides rest and relaxation of mind and body. To exclude the mind after a long day and focus on something else in your spare time it is important to practice something that makes the person happy. One can easily forget the tension and stress and to distract his mind to a creative and constructive plan for active or passive recreation. You should never underestimate the importance of leisure. It helps to break all barriers and one out of its shell, which is closed. One can have a healthy mind and spirit by living healthy. The fact is that our ancestors who were free of stress and tension of modern life have led a pleasant and healthy life free of problems and have been practicing environmentally diseases. Today, as a result of social stress life became anxious that causes high blood pressure, heart problems and other health problems. Identifying the benefits that accumulate a significant number of activities after work is an important factor for improving the quality of life, eliminate social stress and balancing health in the modern world. American psychologist Bruce, A. & Wellington B. - members of the American Psychological Association in the practice say that to achieve great professional success and high quality of life, you must find a balance between professional appearances and commitment to the family by ensure effective management of free time. But unfortunately most actively employed business people are workaholics. Free time reconnect to work. This behavior leads to a lack of stimulus variables and dangerous to the mental equilibrium upsetting overall health. The use of long-cherished personal interests is left to the time after retirement. But workaholics are likely to be ineffective, unim-

aginative and show only destructive behavior. After a while they lose their enthusiasm, creativity, motivation challenges . . . and sometimes lose their health and family. Science has proven the concept of "stress" associated with health and performance. Health concerns personally and performance makes people better or worse professionals. These two reasons are fundamental to the modern world and not require you to bring other arguments, except statistical information. Only within the EU over 200 million people of all ages participate in sport animation or practice SPA and Wellness methods, practices or aqua eastern relaxation techniques, health prevention and recreation. But in our opinion is very important to know that the SPA is the health prevention of a healthy people for their recovery from social and professional everyday stress. In most European countries and it became another kind of SPA effects called a short - Medical SPA. Our working hypothesis is based on the assumption that the development of modules for practicing aquaspining will allow to optimize the proposed relaxing and procreative prevention programs and promoting the health and beauty. The aim of this study was to determine the specificity of the aquaspining effects through the application of current methods of prevention and health promotion. We traced the confidence of women through psychometric experimental methodology. Monitoring the effectiveness of aquaspinning impact the group conducted a body by recording the weight and circumference of the abdomen, pelvis and hips standard anthropometric methods. This report offers a partial view of our regular customers' practicing the aquaspinning program. Analysis of the results is based on the values obtained after mathematical and statistical processing of the data. Using correlation analysis, we calculated the interdependencies between the studied indicators for persons involved in the aquaspinning program. The values of correlation coefficients showed large direct relationship between indicators of aquaspinning modeling programs for weight loss (r = 0,778) and the circumference of the pelvis as for the circumference of the thigh and abdomen of the client (r = - 0,739). It is also a very high correlation between rights programs for weight loss, combined with SPA services (r = - 0,919) like Hydro jet impingement and stream beating - consciously aimed primarily at the studied areas. Many direct relationship found at these combined effects (motor and restorative), including herbal teas and additional regulated water intake of 30 ml. / Kg body weight (r = - 0,882). Topping content of the aquaspinning with SPA services to improve psychophysical status and personal self motivate of our clients in their majority (56.8 to 59.5%). The combined option attracts customers with specific expectations about the emotional and psychological wellness. It is correct to say that this kind of aquaspinning programs is considerably more expensive than just practicing physical activity by means of aquaspinning, which also shows the high efficiency of its impact on areas of cellulite, but found significant results only after the 20th training. The specific underwater movements of modeling aquaspinning programs are presented in **Picture 1**:

Picture 1. Underwater body-work during the aquaspinning activity (specific equipment)

To determine the parameters for effective development of SPA and wellness practices as an alternative to social stress calculated the correlation coefficients of relationships between indicators of both studied areas by preference matrices (**Fig. 2 and 3**). According to the values in the matrix most frequently used SPA services estimate that a very large correlation among the indicators prophylactic SPA treatments and hydro massage and manual (r = 0,949) and significant, but feedback - the practice of yoga (r = -0,593) and Phyto and bassoon procedures wellness (r = - 0,528).

The **correlation analysis** of the relationships between indicators of matrices favorite cartoons and SPA services and for to improve their quality shows very high correlation between aquaculture practices and diversifying the range of services (r = 0.945) and large - with opportunities for bonuses and gifts (r

= 0.802) and the use of modern equipment (r = 0,756). Regarding correlations between indicators of the basic development priorities SPA and wellness business found a large correlation value between the standardization of SPA and wellness services and national policy for legislative measures (r = 0.764) and significant between categorization and qualification requirements of personnel.

Summarizing the results should point out that using SPA and wellness services and mechanisms for improving its quality are directly related to priorities for the effective development of SPA and wellness business that provides "health care for healthy people."

Responses from **psychometric experiment** to capture the views of clients together in five main areas that sparked our interest:

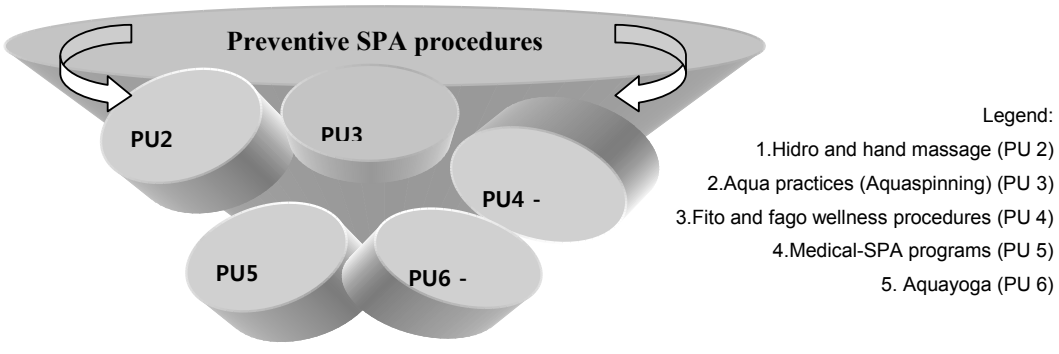


Figure 2. Correlation model interdependencies between the matrixes preferred SPA services.

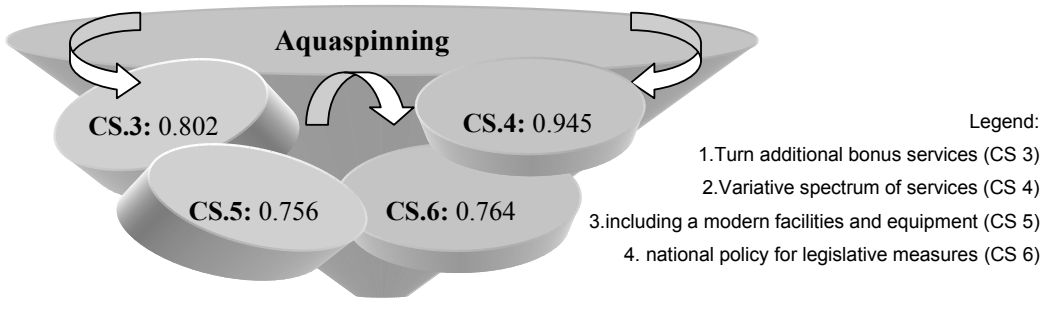


Figure 3. Correlation model interdependencies between matrices indicators of preferred aqua practices for getting rid of the social and professional stress

- The question „Why Aquaspining activity" responses of individuals from both groups show a different level of motivation: beginners are guided by the interest and curiosity (24%), the strong desire to improve health (40%) and quest for modeling the figure (36%); advanced experiencing constant need (66%) and realized the need for physical activity, improving functional capacity and tightening of the muscles of the body (34%).
- The question "How many times per week you visit activities" both groups are categorical that try to be regular by taking part in activities on average twice a week (26-27%): beginners, who practice two times with 28% and three times in 87%; advanced involved three or more times is 44%.
- The question "Whether do sports before you" 55-56% of the participants answered negatively, and only 44-45% said that sports is two to five years, mainly swimming, gymnastics, athletics or sports games.
- The question "What is your diet" answers were in the direction of most Bulgarians traditional use of meat, but not often and not constantly - we found that only 35.5% by all vegetarians, as these are mostly representatives advanced and beginners group these are just 8.5%.
- The question "Are you interested in Aquaspining-literature" were received large discrepancies in the answers to beginners and advanced. It was natural to advanced care and read literature for aqua practices (76%), while novice women interested only in Internet - 28%.

Despite the relatively small number of interviewed persons (only 63 women), the data show that practicing Aquaspining is important and strong motivational factor for delaying the aging process. Abundant hydration of the skin (the largest bodily organ) by the aqueous medium energizes turgidity of the skin and makes it fresh and silky. We analyzed the results of psychometric experiments to determine the current situational anxiety after a specific occupation in Aquaspining. From the tests performed, it is found that the index STAI are within 24-57 homecoming or bale 31.26 average (score over 31 prom was registered only 13 participants). This indicator was found to be lower than the norm (33.99), a fact which eloquently in favor of moderate, evenly, not stressful load activities in akvaspining and soothing aquatic environment, external music leader, serene atmosphere in which minimizes feelings of anxiety and tension. This result is confirmed by our observation on the behavior of practitioners - their facial expressions, gestures, facial color, smile. We think that the behavior is a reliable diagnosis of functional status among cognitive (cognitive) parameters.

Conclusions: As a result of the identified features in the ratios between aquaspining practice and the alternative of the social or professional stress and for prevention and health promotion, we can assume that there is some correlation between the level of anxiety, the weight of individuals and their types of anxiety. Perhaps in our case the respondents were stress or is likely they often fall into this as a result of their individual tendency to nervousness, anxiety and imbalance. Combining the unique properties of water with music and physical activity by aqua practices at the boundary of two media (air and water) rekreirat and energizing practitioners. Through our activities in akvaspining achieved expectations and desired effect on the tone of the body and energy balance of the spirit.

Based on the analysis we allow formulating the following **terminals** in this report:

The Aquaspining activities are an important and powerful strong motivational factor for slowing down the processes of aging and toning turgidity of the skin;

In our modern world the Aquaspining practice perceived as pleasant, exciting and relaxing activities, eliminating sense of anxiety and tension.

According to the prevailing opinions of the clients is imperative to develop and implement Aquaspining packages and SPA procedures for pregnant women with different prices;

The aquaspinning is effective anti-stress program through the aquatic environment and is a preventive health measure, which improves the quality of life when is used in everyday life.

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ATTITUDES TOWARD PHYSICAL ACTIVITY AMONG PREPARATORY YEAR MALE STUDENTS

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Keywords: *Attitude, Physical Activity, Preparatory Year, University*

BACKGROUND AND AIMS

Attitudes come from beliefs people have about people and things. Attitudes can determine our participation in certain activities. [7]. According to Silverman and Subramaniam (as cited by Zeng, Hipscher, & Leung, 2011), it has been shown that positive beliefs towards an object will help a person have a positive attitude towards that object, while negative beliefs towards the object will lead a person to have a negative attitude towards the object. A positive belief in physical activity will lead to a favorable attitude towards physical activity, while a negative belief in physical activity will lead to an unfavorable attitude towards physical activity.

Moderate intensity physical activity has been recommended to be performed by healthy people, or those who do not have any chronic situation related to physical activity, in the age range of 18 – 65 years old, for at least 30 minutes, five days a week, or all days in a week for better results [3]. Evidence suggests that regular physical activity can prevent several chronic diseases like cardiovascular diseases, diabetes, cancer, hypertension, obesity and depression [8].

The prevalence of inactivity in Saudi Arabia is 43.3 – 99.5 % among children and adults, which is high [1]. Determination of attitudes towards physical activity of any group of people in Saudi Arabia can give a perspective on why there is a high prevalence of inactivity among them.

The purpose was to determine the attitudes of preparatory year male students of King Fahd University of Petroleum and Minerals (KFUPM) toward physical activity.

METHODS

288 preparatory year male students aged 16 – 20 ($m = 18.65 \pm 0.064$) participated in this study. Attitude towards Physical Activity Scale [5] was administered during their physical education classes. The questionnaire contained 53 items which are grouped into six aspects. These aspects are social experience, health and fitness, thrills and excitement, aesthetic experience, recreation and relaxation, and sports excellence.

A 5-point Likert Scale was used to answer the questionnaire, with “1” representing “strongly disagree”, and “5” representing “strongly agree”. All positive items had 1 point for strongly disagree, and 5 points for strongly agree, while all negative items had 5 points for strongly disagree, and 1 point for strongly agree.

Descriptive statistics was used to determine the overall attitude of the students towards physical activity [2]. This was achieved by finding the mean per item for each student, which then was used to find the students’ overall attitude toward physical activity. Descriptive statistics was performed using SPSS 16.

RESULTS

Table I shows the results obtained from descriptive statistics. It shows the overall number of students who had a positive view for each aspect and the respective percentage, and the overall mean and standard deviations for each aspect.

Most of the students considered physical activity for thrills and excitement reasons (Aspect 3, N = 181, 62.8%), with an overall average score per item of 3.20 ± 0.52. The next aspect was health and fitness (Aspect 2, N = 172, 59.7%), with an overall average score per item of 3.11 ± 0.37. In order of decreasing favorability, the students had a general positive view towards the following items:

- Item 13, which is preferring to participate in physical activity to maintain physical fitness;
- Item 14, which is the health benefits of physical activity is very important to the individual;
- Item 6, which is preferring to participate in physical activity as a group
- Item 11, which is selecting a physical activity for health benefits is the first aim.

The respective percentages of students who chose these items are 79.9%, 72.2%, 61.1% and 61.1%.

DISCUSSION

The first preference among preparatory year male students of KFUPM in physical activity participation was for thrills and excitement. This choice was noticed in another study [6] This could be explained by the fact that the majority of the students did not have a good background on physical activity. Many students were not encouraged to participate in physical activity before entering the university, making participating in physical activity new to them. This means trying new things was a motivator for the students.

Participating in physical activity for health and fitness benefits was the second preference among male preparatory year students, which differed with some previous studies [4,6,9]. Physical activity is necessary to reduce the risks of chronic diseases and premature death resulting from these chronic diseases, and to maintain the ability to perform tasks in the future. The students were taught about these advantages, and also about health related fitness in two courses, after which they were tested. The students who took these lessons seriously had their attitudes affected positively.

Table I. Descriptive Statistics

Aspect	Number of Students with Positive Attitude	Percentage of Students with Postive Attitude	Mean ± SD
Social Experience	79	27.4	2.82 ± 0.43
Health and Fitness	172	59.7	3.11 ± 0.37
Thrills and Excitement	181	62.8	3.20 ± 0.52
Aesthetic Experience	108	37.5	2.96 ± 0.46
Relaxation and Recreation	55	19.1	2.80 ± 0.33
Physical Challenge Aspect	95	33	2.96 ± 0.34

It should be noted that most male preparatory year students of KFUPM had the relaxation and recreation aspect as their last preference for participating in physical activity. This is in contrast to a study from Kamaria and Omar-Fauzee [2007] which had this as a main reason for participating in physical activity [4]. A reason for reducing stress through physical activity was because of the amount of course load the students had [4]. It is possible that many of the students did not know that physical activity can be used to reduce stress. For that reason, they relied on other methods they were familiar with to reduce stress.

Preparatory year students of KFUPM had participating in physical activity for social experience as the fifth preference; just before the reason to reduce stress. This is in contrast with Khan et al. [2012]. A possible reason is that the students had other means of socialization which they considered better than participating in physical activity.

CONCLUSION

Most male preparatory year students considered physical activities for thrills and excitement and health and fitness. Knowing that favorable attitudes towards an activity encourage participation in that

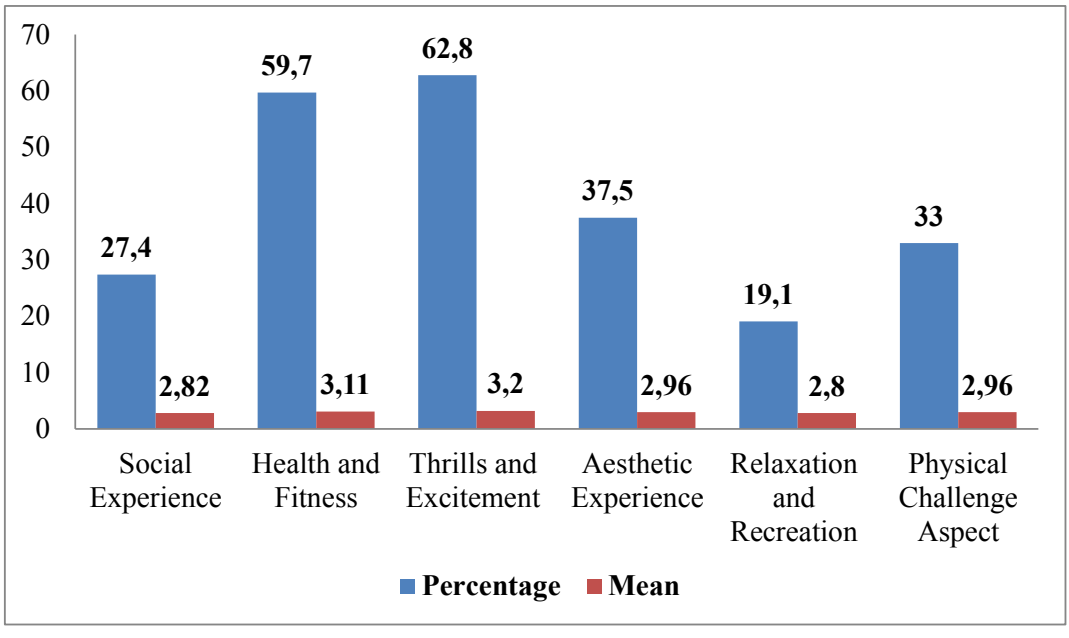

Figure 1. Results from Descriptive Statistics

activity, it can be said the students have taken one of the necessary steps to get the benefits of physical activity. Exercising for health and fitness reasons is necessary for them to achieve health and fitness and benefit from it.

Acknowledgements

The author(s) would like to acknowledge the support provided by the Deanship of Scientific Research at King Fahd University of Petroleum & Minerals (KFUPM) under Research Grant AR121003.

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SELF-MOTIVATION, SELF-EFFICACY AND SELF-CONTROL WITH SAMBO ATHLETES

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Keywords: *intrinsic and extrinsic motivation, self-efficacy, self-control, sambo athletes.*

One of the most popular and widely tested approaches to motivation in sport and other achievement domains is self-determination theory [8, 13]. This theory is based on a number of motives or regulations, which vary in terms of the degree of self-determination they reflect. Essentially, self-determination theory posits that individuals have three innate needs (autonomy, competence, and relatedness) that must be satisfied by social contexts in order to facilitate motivation within that context. When individuals are able to realize these needs, motivation will be more self-determined and positive cognitive, affective, and behavioral responses will ensue [16].

To examine the behavioral regulation resulting from the satisfaction of these innate needs, researchers have employed a multidimensional perspective. That means there is a continuum of behavioral regulations and each reflect a qualitatively different reason for individuals undertaking a given behavior, ranging from the most to the least **self-determined forms of motivation:** intrinsic, extrinsic (external regulation, introjected regulation, identified regulation), and amotivation [8, 13].

Intrinsic motivation is fully self-determined and characterised by interest in, and enjoyment derived from, sports participation. There are three types of intrinsic motivation, namely intrinsic motivation to know, intrinsic motivation to accomplish and intrinsic motivation to experience stimulation. Intrinsic motivation is considered to be the healthiest type of motivation and reflects an athlete's motivation to perform an activity simply for the reward inherent in their participation.

External and introjected regulations represent non-self-determined or controlling types of extrinsic motivation because athletes do not sense that their behaviour is choiceful and, as a consequence, they experience psychological pressure. Participating in sport to receive prize money, win medals typifies external regulation. Participating to avoid punishment or negative evaluation is also external. Introjection is an internal pressure under which athletes might participate out of feelings of guilt or to achieve recognition. Identified regulation represent self-determined type of extrinsic motivation because behaviour is initiated out of choice, although it is not necessarily perceived to be enjoyable. These types of represents engagement in a behaviour because it is highly valued.

Amotivation represents a lack of intention to engage in a behaviour. It is accompanied by feelings of incompetence and lack of connection between one's behaviour and the expected outcome. Some of athletes exhibit a sense of helplessness and often require counselling, as they are highly prone to dropping out.

Within a self-determination theory framework, research in sport and phisical education [10, 15] has linked more self-determined forms of motivation (i.e., intrinsic motivation and identified regulation) to a variety of positive motivational outcomes. The least self-determined forms of motivation (i.e., amotivation and external regulation) have typically been linked to maladaptive motivational outcomes (or negatively related to adaptive outcomes).

Self-Efficacy is connected to one's confidence in one's own ability to act in a way so that one's manifestations lead to the desired result. According to Bandura Self-Efficacy is linked to one's perception of one's own abilities to act successfully in certain situations [5], Subjectively perceived Self-Efficacy can be used for foreseeing behavior in various areas – cognitive functioning, stressors management, health related behavior, as well as sport [4, 5, 7, 14, 17].

Perceived self-efficacy is concerned with people's beliefs in their capabilities to exercise control over their own functioning and over events that affect their lives. Beliefs in personal efficacy affect life choices, level of motivation, quality of functioning, resilience to adversity and vulnerability to stress and depression. People's beliefs in their efficacy are developed by four main sources of influence. They include mastery experiences, seeing people similar to oneself manage task demands successfully, social persuasion that one has the capabilities to succeed in given activities, and inferences from somatic and emotional states indicative of personal strengths and vulnerabilities. Ordinary realities are strewn with impediments, adversities, setbacks, frustrations and inequities [6].

The behavior which is typical for a personality in state of high tension and stress, is determined by the level of **self-control** skills through which the person searches for a change of the level of control over the situation. Rosenbaum defines three basic types of self-control:

- supporting, carried out on a psychological level without active participation of the consciousness. It supports the homeostasis of the organism;
- recuperative – directed towards overcoming the dissonance and recovering the equilibrium;
- transformative, accompanied by an activity which aims to overcome the inefficient habits and to form a new, more efficient demeanor [12].

The level of self-control skills determines the degree of control of the situation during training and during competition. It is known that people with high level of self-control are characterized by less stress symptoms in stress situations. This can be seen in a comparison between Rosenbaum's scale for research of the level of self-control and motivation in sport.

Guided by SDT [8], the present study examined the sport motivation, self-efficacy and self-control of sambo athletes depending on their gender and sports results.

We suppose that self-control and self-efficacy would positively influence the self-determined forms of motivations of sambo athletes.

The aim of the present study is:

- to examine the level of self-control, self-efficacy and the sport motivation with sambo athletes depending on their gender and sports results;
- to reveal whether the level of self-control, self-efficacy influence in the sport motivation of athletes,

The object of the research are 54 sambo competitors from different sport clubs in Bulgaria, 16 to 20 - years old, 31 boys and 23 girls, medalists – 32; 54, ranked after the third place.

METHOD

1. Bulgarian version [2] of **Sport Motivation Scale (SMS)** [11] – a test which consists of 28 items researching the motivation in sport assesses: intrinsic motivation to know, intrinsic motivation to accomplish, intrinsic motivation to experience stimulation, identified regulation, introjected regulation, external regulation, and amotivation. Each of the subscales is scored on a 7-point Likert scale ranging from 1 (does not correspond at all) to 7 (corresponds exactly).
2. **Methods for researching the Self-Efficacy in sport** [3], which include two subscales – Self-Efficacy and Self-hindering.
3. Bulgarian version [1] of **Scale for measurement of the level of self-control developed** by Rosenbaum [12]. The test consists of 36 statements and a 6-stage scale of a Lycert type for evaluation of each one of the statements. The higher the score is, the better the self-control skills.

Organization

Surveyed athletes were tested during training camp. The statistical development of the data has been done through comparative, variational, correlative and regression analysis.

RESULTS AND DISCUSSION

The results from the variational analysis of experimental data shows the following characteristics of distribution concerning the level of self-control: M=154,72; SD=16,16; self-efficacy: M=4,11; SD=0,49 and self-hindering M=2,64; SD=0,64 for all investigated people. Girls show higher level of self-control (M=156,66; SD=9,01) and self-hindering(M=2,71; SD=0,65) in comparison to boys (M=153,07; SD=20,37) (M=2,57; SD=0,63). The level of self-efficacy of boys (M=4,13; SD=0,49) is higher in comparison to girls (M=4,06; SD=0,49) (**table 1**).

Table 1. Mean values of self-control and self-efficacy, differentiated by gender and classification

Variables	Self- Control		Self-Efficacy		Self-Hindering	
	M	SD	M	SD	M	SD
Athletes in the research	154,72	16,16	4,11	0,49	2,64	0,64
Girls	156,66	9,01	4,06	0,49	2,71	0,65
Boys	153,07	20,37	4,13	0,49	2,57	0,63
Medalists from 1st to 3rd place	154,65	15,74	4,11	0,49	**2,45**	0,62
Athletes ranked after 3rd place	154,83	17,07	4,09	0,49	**2,74**	0,63

The results of the comparative analysis (Mann-Whitney criterion) show that the differences in the values of self-control and self-efficiency between the competitors medalists and those ranked after the third place are negligible. But in terms of self-hindering there is a statistically significant difference experienced. Athletes ranked after 3rd place have higher level of self-hindering compare to medalists.

The differentiated analysis done through a percentage distribution of the investigated people shows that 11% of girls have a high level of self-control, 21% have a low level of self-control, 68% fit in the norm (**fig. 1**). In group of boys is established that 26% of boys have a low level of self-control, 57% are in the norm and 17% of them are with a high level of self-control (**fig. 2**).

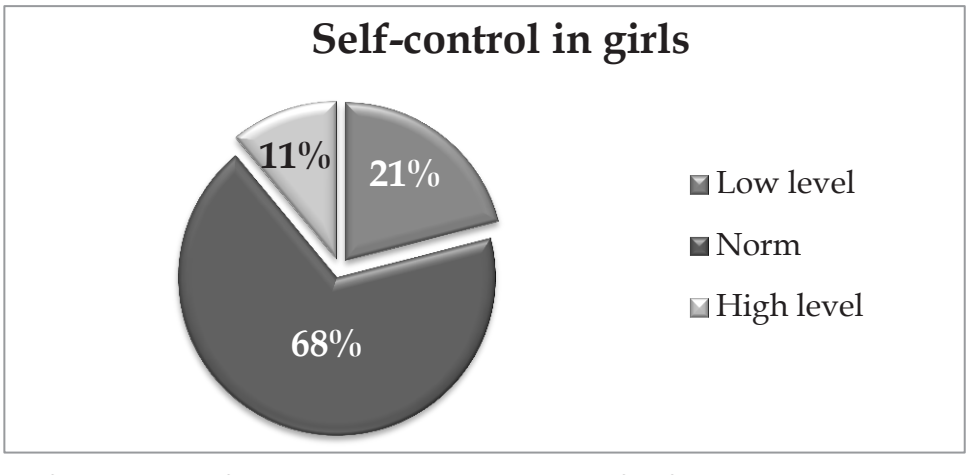

Fig. 1. Percentage of distribution of the girls according to the level of self-control

Sport activity puts men and women in conditions similar to those of a training session and a competition, which presupposes the athletes to form certain self-control skills in order to cope with problem situations and to adapt to the requirements. This is also one of the explanations for the high level of self-control skills which does not dependent on gender or type of sport.

Similar trends in the percentage distribution observed in terms of self-efficacy. According to the derived standards of methodology for the study of the effectiveness (self-efficacy) by the Bulgarian sport athletes [3], is calculated as a percentage the value of the self-efficacy and the self-hindering in all tested individuals. From the calculations made it is showed that 15% of all athletes in sambo have a low level of self-efficacy, 65% are in the norm, and the remaining 20% show high levels of self-efficacy (**fig. 3**).

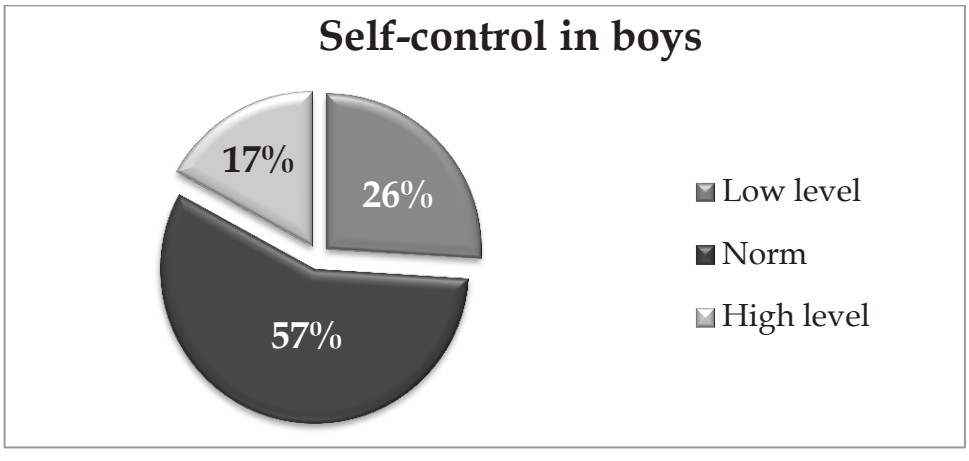

Fig. 2. Percentage of distribution of the boys according to the level of self-control

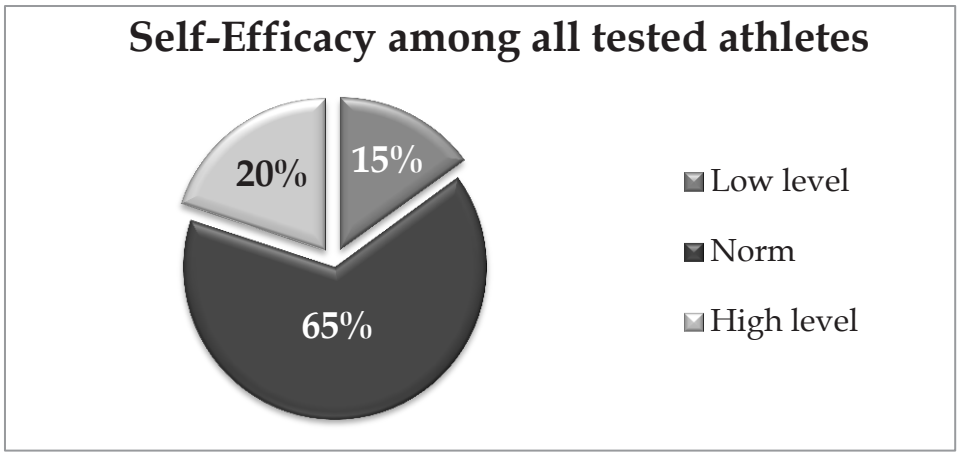

Fig. 3. Percentage of distribution of the investigated people according to the level of self-efficacy

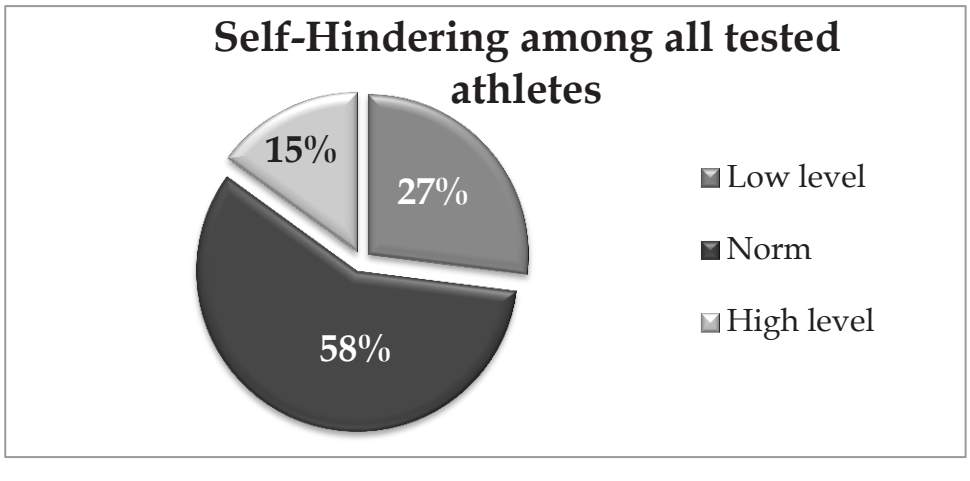

Fig. 4. Percentage of distribution of the investigated people according to the level of self-hindering

More than a quarter of the athletes in sambo show low levels of self-hindering,in the norm there are 58%, and 15% of them have high values of self-hindering (**fig. 4**).

It was found that by all sambo athletes in our study intrinsic motivation to experience stimulation is the leading one (M=5,48; SD=1,21) (**table 2**). Introjected regulation is the second one (M=5,43; SD=1,21). This type of motivation, while internal to the person, is not truly self-determined since it is limited to the internalization of past external contingencies. Similar results were acquired with reference to the other two types of intrinsic motivation - IM to accomplish (M=5,35; SD=1,39) and IM to know (M=5,13; SD=1,39), and which shows that there is a high level of self-determination of sambo athletes. Nevertheless, the same group of subjects of the research show lower levels of external regulation, identified regulation and amotivation (M=1,99; SD=1,12).

Table 2. Mean values of self-motivation, differentiated by gender and classification

Variables	Amotivation		Extrinsic motivation of external regulation		Extrinsic motivation of introjected regulation		Extrinsic motivation of identified regulation		Intrinsic motivation to know		Intrinsic motivation to accomplish		Intrinsic motivation to experience stimulation	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Athletes in the research	1,99	1,12	3,43	1,67	5,43	1,21	4,71	1,18	5,13	1,39	5,35	1,39	5,48	1,21
Girls	2,13	1,29	3,64	1,68	5,48	1,21	4,95	1,22	4,98	1,53	5,27	1,44	5,47	1,19
Boys	1,72	0,59	3,02	1,62	5,33	1,24	4,23	0,98	5,42	1,06	5,50	1,35	5,50	1,25
Medalists from 1st to 3rd place	2,16	1,33	3,54	1,84	5,34	1,41	4,64	1,19	4,86	1,49	5,11	1,51	5,42	1,28
Athletes ranked after 3rd place	1,72	0,58	3,25	1,39	5,57	0,81	4,81	1,21	5,56	1,12	5,73	1,14	5,59	1,09

The data show that the values by the girls of amotivation and the types of external motivation are higher, in relation to the values of the youths, by whom the internal types of motivation are leading. By the competitors, ranked from 1 to 3 spot the averages of amotivation and external regulation are higher toward those of the competitors outside the top three. The levels of other components of self-determination are higher by the athletes ranked after 3 place, in relation to the levels of the athletes medalists. Results from other studies indicate that the sportsmen have shown lower levels for forms of internal motivation and higher levels for forms of extrinsic motivation of introjected regulationand amotivation, in comparison with the more poorly performing athletes [9].

In order to show the connections and interdependence of the studied variables, we used correlation analysis (Spearman criterion) for the group of sambo athletes. Numerous correlations between self-control, self-efficacy and the components of sport motivation are being found.

Increasing of the skills of self-monitoring is associated with higher levels of self-efficacy and intrinsic motivation to accomplish, as well as weaker forms of self-hindering (**table 3**). The feeling of self-efficacy is stronger at high levels of intrinsic motivation to accomplish and intrinsic motivation to experience stimulation and at a low level of self-hindering. There is a positive relationship between self-hindering and amotivation. Numerous positive correlations between the different types of sports motivation are found.

Table 3. Correlation between the studied variables

Variables	Self-Efficacy	Self-Hindering	Extrinsic motivation of introjected regulation	Extrinsic motivation of identified regulation	Intrinsic motivation to know	Intrinsic motivation to accomplish	Intrinsic motivation to experience stimulation
Self- Control	0,403**	-0,338**				0,313*	
Self-Efficacy		-0,375**				0,437**	0,471**
Amotivation			0,300*				
Extrinsic motivation of external regulation			0,439**	0,676**	0,436**		0,333*
Extrinsic motivation of introjected regulation				0,535**	0,533**	0,572**	0,538**
Extrinsic motivation of identified regulation					0,587**	0,493**	0,564**
Intrinsic motivation to know						0,828**	0,707**
Intrinsic motivation to accomplish							0,741**

T* p=0,05; ** p=0,01.

Table 4. Results of regression analysis

Dependent	Self- Control				Self-Efficacy				Self-Hindering			
Variables	β	t	sig.	ΔR^2	β	t	sig.	ΔR^2	β	t	sig.	ΔR^2
Intrinsic motivation to know					0,338	2,21	0,033	0,114				
Intrinsic motivation to accomplish	0,47	3,29	0,002	0,221								
Intrinsic motivation to experience stimulation					0,451	3,11	0,004	0,182				
Amotivation									0,357	2,36	0,024	0,105

Stepwise regression analysis has been applied in keeping with the aim of the research. The self-control, self-efficacy and self-hindering have been analyzed as independent variables. The diferent types of sport motivation have been analyzed as dependent variables. We found that the high level of self-controlling skill raises the intrinsic motivation to accomplish; self-efficacy influences positively most highly on intrinsic motivation to experience stimulation and intrinsic motivation to know. The feeling of self-hindering leads to amotivation in the tested sambo competitors, which is associated with a sense of inadequacy and rejection of sports activities (**table 4**).

CONCLUSIONS

The results from the research add to the picture of the personality determinants of sport motivation and of their regulatory role for the behavior and the adaptation to the requirements of sports activity. The tested sambo athletes show high level of self-control and self-efficacy and lower level of self-hindering in many cases, which determines their success in sports. There is an interdependence between the researched personality parameters and the diferent types of sport motivation. The results from this study show that self-determined forms of motivations (IM to experience stimulation and IM to accomplish) were positively associated with self-control and self-efficacy while amotivation was associated with self-hindering.

The results obtained confirm the hypothesis that self-control and self-efficacy are a significant factor when forming the self-determined forms of motivations of the sambo athletes.The results may be used as a fundament for creating different training programs which will form certain skills, necessary for a more active and efficient coping, as well as for a higher self-determined motivation in sport activity

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PECULIARITIES OF MOTIVATION FOR ATHLETES IN SPORT SHOOTING

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Key words: *Motivation; Intrinsic motivation; Extrinsic motivation; Amotivation; Sport shooting*

The changes that have taken place in the Bulgarian sport shooting in recent years-withdrawal the license of the Bulgarian Federation of sports shooting (BFSS) and the foundation of a New Bulgarian Shooting Union (BSU) with new management, led to de-motivation in a large part of the Bulgarian shooters. New problems of a psychological nature came with it. It is the reason that motivates us to examine in detail the structure and content of the motivation. How, in what way, successfully to motivate the athletes in sport shooting for realization of their optimal opportunities and to bring back the prestige of this sport, which has long traditions in Bulgaria. Our observations and practical experience show that the mental preparation to the athletes in sport shooting in all age groups is far from the desired state as an organization, content, technique and application. Considering all this, we assume that the objective circumstances affect the motivation of the athletes in sport shooting.

According to **our hypothesis**, there are differences in the motivation for the shooters, depending on their qualifications, gender and type of weapon with which they compete. And since the preliminary studies show that scientific researches on the problems related to the motivation of the athletes in this sport are missing or just few, with the current study we will enrich both the theory and the practice of that side of the sport shooting.

The aim of our study is to reveal the structure and content of the motivation and its peculiarities in the athletes in sports shooting.

The subject of the study is a total of 30 shooters at age of 11 to 28 years old, respectively, 14 men and 16 women, with a sports experience of 1-16 years.

The methodology used includes: The sport motivation scale of L. Pelletier and Cole (L. Pelletier & col. 1995) adapted to Bulgarian conditions by Muhovski (2004).;

The scale consists of 28 items, divided into 7 subscales:

Amotivation – it is observed when the effort is not correlated with the outcome, it is a lack of motivation;

Extrinsic motivation by external regulation - leading factors in this motivation are material prizes or restrictions imposed by others;

Introjected extrinsic motivation - activity is the result of a sense of guilt, pressure or anxiety;

Extrinsic motivation by identification - the person appreciates the importance of the activity and can make choices - activity may be the result of personal goals and it is internally regulated;

Intrinsic motivation to know - reflecting curiosity, the desire to be studied and understood various areas;

Intrinsic motivation to accomplish - effective motivation, defining the orientation in the task;

Intrinsic motivation to experience stimulation - the involvement of the individual in the activity, into the desire to stimulate sensations.

Each item is assessed by the respondents on a 7-point Likert-type scale.

ANALYSIS OF THE RESULTS OF THE STUDY OF PECULIARITIES OF MOTIVATION FOR ATHLETES IN SPORT SHOOTING

As mentioned in the methodology to study the peculiarities of motivation for shooters we used sports motivation scale of L. Pelletier (L. Pelletier & Col. 1995). It explores the motivations of the individual in its two aspects – internal (IM), external (EM) and Amotivation.

Our results show that the highest average mean values (Table. 1) were observed in **intrinsic motivation to accomplish** and **intrinsic motivation to experience stimulation**, which have the same average m = 5,7. **The amo-**

tivation has the lowest average value of m = 2.8. This fact is especially beneficial considering the specificity of sports activity. Fact is that every active athlete strives to accomplish a certain result, therefore the high values for **amotivation** are a sign that the athlete wishes to terminate his activities. The results of our study show that two of the surveyed persons had relatively high values of **amotivation**. These high values of amotivation we can explain with the current condition of the shooting union, namely lack of finances, a significant decline in the achievements and lack of participation in local and international competition.

Table 1. Results from the study of motivation

Variable	N	Xmin	Xmax	mean	St.d
Amotivation	30	1	5,3	2,8	1,3
EM by External regulation	30	2,3	6,5	4,8	1,2
Introjected EM	30	2,5	7	5,3	1,4
EM by Identification	30	2,5	7	5	1,4
IM to know	30	3,8	7	5,4	0,87
IM to accomplish	30	4	7	5,7	0,87
IM to experience stimulation	30	3	6,8	5,7	0,91

Intrinsic motivation is characteristic of people experiencing satisfaction from the activity or to create something difficult. And that's what makes the specificity of sports competition to overcome difficulties and to improve the level. Our established values confirmed the established of the literature ones, that this is one of the leading motivation for shooters, m = 5,7 (**Fig. 1)**.

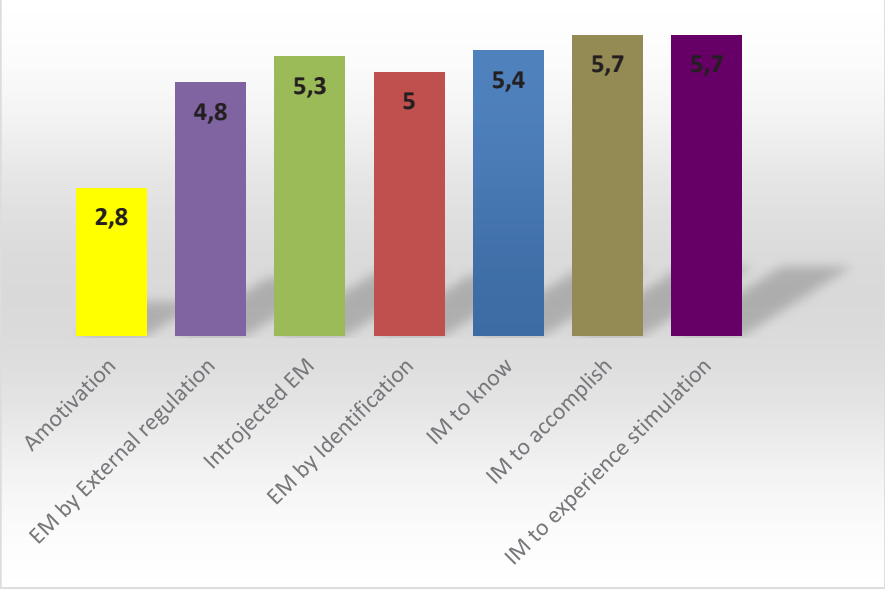

Fig. 1. Values of motivation

The same values as **intrinsic motivation to accomplish** are **the intrinsic motivation to experience stimulation**. This motivation is associated with stimulation of sensations derived from participation in the activity. This includes athletes who participate to have exciting experiences. Therefore we can say that the sport shooting is perceived by the surveyed athletes as a sport with a large Emotional intensity. The mean value for this component is m = 5.7.

Thirdly, as the average value is **intrinsic motivation to know**, m = 5.4. It shows the tendency of curiosity, the desire of the individual to explore new things, to know and understand everything around him.

As regards the extrinsic motivation with the highest average values is **the introjected extrinsic motivation**, m = 5.3. With this motivation, the activity is no longer the result of the feeling of necessity, but rather caused by a feeling of guilt, pressure or anxiety. The athlete feels frustrated or guilty when he is not in the best shape.

The average value for **the extrinsic motivation by identification** is m = 5. Individual assesses how significant and important activities are and can make choices. Athletes perform an activity because they feel that it contributes to their personal development and growth.

With the lowest values in our research is **the extrinsic motivation by external regulation**, whereby the leading factors are material rewards or restrictions imposed from the outside. The average value of this kind of motivation is m = 4.8. Athletes who trains, led by their motivation, does it for fun, and not to receive reward or avoid punishment. This relatively low average value can be explained by the fact that the sport shooting is not a sport in which there is big money or prizes.

All scale values for intrinsic and extrinsic motivation can be traced on Fig. 1. The results show that in general sport shooting are leading internal motivations such as learning, fulfillment and pleasure, not awards and satisfying the desires of others. This confirms the educative nature of the sport - to build purposeful individuals who are ready to grow and to make efforts.

The comparative analysis that was made by **gender** shows no significant statistical differences.

The obtained data according to **qualification** reveals statistically significant differences only in reference to the scale of **intrinsic motivation to know** (**Table. 2 and Fig. 2**). The competitors on Country level have significant higher values of **intrinsic motivation to know**. This difference could be explained in the following way. With the accumulation of a sport experience the need of knowledge in most of the shooters might be decreased, while the shooters with a lower level of qualifications are more interested, curious and seek new knowledge, they want to develop, improve themselves to reach the leading athletes. These results have significant practical value in terms of looking for more effective management strategies of motivation in the elite shooters.

Table 2. Comparative analysis of motivation by qualification

Variable	n 1 level	n2 2 level	m 1 level	m 2 2 level	S 1 level	S 2 2 level	F	Sig
Amotivation	16	14	3	2,4	1,3	1,4	1,35	0,25
EM by External regulation	16	14	4,6	5,2	1,1	1,3	1,98	0,17
Introjected EM	16	14	5	5,7	1,5	1,2	1,96	0,17
EM by Identified	16	14	4,7	5,3	1,4	1,3	1,81	0,19
IM to know	16	14	5,1	5,7	0,92	0,72	3,95	0,057
IM to accomplish	16	14	5,7	5,8	0,96	1	0,28	0,59
IM to experience stimulation	16	14	5,6	5,8	0,78	1,1	0,4	0,52

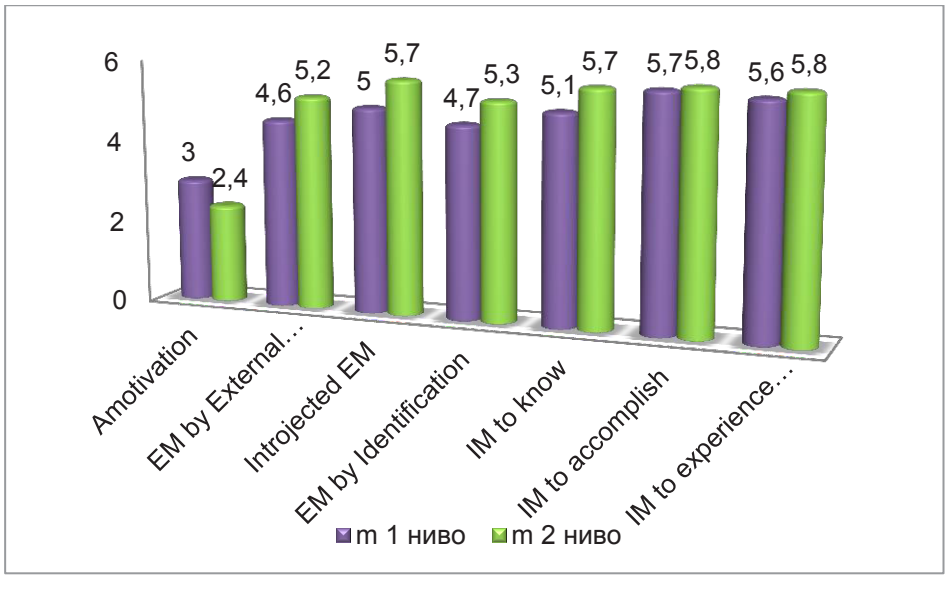

Fig.2. Values of motivation by qualification

A disturbing fact is that the elite athletes have higher (although not statistically significant) values of amotivation, i.e. our leading athletes often have a desire to end their sports carrier, a fact which should be further analyzed. The shooters of country level (second level) are characterized by higher mean average values than the elite athletes (first level) on all scales related to extrinsic motivation.

As regards the factor **type of weapon**, the data also shows that there are statistically significant differences in **intrinsic motivation to know** (**Table 3. and Fig. 3**.).

Table 3. Comparative analysis of motivation by weapon type

Variable		n	n 2	m	m 2	S	S 2	F	Sig.
		rifle	pistol	rifle	pistol	rifle	pistol		
Amotivation		18	12	2,9	2,6	1,2	1,6	0,338	0,56
		18	12	4,7	5,1	1,3	1,1	1,01	0,32
	EM by Ext. regulation								
	Introjected EM	18	12	5,2	5,6	1,4	1,5	0,79	0,38
	EM by Identification	18	12	4,7	5,4	1,3	1,4	2,12	0,15
IM to know		18	12	5,1	5,8	0,8	0,86	4,57	**0,041**
	18	12	5,6	5,9	1	0,87	0,65	0,43	
	IM to accomplish								
	IM to experience stimulation	18	12	5,6	5,8	1	0,7	0,29	0,59

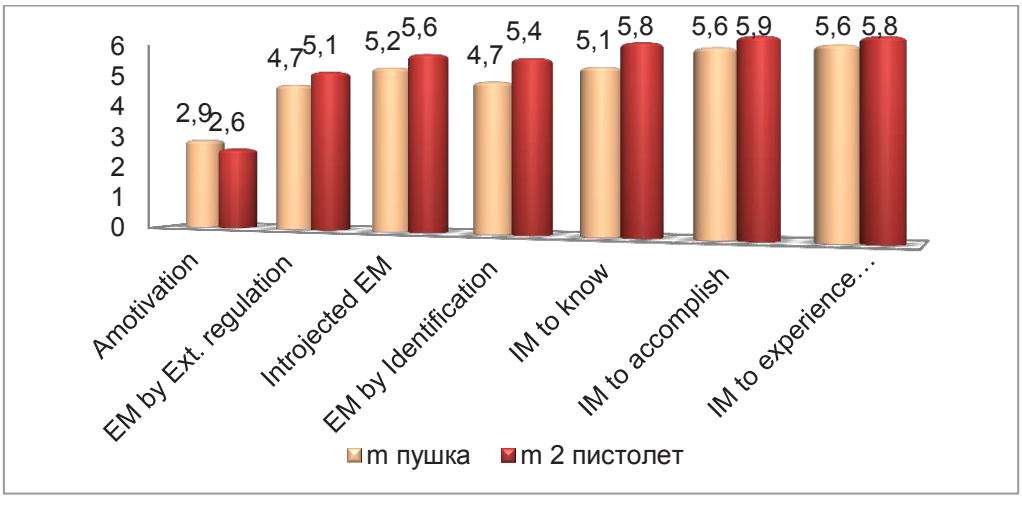

Fig.3. Values of motivation by type of weapon

The athletes with a pistol have higher mean values for this type of motivation compare to the athletes with a rifle. This difference may explain that the shooters with a pistol in the Bulgarian are prevalent in recent years, as well as the leading athletes with great international experience and global success are mostly shooters with this type of weapon. These results are logical, considering the data from the literature.

The good achievements, traditions in the shooting with a pistol placed higher demands on these athletes. They are role models for the young athletes in these disciplines, which require from them to maintain a high level and self-improvement.

Here also the leading subscales of the motivations are the same as in the above factors, the athletes with pistols have higher mean values in comparison with those with rifles. Regarding the amotivation, the shooters with a

rifle have a higher average value. The reason for this could be the material-technical base. Training with a pistol is more easily available on the equipment, weapons and a place for training, which leads to greater interest to the pistol. While for the shooters with a rifle is needed more equipment, such as a special shooting suit and accessories to it and to the weapon. Also they depend on the shooting base. The disciplines with a rifle are much more extended and can lead to boredom.

The analysis of the results obtained from the present study gives us a reason to make the following conclusion:

Leading motivation for the athletes in sport shooting as a whole is **intrinsic motivation**. With the highest average values are **intrinsic motivation to accomplish** and **intrinsic motivation to experience stimulation**. On the base of the results of this research, we can conclude that leading motivators for the athletes in this sport are internal motivators such as learning, fulfillment and pleasure. It outlines a favorable motivational profile.

The present report is only part of a large scientific study of athletes in sport shooting. It featured more problems for the motivational climate, for efficiency and target orientation of shooters to the task or the ego.

RECOMMENDATIONS, WHICH WE CAN MAKE, ARE THE FOLLOWING:

1. To look for and create more condition and opportunities for the athletes to participate in more competitions, which will affect the motivation of shooters.
2. To pay attention to adolescent athletes, to fairly evaluate their successes and to encourage their effort and improvement.
3. To create conditions for building united team and to work out for leading common goal to higher sports achievements.

Creation and stimulation of an adequate motivational context will allow to apply the most appropriate and effective methods to increase the motivation of the athletes in sport shooting, and from there to improve sports performance.

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EFFECT OF MOTIVATIONAL MUSIC AND VIDEO AND COMPETITIVENESS FEATURES ON SPRINT PERFORMANCE OF YOUNG FEMALES

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Keywords: motivation, music, movies, competitiveness, Sprint

INTRODUCTION

Today, in the world of sport, practice and regular physical exercise is not as a key factor for success and achieve peak performance, the pre-determined objective. The physical and psychological fitness is necessary for optimal athletic performance and sport skills .It seems differences in performance of winners is highly dependent to mental fitness more than physical fitness. The Factors that change person's mental and motivational state as well as can affect his sport performance. According to brownly (1996) [3] one of the motivational stimulus that may have caused increase in performance is particular sounds. It is possible that special kinds of sounds will increase the performance, while another kind of sounds could have contradictory results. If the music classified as a kind sounds can be used to different objectives such as a stimulation or relaxation and can be expected to specific results

Several studies have been conducted In relation to the use of music to enhance performance in sport. The first studies by Weiss (1987) [8]. showed the effect of music on central nervous system. The more important and comprehensive investigation conducted by Diaz (2001)[5].He studied the effect of motivational and sedative music on the autonomic nervous system reactions such as heart rate, pulse, blood pressure, breathing, and brain waves and concluded that music have a major effect on the is factors.

The film and video is a useful and effective tool in enhancement of self confidence and motivation, overcome the stress that leads to better performance (caroll1982[4] , weiss 1987[8]), Bandura (1986) [1] in cognitive mediation theory states human behavior is formed by observation and patterning. Watching sports skillful execution video can increase motivation to produce the same performance. The idea of using a personal motivational videos for athletes is supported during a relatively short period (two weeks) in tennis player. It is proved that the combination of music and video can stimulate positive thoughts and emotions such as confidence and help recall of previous successful performances. It seems stimulation some areas of the brain can lead to emerging of desired feelings that excite self-efficacy and motivation during practice and competition.

The study of individual differences in sports is one of the popular topics in differential psychology. The competitiveness is one of individual differences in sport psychology that can leads to success of in sport competitions. The individual differences in competitiveness also can be observed in different levels of armature and professional sports. The competitiveness is a motivational factor that increases arousal and is a process in which a person with some performance standards and the presence of at least one other compare with a scale(martens1988).Competitiveness, on the other word is defined as trying to gain some measure of satisfaction in excellent condition in presence of comparison and judgment of others.(williams2000)[9].The athletes who have more competitive sense had more positive successfully interpretations compared to those hadn't it. Research in this field has shown different results and most has examined these factors in isolation. The study not found that review the combined effect of competitive and non- competitive music and video on sprint competitions. This study examines the combined effect of music and video and competitive and non- competitive peoples on sprint. The combination of music and film has the potential to shift senses from internal stimulus to the external cues .During light and moderate exercise, music can reduce ratings of perceived exertion. Randy (2008)[6]

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suggests music with a fast rhythm can increase efficiency without changes in the attention. The aim of this study is compare the effect of motivational and non- motivational music and video on sprint performance of young females with competitiveness characteristics.

METHODS

The research method is Quasi-experimental and was used research design including four experimental group and control group. The subjects were 132 female high school students (age 16.5±0.7) that participated voluntarily and divided in experimental and control groups.

MATERIALS

The sports achievement motivation questionnaire (Gill and Dieter) was used to determining. Sports achievement motivation questionnaire (sport -oriented) consists of 25 questions and has three subscales, goal -oriented, achievement -oriented and competition -oriented. The 5 -point Likert scale as this scale (strongly agree = 5, and I strongly disagree = 1) The Competitiveness subscale consists 13 items and total score of the questions shows competitiveness feature.

MOTIVATIONAL CONDITIONS:

Music with high multiplying (120 to 130 bpm) selected with the same tracks for this study .The selected music was the combination of (bond group –predestination album- allegretto) and Dj dado (The legend of Babel).The video scenes were the performance of runner champions including practice and competition conditions.

NON-MOTIVATIONAL CONDITIONS:

This section included images of nature and calm music (album: in the mirror - Yanni Krysumalys –song: Quiet Man). There was no any coordinated point or harmony between scenes and songs that excite feelings.

PROCEDURE

The subjects were divided into two groups according to their competitiveness score (high competitive and low competitive trait) and then subdivided motivational , non-motivational and control groups .The selected music and videos mixed using (ULED12 soft ware) and showed with Audio-visual projection system(Micro lab).The scores of sprint performance of subjects recorded with stopwatch (Gujie DS-2009A). The control group performed warm-up and sprint stages in controlled conditions without any music and video playback.

DATA ANALYZE

In each trial, sprint scores was recorded and calculated means for groups .Statistical analyses were conducted for the values of mean , standard deviation of sprint records ANOVA (Condition × block:2×3). And post -hoc test was automatically used from SPSS (ver.18)

RESULTS

The findings of sport achievement motivation questionnaire for competiveness shown in **table (1)**

Table 1.results of sport achievement motivation questionnaire for competiveness features

Groups	Mean	SD
Iompetitiveness	62.60	1.876
Non-competitiveness	49.5	4.084

Table 2 shows the mean sprint for the three research groups . As can be seen subjects in High motivational groups have better records in compititiveness and non-competitiveness conditions

Table 2. Results of sprint performance

		Mean	SD
Competitiveness	Motivational	11.826	.5962
	Non- motivational	12.271	.7331
	Control	12.273	.5650
Non-competitiveness	Motivational	11.911	7658
	Non- motivational	12.140	.4912
	Control	12.723	.6875

Analysis of the data revealed significant differences between the groups record.(F=3.897, p= 0.003). the results of post –hoc test results sowed intergroup differences(Table3)

Table 3. Results of post-hoc test

		Mean Defrences	Deviation, standard error	P value
Competitive-motivational	Non- motivational Competitive	12.271	.7331	0.013*
	Control- Competitive	12.273	.5650	0.027*
Competitive-non-motivational	Motivational- Competitive	11.911	7658	0.013*
	Control- Competitive	12.723	.6875	0.020*

(Significant P<0.05)

DISCUSSION AND CONCLUSION

Findings revealed motivational music and videos is effective on the Sprint competition in young females. Moreover motivational music with sport videos as part of a motivational factor had positive effect compared to a control group of non- motivational sprint records. These results are somewhat consistent with the findings of Barwood (2009) that showed the composition music and video have a significant impact on the motivational Group performance. Also ,waterhouse (2009) Brownley (1995) showed a significant effect of fast music on Sprint runners' performance.

Finally , his study supports a beneficial effect of motivational music and video on the performance of individuals in competition conditions. In this study, subjects competitive subjects ran faster than, non-competitive. Motivational music and music had a better performance in comparison to other groups.

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MOTIVATION AND ATTITUDES OF FOOTBALL AND VOLLEYBALL FANS

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Key words: *football fans, volleyball fans, attitudes, motivation, sport events, hooliganism*

In modern sport the interaction between sport fans and sport events and competitions is multidirectional. In all cases the sport is highly dependent on the spectators. Some of them may be never visiting live sport event, even their favorite team, but they never miss the television broadcast or live streaming of the events. The motivation and attitudes of fans in Bulgaria are important to research because of the necessity of knowledge of why fans are in stadiums, researching of sport as a social phenomenon, prevention of incidents and problems, improving the area in stadiums. The aggression behavior and hooliganism are often the real reasons, hidden behind the love of favorite team.

As a phenomenon sport takes a significant place in social and cultural life of many people in the world. In Europe and South America football is such a strong part of the culture that the followers have quasi-religious characteristics [10]. The involving of fans in football matches is often accompanied by intensive emotions like frustration, anger, anxiety, or of course big celebration when the team wins. This behavior poses a very important question for the psychologists who research the problem of the view point for collective behavior of the psychology of the crowd [1]. William Floyd Allport (1924) says that connection of people in crowds is associated with certain personality characteristics. The modern theories of football hooliganism and sport competitions are based on this explanation. For example analysis of violence associated with football crowds concluded that there are basic traditions for physical violence in some parts of the society for which football is special interest.

In earlier works, researchers of fan's motivation [13, 14] have been trying to explain what motivated people to be fans. His work has discovered that there are some factors which build the motivation - entertainment, aesthetic pleasure, escapism, family needs, eustress, group affiliation, self-esteem. Eustress is described as: "the human need for positive stress and psychological activation" [11, p.158]. This reason is included in the category of psychological dimensions related to motivation, because it is a direct reference to the emotional sphere of the person. Smith and Stewart (2007) write that pleasure and anxiety go together in the case of sport fans. Physiological responses of the body like adrenalin and dopamine are expressed in emotional experiences.

Everyday stress can be problem for the people. A big part of individuals trying to escape the stress includes the identity of their favorite team in support for it[13,14]. Modern people work intensively, has little time for vacation and the psychological reason for escape is important for fans and maintains them in good spirit. Research shows that the psychological reason for escape can be found for example in the wish of some stigmatized groups to challenge other groups of society [4].

The research of [14] shows that to follow sport events is an aesthetic experience and it is a part of the motivation of the fans. People visit sport events because it brings them permanent memory experience. The aesthetic pleasure can be derived from different sources - the actual event, star athletes, attractive players (for example the football player David Beckham), the spirit of the crowd.

According to research of [13] the entertainment has basic role of the fans' loyalty to the team. In one research 85% of the people declare that they are fans and visit sport events for the entertainment. Smith and Stewart (2007) pay attention to factors like the excitement of the senses, remarkable execution, sounds, colors or group affiliation.

Smith and Stewart (2007) write that "sport events ensure that families spend their time together and the communication in this period seems like celebration or vacation" (p.161). Some researchers think that sport events are used for family cohesion, but this usage weakens their identity as fans.

The research of [13, 14] show high identification of fans with sport and using it as way for expression and cohesion. In this case sport builds harmony and cooperation in the group. The fans feel this cooperation as general identification for all. They are dressed in the same manner, with the same colors and symbols. All this can give them feeling of affiliation and cultural connection in their society.

METHODOLOGY

The purpose of this study is to research the attitude and motivational profile of football and volleyball fans and their relation with some personality traits and to find possible differences, if any, between gender, age, professional experience and favorite sport.

The object of the study are 107 football and volleyball fans from 14 to 71 years of age.

- For the realization of the research we used:
- Fan Motivation Scale – FMS, Y. Al-Tabitti, 2004

Methodology for assessment of mental instability and sensation seeking. A. Velichkov, M. Radoslavova, 2005.

ANALYZE OF THE RESULTS

The volleyball fans in this research are 18(23,4%) males and 43(55,8) females aged between 14 and 71 (median age-29,36). 10 of them have primary education (still students), 21 have secondary education, 30 have higher education in different fields - doctors, teachers, managers, journalists, IT specialists, accountants. The participants in the study are fans of various volleyball clubs.

23 of the respondents are members of Bulgarian National Volleyball Fan-Club. The duration of support to their favorite team is represented on **Fig.1**. 6 people have less than one year, 13 have between 1-4 years, and these are the youngest fans in this study, the people with 5-9 years of support are 12, 8 have 10-14 years, 3 people have 20-24, and 8 have more than 25 years. The answer of other 8 participants is that they are not fans of a specific volleyball team. On **Fig.2** is represented the distribution of fans of Bulgarian national teams - men and women. 11 have been fans for 1-4 years; the youngest participants are in this group.

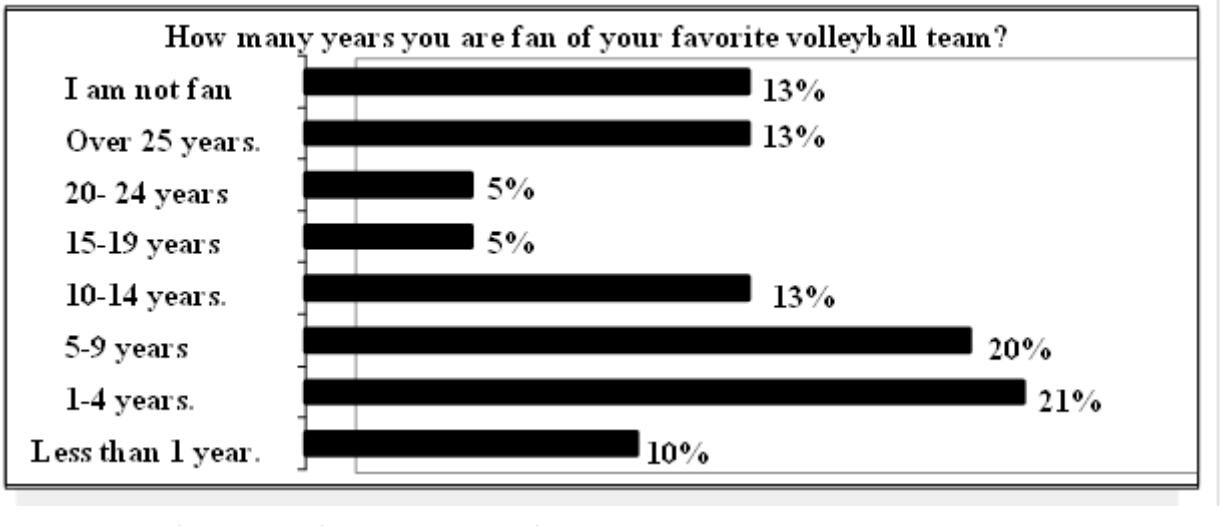

Figure 1. Volleyball fans-years of supporting their favorite team

The largest group of 17 fans of Bulgarian national team have supported it for 5-9 years, which may be based on the fact that in last 10 years the Bulgarian male national team has become very famous and has systematically gained big successes in important competitions - European and World championships, Olympic games and finals of the World league. Of course, a significant part of the participants (about 15%), respond that they are fans of more than 25 years and certainly remember the oldest performances of Bulgarian volleyball.

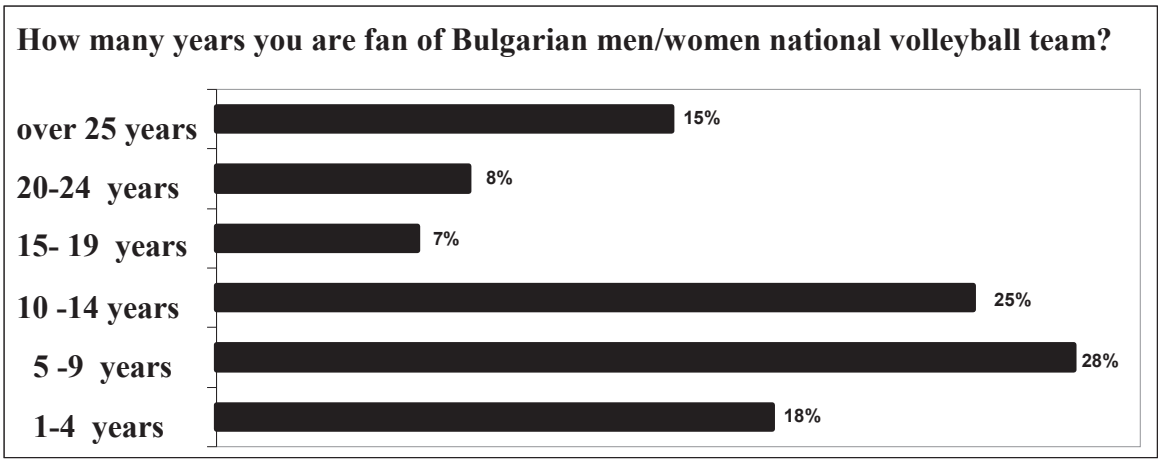

Figure 2. Volleyball fans-years of supporting Bulgarian national team.

With the next two questions we decided to check how many fans participating in this study have played professional or amateur volleyball. The answers show that a great part of them (41) are only fans of the game and they have never trained professional sport. 37 of the participants have trained and played amateur volleyball.

Next some questions show the frequency of visits to the favorite club team, the Bulgarian national team and the way the support is expressed. Only 12 of the people answer that they don't visit matches, all others support their favorite team with different frequency, which is influenced not from unwillingness, but from the program of sport events, the expense of tickets, previous commitments. Only 6,5% don't visit matches of national team. When the sport event of a favorite team is in other town, most of the fans answer that they prefer to watch the match on television. There are 10,4% of fans who follow the team in the hall in every match - home or as guests.

The results do not entirely confirm our preliminary assumptions. In a comprehensive view, the first reason of fans to visit football matches is the quality of game. Next is the search for entertainment and the sport atmosphere. The comparative analysis between the results of football and volleyball fans shows that the hierarchy of motives is the same.

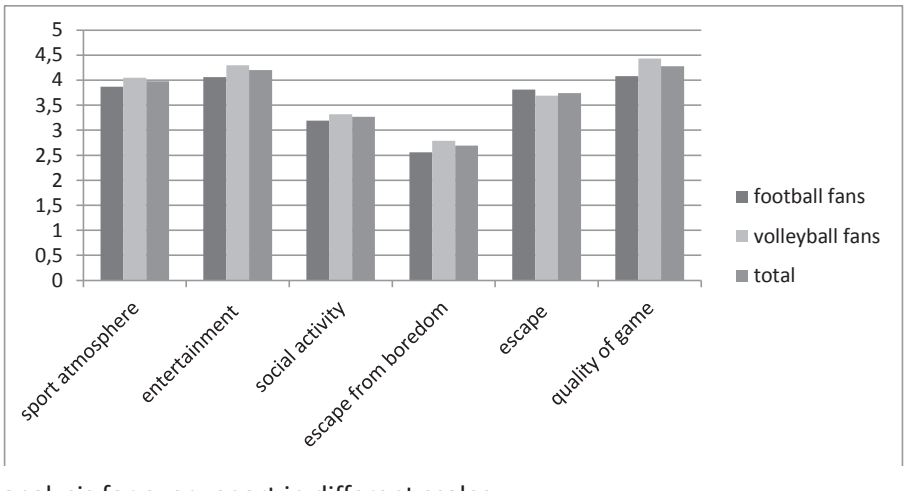

Fig.3. Comparative analysis for every sport in different scales.

There are statistically significant differences depending on the type of sport in two leading motives-quality of game and entertainment (Fig.2). Both of these motives in volleyball fans are with higher results. That is not connected to the hierarchy of motives.

The comparative analysis of the results on the factor age show statistically significant differences only on entertainment.

On the factor of education there are statistically significant differences again only with one motive - escape of boredom. The fans with higher education more often see the sport events as alternative of everyday boring life.

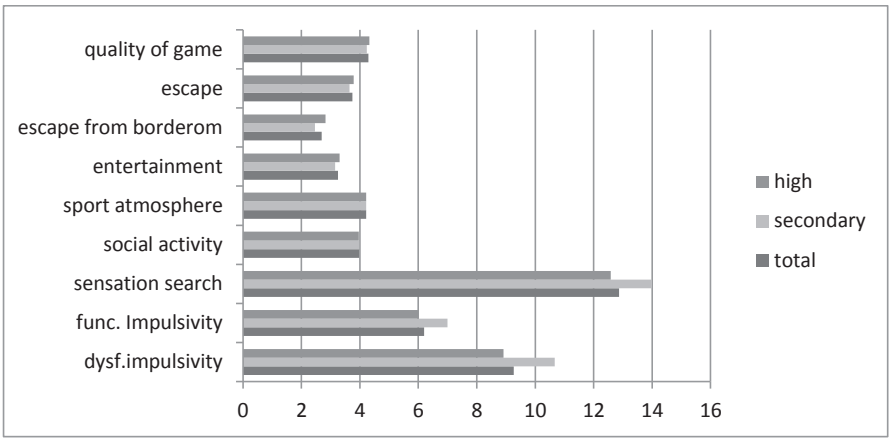

Fig.4. Results of comparative analysis of factor education.

It is surprise for us to see that there are no statistically significant differences on the factor of professional status, which is found in other research as one of the basic determinants of hooligan behavior.

One of the accents of our research was the study of some personality traits, which are related with asocial behavior, by data from literature – the search for sensation, functional and dysfunctional impulsivity.

The comparative analysis with average data for Bulgaria [12] discover that fans have (**fig.4**) higher results on dysfunctional impulsivity and sensation search i.e. they are inclined to risk, they are looking for dangerous and strong emotions, impulsivity of reactions. In this case our results are consistent with other data in literature.

Our results show that people with secondary education (fig.3) have a higher degree of searching for additional stimulation and experiences, characteristics related with asocial and risk behavior. But these results are not statistically significant and we can interpret them only as tendency.

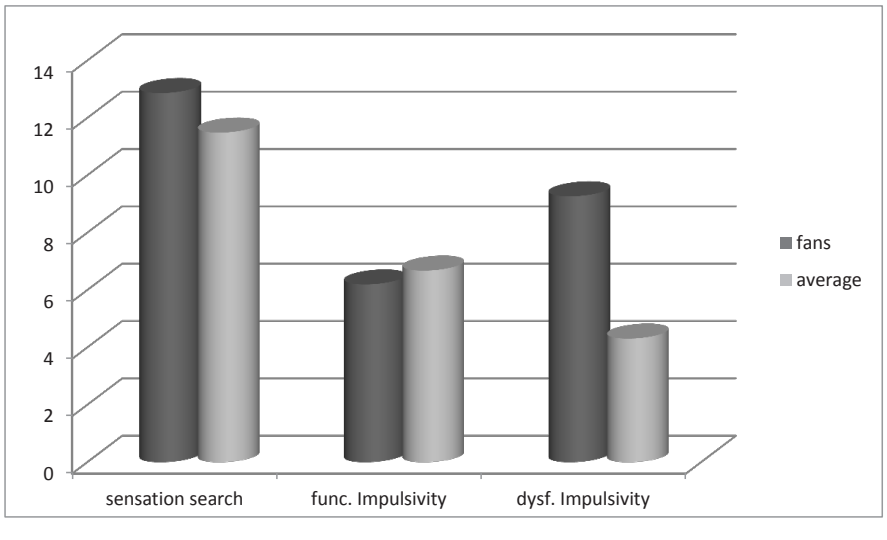

Fig.5. Average results from personality traits of fans and Bulgarian population.

The data comparative analysis discovers that there are no significant differences of personal characteristics – search for sensation, functional and dysfunctional impulsivity when we put them together with gender, age and professional status. In this sense, we can consider that these characteristics are typical of the fans at all.

The fans' behavior, independent from the sport, is similar in many cases and has same motives, so we can suggest that the specific sport environment, the opportunities for "expression" is the reason for hooligan behavior. The analysis from our study gives us reason to make conclusion that the fans independent of age and professional status manifest similar personality features (search for sensation, functional and dysfunctional impulsivity) with different results from the average Bulgarian population.

CONCLUSIONS:

The conclusions of this study gives us reasons to think that independent of age and professional status, the fans manifest similar personal features which are different from the average for Bulgaria (this is from research with "Methodology for assessment of mental instability and sensation seeking". A. Velichkov, M. Radoslavova, 2005).

There are high values (Fig.4) of dimensions dysfunctional impulsivity and sensational search i.e. the fans are prone to risk and impulsive reactions, search for dangerous and strong experiences.

It is probably that aggression and hooliganism are collective phenomenon of behavior related with special conditions which make their manifestation easier, the real reason has not much to do with the sport. In this sense, it is more correct to speak of hooliganism at football matches, not for football hooliganism in general.

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PSYCHOLOGICAL TESTS IN THE PROGRAM "GYMNASTICS WITH PSYCHOPROPHYLAXIS" FOR WOMEN WITH NORMAL PREGNANCY

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***Keywords**: program, gymnastics, psychological treatment, psycho effects, tests*

Pregnancy is a period of change caused by „stress of pregnancy" due to hormonal changes in the woman preparing for normal development of the fetus and adapting to the new situation [9, 10, 11, 13]. Injurious or unpleasant stress beyond acceptable levels for the human body is called „distress", which is a result of strong external or internal influence and leads to a pathological condition [14]. Defined as a state of tension of the personality due to stimuli-physical, mental, chemical or others [3]. Some authors [6, 7, 14] proposed a theoretical model which includes controlled consultations with pregnant women to obtain knowledge about their condition.

In the natural process of pregnancy through the mother is being performed the so called prenatal education - related to the quality of future generations through psycho-preventive methods of impact [1, 5]. It has long been known that physical activity is a factor that protects from everyday stress and programs aimed at physical and mental health of pregnant women will be beneficial for the period of pregnancy. This study is to trace the effect of applying the combined program and the main task is to reveal the influence of the methods applied by psychological test studies.

METHODOLOGY The study included one hundred women aged between 22 and 39 (average 30.4 ± 5.3 years) with pregnancy between the second and eighth month (average 5.5 ± 1.6 months). All examined women are with normal pregnancy, ie good obstetric status. In the study women confirmed their participation with an informed consent and obstetrician recommendation. Attached are field test studies at the NSA „Vassil Levski „aerobics room at the beginning and at the end of the program "Gymnastics with psychoprophylaxis in women with normal pregnancy"(**fig. 1, 2, 3**).

Fig. 1,2,3

Fig. 4, 5

The program includes two modules in one session, twice a week: 40 minutes of gymnastics and 10 minutes psychosocial effects with different methods (regulation of breathing, meditation, relaxation, spot, color and sound impact, audio-visual effects and visual-auditory biofeedback motor) of **fig. 4, 5** [12].

To determine the physiological parameters the following methods are applied: 1) Scale Spilbargar STAY-Y-I for evaluation of situational and personal anxiety; 2) Colour Test Löscher; 3) Test - a survey to study the value systems of Rokeach.

ANALYSIS OF RESULTS

1. Results of variance analysis and comparison between the initial and final examination – test Spilburger.

Analysis of variance shows that the subjects have low situational (SP_S) and personal anxiety (SP_L) at the first and final testing. Values are within the normal range for Bulgarian sample. The average values in the second study are with a lower degree of markedness in table 1. However, in order to establish how significant the differences are, a comparative analysis was being implemented.

Table 1. Variation analysis of situational and personal anxiety at baseline and final examination

Indicators	N	Initial study (IT)				Indicators	Final examination (FT)			
		Min	Max	M	SD		Min	Max	M	SD
SP1_S	68	20	53	33,38	7,12 [a]	SP2_S	24	44	32,75	5,91 [a]
SP1_L	68	21	53	37,28	7,33 [a]	SP2_L	25	48	36,69	7,91 [a]

*The coherent letters indicate no statistical differences and the different - the existence of such; All determined differences were at confidence level p <0.01.

The comparative analysis of situational and personal anxiety at the first and final study (table 1) showed no statistically significant differences. As the pregnancy is progressing, there is an increasing concern, anxiety and mental stress related to the pregnancy outcome. But the results of the study show that the levels of personal anxiety remain in the normal range [1, 8]. This is confirmed by the results obtained by testing Löscher assessment of current mental state [2]. Displayed indicators characterize the subjects as calm, without anxiety and the minor amounts of anxiety are compensated with sufficient resources to address the factors that caused it.

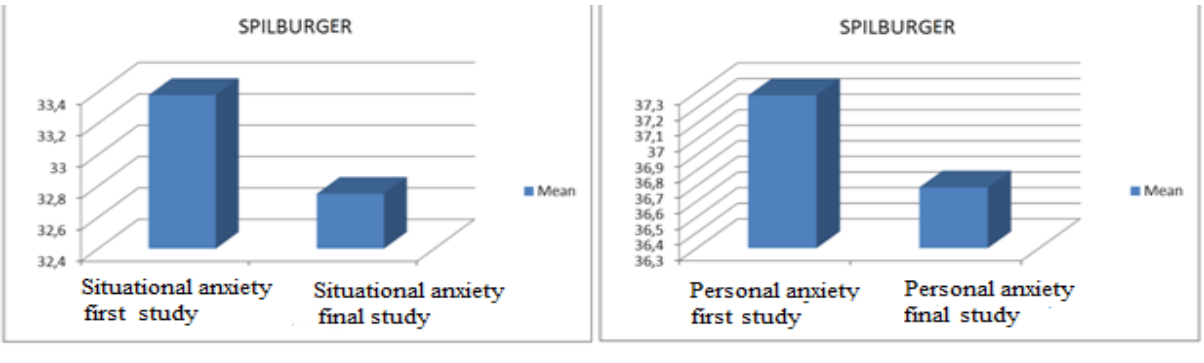

Fig. 6, 7. Comparison between IT and FT situational and personal anxiety in pregnant women

2. Results of variation and comparative analysis - color test Löscher

The test method used Max Löscher allows a diagnosis of the emotional and physical condition of pregnant women and their stress levels by the means of accurately defined indicators (table 2 and 3).

Table 2. Results of analysis of variance test Löscher - first study.

INDICATORS		N	Min	Max	M	SD
L1_VK	Vegetative factor	100	-3,33	2,67	,43	,87
L1_IT	Intensity of anxiety	100	,00	6,00	1,52	1,44
L1_NK	Unfavorable compensation	100	,00	6,00	,83	1,41
L1_OAN	Autogenic deviation from the norm	100	4,00	30,00	**13,67**	6,45
L1_K	Internal conflicts	100	,00	3,00	,30	,70

The autonomic coefficient in the first study is close to the norm (0.43). The average value of the intensity of anxiety was low (1.52). The maximum value of this ratio is 6. Lack of internal conflicts, contradictions and imbalances (M = 0,30) and the relatively close to autogenic rate coefficient (13.67) show that the current mental state of the people examined falls within the normal range.

The results of the final Löscher testing reveal a similar picture, but with the parameters characterizing more normal mental state. The average values for all parameters were lower (table 3).

Table 3. Results of Löscher variational analysis - final test.

INDICATORS		N	Min	Max	M	SD
L2_VK	Vegetative factor	33	-3,33	2,00	,07	,70
L2_IT	Intensity of anxiety	33	,00	6,00	,60	1,24
L2_NK	Unfavorable compensation	33	,00	4,00	,24	,73
L2_OAN	Autogenic deviation from the norm	33	,00	30,00	**4,76**	7,60
L2_K	Internal conflicts	33	,00	2,00	,11	,39

The results of the comparative analysis showed a statistically significant differences in all variables. The Comparison of the average values from the first (primary) and second (final) examination indicates that the second parameters are changed in a direction leading to more favorable current mental state (fig. 8, 9). Anxiety is of negligible value (0.6) and the value of internal conflicts is also reduced (0.11), but the most significant development was observed in terms of Autogenic norm (4.76), which reflects the mental state after relaxation or meditation. The final coefficient and the examined significant differences in the Löscher test give us a ground to assume that the complex impact methodology has affected the mental state of the examined people in a favorable direction (**table 4**).

Table 4. Results of the comparative analysis of Löscher test.

INDICATORS	Vegetative factor	Intensity of anxiety	Unfavorable compensation	Autogenic deviation from the norm	Internal conflicts
U	-3,51	-5,06	-4,07	-6,95	-2,71
A	,000	,000	,000	,000	,007

3. Results of variation and comparative analysis of the test – survey Rokeach

The results of the variance test analysis - Rokeach Value Survey are presented in two lists. Since the values of this test are ranged (data ranks scaled) as the most appropriate statistical methods [4] to analyze the results of the empirical study we chose the variational analysis.

Results of List A - RA reveal subjective significance of pregnant women individual values. Since the most significant values are placed first, they are characterized by the lowest average values. Pregnant women values as goals are ranked (rank in order of importance) as follows:

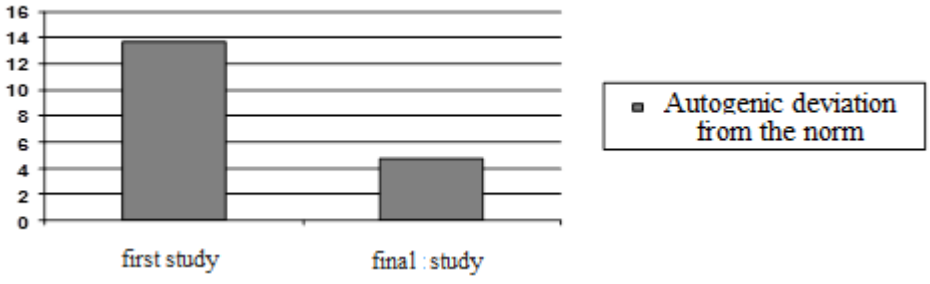

Fig. 8.. Comparison between IT and FT of Autogenic rate in pregnant

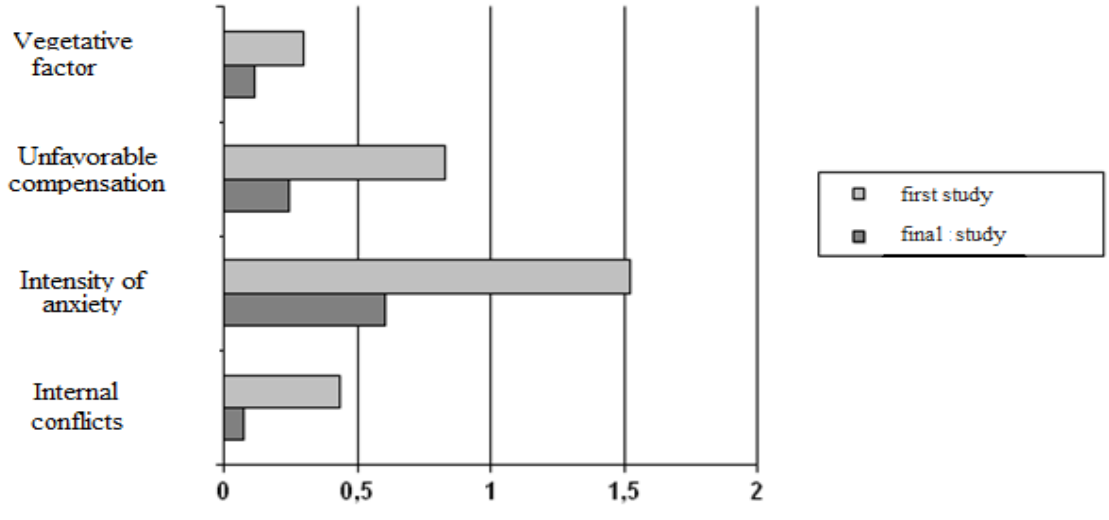

Fig. 9. Comparison between IT and FT indicators of current mental status of pregnant women.

LIST A – VALUES OBJECTIVES (TERMINAL)

1. Health (physical and mental)
2. Love (spiritual and physical intimacy with a loved one).
3. Happy family life.
4. Assets and fulfilling life (completeness and emotional intensity of life).
5. Self-confidence (inner harmony, lack of internal contradictions, doubts).
6. Good and loyal friends.
7. Personal Development (working on yourself, constantly physical and spiritual improvement).
8. Freedom (autonomy, independence in judgments and actions);
9. Cognition (opportunity to expand their education horizons, general knowledge, intellectual development).
10. Productive life (maximum full use of their capabilities, strengths and abilities).
11. Interesting work.
12. Financially secured life (lack of financial problems).
13. Life wisdom (mature reasoning and common sense gained through life experience).
14. The beauty of nature and art (the wonderful experience of nature and art).
15. Entertainment (good time, no obligation and commitments).
6. Happiness of others (well-being, development and improvement of other people, of the whole nation, of humanity as a whole).
17. Public recognition (respect from the surrounding, the collective work colleagues).
18. Creativity (opportunity for creative activity).

The comparative analysis of the importance of pregnant women terminal values shows that despite the differences in their ranking, the same values are coming to the fore. These are the values of health, love and happy family life. Pregnant women strive to achieve "targets" that enable them to have an active life of fulfillment, with good friends, with constant work on themselves, with permanent physical and spiritual perfection, freedom, and knowledge. This characterizes them as socially mature and balanced human beings. The results of values analysis of variance - means (Schedule B - RB) show how, by what values pregnant women strive to achieve their goals.

LIST B - VALUES MEANS (INSTRUMENTAL)

1. Honesty (honesty, sincerity).
2. Responsibility (sense of duty and ability to keep one's word).
3. High Education (knowledge, vast general knowledge).
4. Upbringing (good manners).
5. Independence (ability to act independently and decisively).
6. Zest (humor).
7. Self (self-restraint, self-discipline).
8. Courage in defending their opinions and views.
9. Broad Mind (ability to understand the foreign perspective, respect for diverse tastes, customs, habits).
10. Accuracy (cleanliness), the ability to maintain order in things, order in commitments.
11. Manageability (discipline).
12. Strong will (ability to defend, easily overcoming obstacles).
13. Responsiveness.
14. Tolerance (to respect the views and opinions of others, the ability to forgive others mistakes and delusions).
15. Rationalism (sustainable and logical thinking, making thoughtful, rational decisions).
16. Effectiveness at work (hard work, productivity in itself)]
17. Aim high (high demands and high life claims).
18. Intolerance to shortcomings in themselves and in others.

The rank analysis of values by which pregnant women seek to achieve their goals, places the values of honesty, responsibility, education first. This is a clear sign of the great responsibility of mothers towards their children. After that is coming the value of education, independence and sense of humor, followed by other skills such as self-control, courage, accuracy and strong will. The values ranged in that way characterize the examined pregnant women as sincere with a sense of duty, with vast general knowledge, as an autonomous, independent and self-reliant and last but not least as people with no extreme claims.

CONCLUSIONS

1. The levels of personal anxiety according to the Spilbargar test remain in the normal range. We assume that this is due to the psychological effects and methods included in the overall program.
2. Factors obtained and significant differences in the Löscher test give us a ground to assume that the complex methodology has benefited the mental condition of the studied pregnant women..
3. The ranks analysis of values test - Rokeach value survey whereby pregnant strive to achieve valueable goals, giving the first places to the values of honesty, responsibility, and education as well as to values associated generally with health, love and happy family life. These values characterize pregnant women as socially mature, balanced, honest, with a sense of duty and general knowledge.
4. In all stages of pregnancy gymnastics with psychoprophylaxis improves not only physical but also emotional, mental and psychological state as a whole.

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PSYCHOMETRIC CHARACTERISTICS OF THE TEST FOR STUDYING GAME ANTICIPATION IN HANDBALL PLAYERS

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Keywords: *anticipation, handball, test, psychometrics, reliability*

Anticipation is the cognitive ability "to jump forward in the future as response to stimuli from the present" [1]. Anticipation in sport is the ability of the athlete to make decisions and to act ahead of time [3]. This ability to foresee the development of the game situation is crucial for performance while at the same time we lack methods of either studying or developing it. Well known methods for studying anticipation are directed only to the perceptual level of anticipation [2] while the anticipation on thinking level is not studied experimentally, at least in handball. This state of affairs directed our efforts to creating a new method for studying game anticipation in handball.

METHOD

The aim of the study is to establish the psychometric characteristics of the test for studying game anticipation in handball.

The test measures game anticipation on the level of thinking [3] and consists of 70 tasks – game situations from real matches on international level, presented as video clips (more about the test can be found in [4]. The players anticipate the development of the situation and choose their answer from 3 options, only 1 of which is correct.

The subjects of the study were 149 handball players from 8 teams (111 males and 38 females) aged 11-28 – Table 1.

Table 1. Age and sex of the subjects.

	Age	Sex		Total
		Males	Females	
1.	11-12	9	0	9
2.	13-14	23	8	31
3.	15-16	33	11	44
4.	17-18	27	10	37
5.	above 18	19	9	28
	Total	111	38	149

Part of the athletes (N=37) have been also studied using Schuhfried Viener system for psychological diagnostics – tests for measuring simple and complex reaction times (RT) and motor-type anticipation (ZBA), and also by Raven's progressive matrices (N=45). The tactical skills of all handball players have been evaluated by their coaches using a special scale [5]. The last item of the scale (which evaluates anticipation), was used as a separate estimation of the anticipation by coaches.

The data was analyzed with SPSS 15.0. - modules for descriptive statistics, Students' t, correlation analysis and item analysis (The Kuder Richardson Coefficient of reliability (K-R 20 is used to test the reliability of binary measurements but Chronbach's Alpha, when applied to binary data, produces the same value as K-R 20).

RESULTS AND DISCUSSION

The first step of the analysis was to examine the internal consistency of the five scales (Tables 2-10). The results of the item-analysis of the first scale ("Defender") are presented on Table 2.

Table 2. Results of the first item-analysis of the scale "Defender".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	8,8027	4,817	-,138	,498
Item 2	8,7619	4,183	,163	,408
Item 3	8,5374	4,497	,052	,438
Item 4	8,4150	4,203	,376	,371
Item 5	8,5306	4,223	,217	,395
Item 6	8,7891	4,332	,087	,432
Item 7	8,6395	4,246	,153	,411
Item 8	8,6599	3,870	,355	,348
Item 9	8,4898	4,115	,324	,370
Item 10	8,8707	4,264	,122	,421
Item 11	8,8367	4,110	,198	,397
Item 12	8,6259	4,702	-,076	,475
Item 13	8,6463	4,285	,131	,418
Item 14	8,4626	4,182	,310	,377

The results of the item-analysis show unacceptable low consistency of the scale - Cronbach's Alpha = 0.432. Some items even have negative relationship with the total score (items 1 and 12). These results mean that some items should be removed in order to improve the reliability of the scale. The "weak" items have been removed step by step until the point when further removal of any item would only worsen the reliability of the scale. The final version of the scale is shown on Table 3.

Table 3. Results of the final item-analysis of the scale "Defender".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 2	6,2653	3,607	,213	,591
Item 4	5,9184	3,829	,286	,576
Item 5	6,0340	3,773	,197	,592
Item 7	6,1429	3,644	,220	,588
Item 8	6,1633	3,439	,335	,558
Item 9	5,9932	3,582	,367	,555
Item 10	6,3741	3,455	,301	,568
Item 11	6,3401	3,445	,303	,567
Item 13	6,1497	3,594	,247	,581
Item 14	5,9660	3,677	,332	,564

The final variant of the scale consists of 10 items and Cronbach's Alpha = 0.600 that is adequate reliability for further exploration.

The results of the item-analysis of the second scale ("Dynamic situations against the goalkeeper") are presented on Table 4.

Table 4. Results of the first item-analysis of the scale "Dynamic situations".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 15	6,8176	4,422	-,212	,334
Item 16	6,7635	3,665	,161	,179
Item 17	6,9324	4,172	-,089	,282
Item 18	6,8514	3,325	,363	,085
Item 19	6,6622	3,735	,132	,193
Item 20	6,8041	3,818	,080	,215
Item 21	6,7432	3,702	,141	,188
Item 22	6,4932	3,966	,051	,227
Item 23	6,8851	3,449	,297	,119
Item 24	6,5811	3,932	,042	,231
Item 25	6,8851	3,925	,032	,236
Item 26	6,7230	4,691	-,331	,377
Item 27	6,7500	3,713	,136	,191
Item 28	6,6216	3,502	,276	,130

The results of the item-analysis show unacceptable low consistency of the scale - Cronbach's Alpha = 0.233. Some items have negative relationship with the total score (items 15, 17 and 26). These results mean that some items should be removed in order to improve the reliability of the scale. The "weak" items have been removed step by step until the point when further removal of any item would only worsen the reliability of the scale.

The final variant of the scale consists of 6 items and Cronbach's Alpha = 0.576 that is below the line of adequate reliability for further explorative purposes. Appropriate variant for this scale would be its removal or merging with another scale in order to obtain better reliability.

The results of the item-analysis of the third scale ("Goalkeeper") are presented on Table 5.

Table 5. Results of the first item-analysis of the scale "Goalkeeper".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 29	5,9796	6,801	-,119	,584
Item 30	5,7007	5,567	,378	,490
Item 31	5,9388	6,167	,167	,536
Item 32	5,6531	5,612	,358	,494
Item 33	5,6395	6,068	,160	,539
Item 34	5,7959	6,575	-,040	,579
Item 35	5,7755	5,531	,404	,484
Item 36	5,7007	5,732	,304	,507
Item 37	5,6190	5,826	,266	,516
Item 38	5,7415	5,590	,371	,492
Item 39	5,7347	5,689	,325	,502
Item 40	5,8435	7,078	-,234	,613
Item 41	5,6735	5,879	,239	,521
Item 42	5,5918	5,736	,310	,506

The results of the item-analysis show unacceptable low consistency of the scale - Cronbach's Alpha = 0.547. Some items have negative relationship with the total score (items 29, 34 and 40). These results mean that some items should be removed in order to improve the reliability of the scale. The "weak" items have been removed step by step until the point when further removal of any item would only worsen the reliability of the scale. The final version of the scale is shown on Table 6.

Table 6. Results of the final item-analysis of the scale "Goalkeeper".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 30	3,9796	4,678	,413	,658
Item 32	3,9320	4,817	,345	,672
Item 35	4,0544	4,572	,479	,645
Item 36	3,9796	4,705	,400	,661
Item 37	3,8980	4,832	,341	,672
Item 38	4,0204	4,842	,335	,674
Item 39	4,0136	4,698	,406	,659
Item 41	3,9524	4,922	,293	,682
Item 42	3,8707	4,949	,289	,683

The final variant of the scale consists of 9 items and Cronbach's Alpha = 0.693 that is adequate reliability for further exploration.

The results of the item-analysis of the fourth scale ("Offender") are presented on Table 7.

Table 7. Results of the first item-analysis of the scale "Offender".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 43	7,5101	4,630	-,137	,412
Item 44	7,3624	4,057	,166	,308
Item 45	7,6644	4,089	,131	,319
Item 46	7,4497	4,263	,040	,352
Item 47	7,5638	4,018	,157	,310
Item 48	7,6107	4,469	-,062	,387
Item 49	7,5235	3,630	,369	,227
Item 50	7,7181	3,812	,300	,259
Item 51	7,3020	3,928	,269	,275
Item 52	7,4698	3,724	,322	,247
Item 53	7,1611	4,190	,225	,303
Item 54	7,2483	5,310	-,478	,480
Item 55	7,4966	4,076	,129	,320
Item 56	7,5302	3,953	,191	,297

The results of the item-analysis show unacceptable low consistency of the scale - Cronbach's Alpha = 0.344. Some items have negative relationship with the total score (items 43, 48 and 54). These results mean that some items should be removed in order to improve the reliability of the scale. The "weak" items have been removed step by step until the point when further removal of any item would only worsen the reliability of the scale. The final version of the scale is shown on Table 8.

Table 8. Results of the final item-analysis of the scale "Offender".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 44	4,9933	4,358	,192	,608
Item 45	5,2953	4,264	,223	,602
Item 47	5,1946	4,185	,250	,596
Item 49	5,1544	3,969	,365	,567
Item 50	5,3490	3,945	,418	,556
Item 51	4,9329	4,239	,289	,587
Item 52	5,1007	3,929	,394	,560
Item 53	4,7919	4,558	,213	,602
Item 55	5,1275	4,220	,234	,600
Item 56	5,1611	4,150	,269	,592

worsen the reliability of the scale.

The final variant of the scale consists of 9 items and Cronbach's Alpha = 0.438 that is way below the line of adequate reliability for further explorative purposes. Appropriate variant for this scale would be

Table 9. Results of the first item-analysis of the scale "Static situations".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 57	6,0676	4,349	-,065	,323
Item 58	6,1351	4,131	,057	,277
Item 59	6,1689	4,182	,039	,284
Item 60	6,0541	3,875	,176	,231
Item 61	5,9797	4,102	,050	,281
Item 62	6,1014	4,214	,007	,296
Item 63	5,7838	3,885	,181	,230
Item 64	5,8514	4,019	,096	,263
Item 65	6,0811	3,789	,230	,210
Item 66	5,8919	3,784	,215	,214
Item 67	5,8649	4,009	,099	,262
Item 68	6,0338	4,509	-,143	,352
Item 69	5,8176	3,919	,154	,240
Item 70	5,8784	3,944	,131	,249

The final variant of the scale consists of 10 items and Cronbach's Alpha = 0.613 that is adequate reliability for further exploration.

The results of the item-analysis of the fifth scale ("Static situations against the goalkeeper") are presented on Table 9.

The results of the item-analysis show unacceptable low consistency of the scale - Cronbach's Alpha = 0.282. Some items have negative relationship with the total score (items 57 and 68). These results mean that some items should be removed in order to improve the reliability of the scale. The "weak" items have been removed step by step until the point when further removal of any item would only

its removal or merging with another scale in order to obtain better reliability. Because we had similar problem with the 2nd scale – Dynamic situations against the goalkeeper, the decision is to combine these 2 scales in order to improve their psychometric characteristics. The combined scale would give information about the anticipation in situations against the goalkeeper – static as well as dynamic situations.

The final variant of the scale consists of 12 items (6 for static and 6 for dynamic situations) and Cronbach's Alpha = 0.637 that is adequate reliability for further exploration (Table 10).

Table 10. Results of the final item-analysis of the scale "Static and dynamic situations against the goalkeeper".

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 18	5,8027	5,721	,411	,591
Item 21	5,6871	5,956	,299	,613
Item 23	5,8299	5,635	,459	,583
Item 25	5,8299	5,991	,296	,613
Item 27	5,7007	6,115	,231	,625
Item 28	5,5714	5,973	,314	,610
Item 63	5,5646	6,275	,182	,633
Item 64	5,6259	6,263	,175	,635
Item 65	5,8639	6,077	,267	,619
Item 66	5,6667	6,005	,280	,616
Item 69	5,5918	6,147	,231	,625
Item 70	5,6599	6,116	,233	,625

The internal consistency of the test as a whole (all 4 scales) is high - Cronbach's Alpha = 0.855. The final variant consists of only 41 items, which helps to significantly shorten the duration of the diagnostics.

The descriptive statistics of the scales is presented on Table 11.

Table 11. Descriptive statistics of the Game anticipation test.

Scales	Mean	Std. Deviation	Minimum	Maximum	Range
Defender	,6825	,20518	,20	1,00	,80
Offender	,5678	,22248	,10	1,00	,90
Dynamic and static situations	,5167	,21845	,17	1,00	,83
Goalkeeper	,4925	,27036	,00	1,00	1,00
Game anticipation (total)	,5645	,19174	,24	0.98	,73

The least difficult are the situations included in the scale Defender and the most difficult are the situations included in the scale Goalkeeper, where the biggest individual differences are observed. As a whole the test is characterized by a moderate difficulty, especially when we take into consideration guessing probability of 0.33.

The obtained data allows calculations of percentiles of the test (Table 12).

Table 12. Percentiles of Game anticipation test

5	Percentiles						
	10	25	50	75	90	95	
Weighted Average(Definition 1)	,3293	,3659	,4390	,5122	,6463	,9024	,9512

The results of Student's test show that sex has no effect on the scores on any of the scales and on the total test score. Absence of sex differences is typical for majority of intelligence subtests.

Results of the analysis of the relationships between scales are shown on Table 13.

Table 13. Correlations between scales.

Scales	Defender	Goalkeeper	Offender	Dynamic and static situations
Goalkeeper	,444**			
Offender	,483**	,666**		
Dynamic and static situations	,515**	,541**	551**	
Game anticipation (total)	,735**	,827**	,835**	,825**

**All correlations are significant at 0.01 level.

Correlations between scales are moderate to strong. The scales are not independent and reflect slightly different sides of the same phenomenon; the scores on different scales should rather be viewed as auxiliary, giving particular helpful information for the work of the coaches for improving anticipation skills of the handball players.

The results of the analysis of the relationships between game anticipation and other studied variables are shown on Table 14.

Table 14. Correlations between anticipation and other variables.

Variables	Anticipation (coach)	Tactical skills (coach)	General intelligence	Latent time – simple reaction	Motor time – simple reaction	Latent time – complex reaction	Motor time – complex reaction	Time – motor anticipation	Space – motor anticipation
Game anticipation	-.066	-.080	.373*	-.147	.209	-.095	.070	.019	.151

*Correlation is significant at 0.05 level.

Game anticipation has moderate relationship only with general intelligence (measured by non-verbal test of Raven). As expected, the anticipation on thinking level is an intellectual process. It is not the anticipation of the trajectory and timing of movement, studied through psychomotor ZBA-test from Schuhfried's Viener system. Game anticipation is not related to the latent or motor time of simple and complex reactions. Or, the anticipation test we created does not reflect decision making on psychomotor level. The evaluations of the tactical skills and anticipation, given by the coaches of handball players, are also not related to the test score of game anticipation. As expected, coaches are not able to observe and evaluate the manifestations of game anticipation and they cannot relate on their experience and observations to identify high or low levels of game anticipation skills. Therefore coaches could rely only on performance tests (like the one presented here) for the purposes of diagnostics and measuring progress in development of anticipation skills.

CONCLUSION

The new test for studying game anticipation in handball has good psychometric characteristics: the internal consistency of the test as a whole is high (α=0.86). The 4 subscales of the test (Alphas range 0.60-0.69) have auxiliary character to help coaches in the process of development of game anticipation. Sex does not influence game anticipation level, which is typical for intelligence tests. Divergent validity of the test is demonstrated through weak and zero-level correlations with simple and complex reaction time, motor-type anticipation and the coaches' evaluation of the tactical skills of their players. The results show that what was studied was indeed game anticipation on thinking level and not anticipation on psychomotor level. Coaches are not able to evaluate the manifestations of game anticipation and they cannot relate on their experience and observations to identify high or low levels of game anticipation skills. Therefore coaches could rely only on performance tests (like the one presented here) for the purposes of diagnostics and measuring progress in development of anticipation skills.

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Note. The presented study was part of the scientific project of NSA "V. Levski" 228/09.04.2013.

SPORT TRAINING FOR YOUTH ATHLETES – STYA

ANALYSIS OF OFF-SNOW IMAGERY SKILLS AT JUNIOR ATHLETES LEVEL (10–15) THROUGH SLALOM COURSE VISUALIZATION

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Keywords*: tactics, visualization and imagery skills, course inspection, U12, U14, U16*

In alpine skiing, visualization after the course inspection is an important part of the tactical planning (choosing the right line and the proper stance at gate clearing, etc.) – mental skills that are essential to improving young athletes’ performance.

The key aspects that bear relation to slalom course visualization are as follows: number of vertical combinations, number of rhythm changes, number of gates, counter-slopes, transitions from flat to steep and from steep to flat, etc.,[5]. Considering the favorable profile of age groups that are being studied (10- to 15-year olds) [1], we believe that the above mentioned tactical skills can be developed through indoor (i.e. classroom) activities too. Similar methods are described in [4] and [2].

Regrettably, Bulgarian coaches tend to underestimate their effectiveness and prefer to focus on tactical skill development mainly in real race conditions. It is good to know though that visualization and imagery skills can be worked through in off-snow sessions as well. The appropriate selection of training methods adaptable to the year-round training plan could significantly improve athletes’ racing skills. That is the overall objective of the present survey.

Objective: Explore tactical skill development through off-snow mental imagery training.

Tasks:
1. Design a computer graphic model of a slalom course.
2. Test junior athletes’ ability to recall the tactical elements of the graphical course.
3. Analyze the results obtained.

METHODS

1. Statistical methods: variation and comparative analysis.
2. Visualization based on a computer graphic model of a slalom course.

Subject of inquiry: junior members (boys and girls) of 5 Bulgarian ski clubs (29 athletes 10- to 13-year old and 19 athletes 14- to 15-year old). The survey was conducted indoors at the appointed clubs, between May and October 2013.

Stages:
1. Displaying a computer graphic model of a slalom course consisting of 40 gates, including 12 tactical elements. The athletes have 8 minutes to memorize it and 10 minutes to reproduce it on paper.
2. Same as above, with various slalom course graphical models preliminary emailed to the athletes for individual training with the object of skill improvement.

ANALYSIS OF RESULTS

At the first stage of the survey the athletes 10- to 13-year old were less likely to accurately implement the task, which was not surprising bearing in mind their inexperience, lack of concentration, and poor

understanding of the tactical elements that were to be memorized. Common errors: number of gates (total 113 errors), number of vertical combinations (42 errors), changes in snow conditions (49 errors).

After the individual practice sessions the athletes' results improved as follows: number of gates – 48 errors; number of vertical combinations – 33 errors; changes in snow conditions – 34 errors.

The athletes 14- to 15-year old demonstrated more in-depth understanding of tactical elements, as well as better memory and concentration. Four of them – Vera Assenova (15 years old, member of Ulen Ski Team), George Okolski (15 years old, member of Borovets Ski Club), Svetoslav Stanchev (15 years old, member of Ulen Ski Team), and Lorita Stoimenova (15 years, member of Ulen Ski Team) – reproduced precisely all the tactical elements of the graphical course. The most common errors made by the rest of the athletes were as follows: number of gates (total 26 errors), change of snow conditions (20 errors), number of vertical combinations (16 errors).

At the second stage of the survey the athletes improved their results, most significantly – in regard to the number of gates. Change in snow conditions – 12 errors; number of vertical combinations – 8 errors.

The results obtained are presented by the indicators listed in (Table 1). The low values of the asymmetry As and the kurtosis Ex (less than 1 and close to 1) assume a normal distribution.

Table 1. Variational indicators.

variational indicators	10–13		14–15	
	1st stage	2nd stage	1st stage	2nd stage
X	9	5	4	2
S	4,5	2,6	3,1	1,5
V	53%	53%	77%	85%
As	0,7	0,9	0,3	0,2
Ex	-0,4	0,8	-0,4	-1,3
Max	19	12	11	4
Min	3	2	0	0
R	16	10	11	4

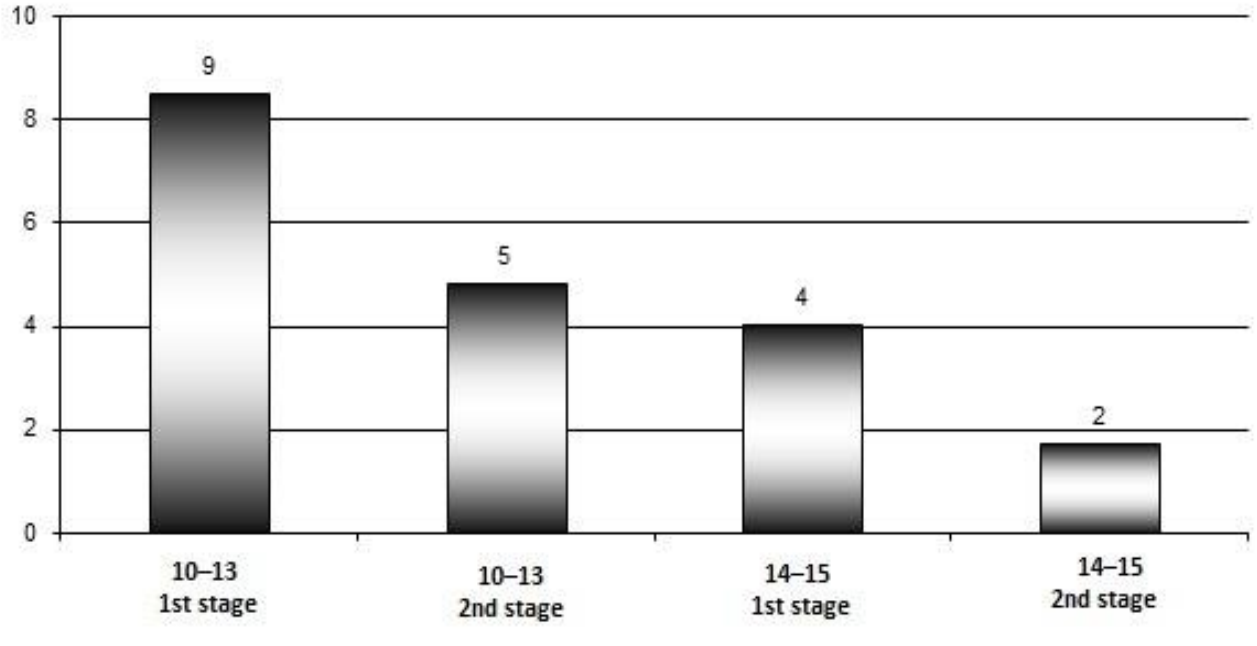

Figure 1. Average values of the errors made by the athletes at each stage of the survey.

Figure 2 shows the maximum and minimum values of the variables being studied. Student's t-criterion was applied for comparison of the growth of results.

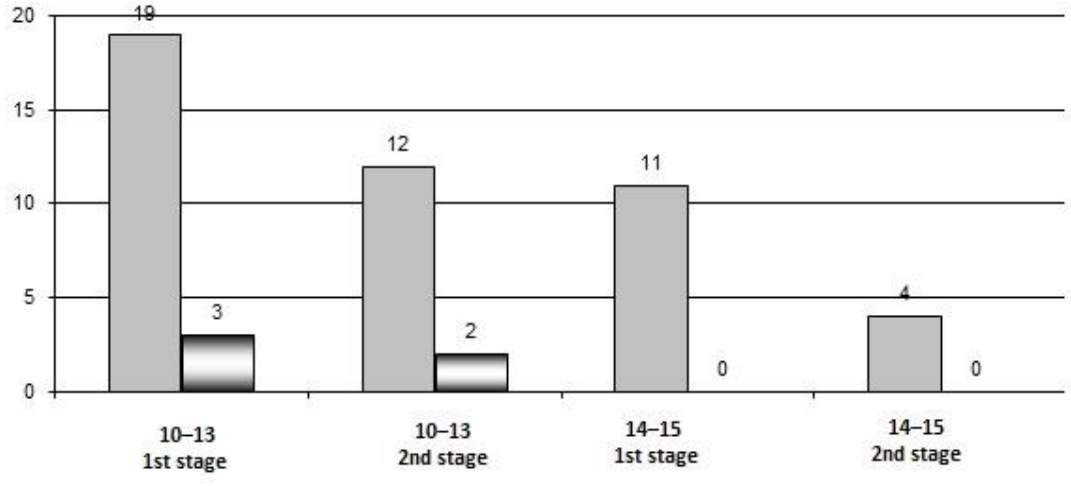

Figure 2. Comparative analysis of the maximum and minimum values of the two age groups' results.

It is worth noting that the minimum value shown by the younger group is other than 0, whereas the older group shows null values both at the beginning and at the end of the experiment (Figure 2). Accordingly, the maximum value both as average and as maximum is also lower, compared to the younger group's results.

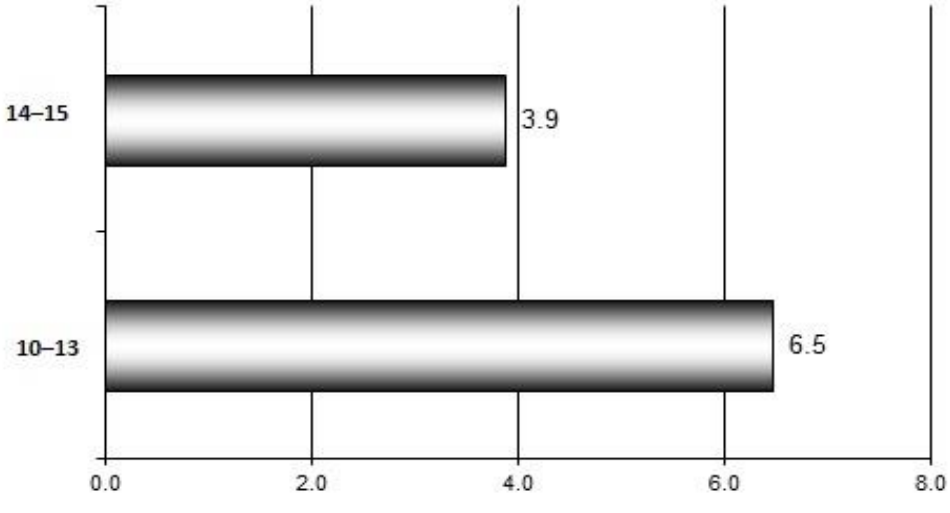

Figure 3. Growth of results of the two age groups being studied.

Both groups show a significant growth of results, since Student's coefficient is higher than the limit value (Figure 3). The younger athletes show a bigger growth, which can be explained by the greater number of errors made at the first stage of the experiment – and by the individual training prior to the second stage. Apparently at this age the off-snow activities have a very positive impact on the development of tactical skills. The method is most effective when the athletes possess the required theoretical knowledge and are aware of the tactical elements which they need to focus upon.

CONCLUSIONS

1. The application of graphical models in slalom tactics has the following benefits:

- As the method involves computer graphic models, it is especially appealing for teens.
- It is also applicable both indoors and outdoors, and can be used both for team and individual training, as well as for skill assessment.
- It can be modified towards increase or reduction of number of tasks, extension or reduction of task time, etc.
- Athletes can independently assess their own results.

2. The analysis of the survey results show that there is a vast difference between the two age groups' tactical skills.
3. There is a growth of results between the two stages of the experiment, especially in regard to the 10- to 13-year olds.
4. Apparently Bulgarian coaches do not conduct any off-snow activities to improve junior athletes' tactical skills.

RECOMMENDATIONS

1. The presented method would be extremely worthwhile if applied in the summer (during the preparatory phase) with a view of visualization and imagery skill improvement.
2. As a basis for tactical skill development, the athletes' theoretical knowledge of The International Ski Competition Rules should be also improved.

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SHORT RALLIES IN ELITE JUNIOR TENNIS – A KEY TO JUNIOR SUCCESS

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Key words: *first-shot, hard court, notational analysis, return-of-serve*

INTRODUCTION

In elite tennis, more than 50% of all points are concluded within short rally durations of less than eight seconds or within first five strokes [4, 8]. Numerous descriptive investigations have focused on the characteristics of the initial first two strokes in professional tennis (service and return of serve), describing these as key factors to the overall success rate in professional tennis [2, 5, 6]. However, there is no research to date investigating the importance of these strokes in elite junior tennis. In addition, no research has investigated the relationship of the first ground stroke of the service player (first-shot) and point outcomes, despite some evidence suggesting the first shot is of high relevance to elite performance, and should be an integral component of junior training and development [8].

The current descriptive study investigated the importance of short rallies (first three shots) in junior elite tennis and provides specific game characteristics and positional demands. In particular, the service and first-shot represent a combined strategic component, instead of individualised strokes. This information is particularly important for coaches looking to optimise junior athlete's success rate and devising training activities tailored to most common rally scenarios in junior tennis.

METHODS

Design

A quantitative analysis of competitive junior tennis based on rally and point profiles was undertaken. A computerized system was developed to collect data from video recordings of ten randomly selected sets during a national junior tennis event. The following details were recorded from each point:

- Type of stroke
- Court position
- Outcome of each stroke

The outcome measure included:

- In-ball (ball lands within boundaries of the singles line; rally continues)
- Winner (in-ball and not intercepted by opponent, end of rally)
- Lucky winner (ball contacts top of net and deviates into players court, end of rally*)*
- Error (ball lands outside boundaries of the singles line; end of rally)

Errors included both forced and unforced, to reduce the influence of subjective opinion viewed by the observer. Grid divisions [3] were used for the analysis of court position (**Fig. 1**).

Participants

The sample consisted of 8 male tennis players; age group under 14. The state ranking position in their age group ranges from 16 to 76. All subjects were right handed and participants of the 2012 Victorian Junior Outdoor Hardcourt Championships Boys Singles Draw. Matches included in this study were best of three tiebreak set and collected from the quarterfinals to semifinals only.

Procedure

Analysis was completed on ten randomly selected sets, for both players within the set. The total data captured included: 1200 rallies and 5721 strokes/court positions.

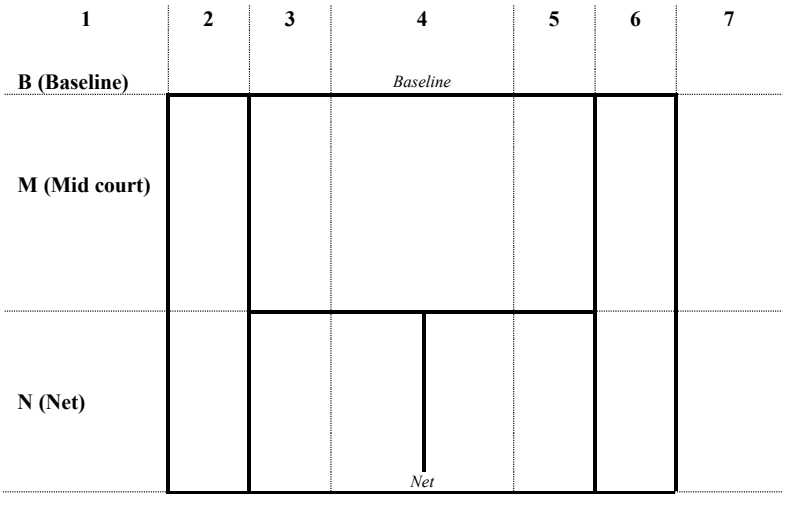

Figure 1. Grid divisions of the tennis court.

A Lenovo Laptop (2.60 GHz; ThinkPad display 1366x768) and Kinovea – 0.8.15 was used for computerized visual analysis of recorded sets.

The statistical analysis was processed on the mean of the 2x10 sets using Microsoft Excel software. IBM SPSS Statistics Version 22 was used to evaluate Cohen's Kappa [1] for the reliability check of the point and rally profiles. Chi-Square test was applied to ascertain statistically characteristic differences between type of stroke (i.e. forehand versus backhand), type of outcome (i.e. winner versus error) and court position (i.e. baseline area versus net area).

Results

Reliability

The intra-observer reliability was established with three randomly chosen sets (171 strokes). The results of the kappa statistics [1] show a 'very good' agreement (.81-1.0) with all measurements (**Table 1**).

Table 1. Reliability of data (kappa)

Measure	Intra-observer reliability
winner of the point	0.957
type of stroke (player)	0.944
outcome (player)	1.000
stroke cell	0.907
type of stroke (opponent)	1.000
stroke outcome (opponent)	0.951

General point profiles

On average, in junior tennis, a set consisted of 60 rallies in which almost half of all rallies (49.0%, **Fig. 2**) completed concluding 1-3 strokes (overall mean: 4.8 strokes per rally; SD ±3.7; median: 4) as a consequence of an error (82.8% compared to 17.2% winners; $p<0.001$). The first three strokes consist of service, return of serve and first ground stroke of the service player (first-shot).

Service

54.6% of all 1st serves and 82.8% of all 2nd serves were in-balls (**Table 2**). Following a successful 1st serve the chance of winning the point for the service player is higher (55.9%; $p<0.001$) compared to following the 2nd serve (42.9%) (**Table 3**). On average, participants produced more double faults than aces per set (0.7 aces and 2.1 double faults).

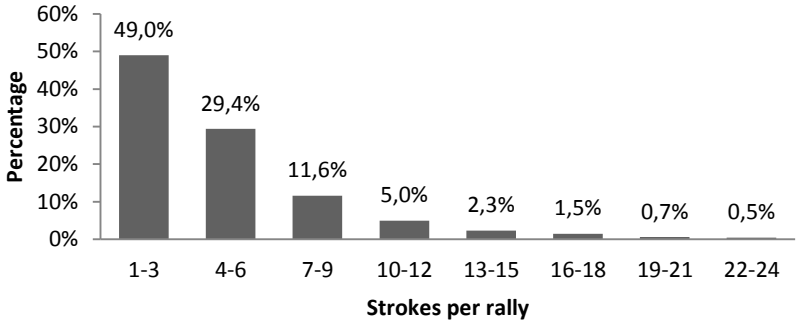

Figure 2. Quantity of strokes per rally.

Table 2. Outcome of service, return of serve and first-shot.

Type of stroke	In-ball	Winner	Error
1st service	54.6%	2.0%	43.4%
2nd service	82.8%	0.8%	16.5%
Return (general)	76.7%	2.8%	20.6%
1st serve-return	73.9%	3.0%	23.1%
2nd serve-return	81.0%	2.3%	16.7%
First-Shot	72.2%	5.4%	22.4%

Table 3. Service characteristics

Characteristic	1st service	2nd service
In-balls	54,6%	82.8%
Chance of winning the point	55.9%	42.9%
Rally length [strokes per rally]	4.5	5.0

Return of serve

The return of serve indicates a high percentage of success (in-balls: 76.7%) with a low occurrence of winning shots (2.8%). Overall there was a higher utilization of forehand compared to backhand return of serve ground strokes (55.8% versus 44.2% ; $p<0.01$). This included the 2nd serve return which was dominated by forehand returns compared to backhand returns (65.7% versus 34.3%; $p<0.001$). The majority of the 2nd server-returns were hit behind the baseline (87.0%). There were no differences in 1st serve-return strokes (49.2% forehand return and 50.8% backhand return). There was no difference in producing winners via a 1st serve-return or a 2nd serve-return (Table 2). Similarly, no difference in error rate for return of 1st serve and 2nd serve was observed.

First-shot

Compared to general error rate for all rallies (16.5%) the frequency of first-shot errors is significantly higher (22.4%; $p<0.01$). The first-shot is characterized by a lower rate of generating winning shots (5.4%) and a higher chance of continuing the rally of 72.2% (in-balls). Compared to other strokes, the first-shot was reliant on the forehand ground stroke (56.8%; $p<0.001$).

As the concluding stroke of the rally, 13.6% of the overall percentage of the first-shot were winners produced by a forehand ground stroke (**Fig. 3**). Errors were made by forehand and backhand ground strokes were 41.5% and 33.9%, respectively. The winner positioning data illustrates that 52.1% ($p<0.01$) of the overall percentage frequencies of winners is within the central area of the court (**Fig.4**). More specifically these include cells B4, M4 and N4, with individual percentages of 17.4%, 21.7% and 13.0% (respectively). Errors were made predominantly in baseline cells, with a combined total of 50.5% in cell B4 and B5 of the overall percentage frequency (**Fig. 5**).

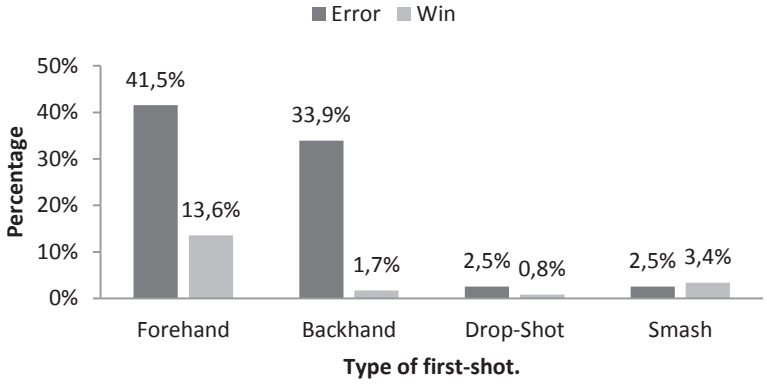

Figure 3. First shot as the concluding stroke: Distribution of the type of stroke and kind of outcome.

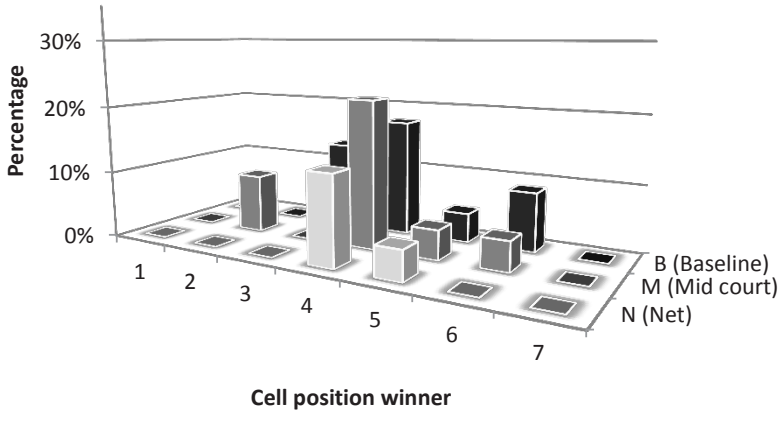

Figure 4. Cell position at the ball of the first-shot winner.

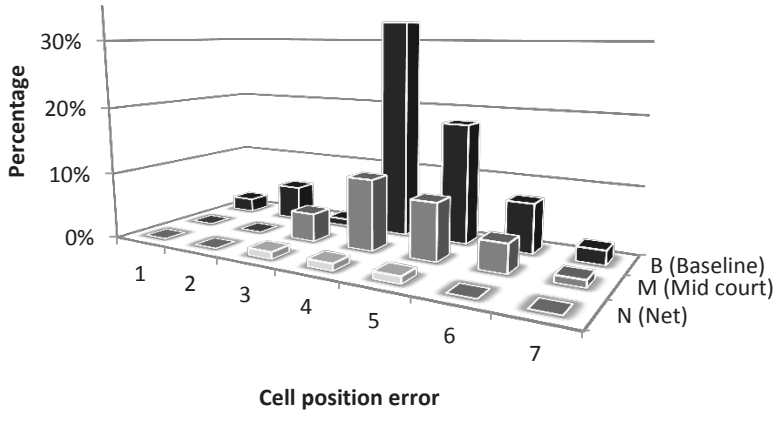

Figure 5. Cell position at the ball of first-shot error.

DISCUSSION

In elite junior tennis a large proportion of points are finalized via an error, and within short rally counts (≤4 shots per rally). This places a greater emphasis on the first strokes of each point. In particular, the first three strokes, service, return of service, and first stroke of the service player (first-shot) play an important role in the overall success rate in junior tennis. Weber and Born [7] mentioned an increased importance of the first-shot in elite senior tennis, however the present study highlights that the first-shot is a determining factor for success in elite junior tennis as well. In contrast to general characteristics of all rallies, first-shot errors occurred more frequently ($p<0.01$). The first-shot of the service player

is influenced by the quality of the service, as well as the returner's performance. In junior tennis, where the service itself is less pertinent compared to senior level tennis, it is important junior athletes utilize the serve as a 'set up' tool instead of attempting to hit winners/aces. This would optimize first-shot positioning following the serve and improve point success rate.

On the contrary, professionals serve more aces than double faults [5, 7] per match, whilst junior tennis players produce fewer aces than double faults. Furthermore, the success rate of the 1st service (54.6%) is lower, as well as the chance of winning the point for the server following a 1st or 2nd service (55.9% and 42.9%, respectively) compared to service of professional players. Professional's services performance is characterized by a success rate of more than 60% [2, 5, 8] and a high probability of winning the point following 1st (70%) [5, 8] and 2nd serve (51%) [2, 5, 8]. Therefore, serving (1st and 2nd serve) in junior tennis may play a smaller role in winning points. Instead their serve should be utilized as a 'set up' tool to influence the construction of the point and the positioning of the server prior to contact of their first shot.

CONCLUSIONS

Successful junior tennis relies on minimizing errors within the first-shot following the serve, as well as maximizing the potential for hitting winners within short rallies (<4 strokes) by achieving a central court position which allows forehand dominance. To achieve this, the server should utilize the serve as a 'set-up' tool, dictating the direction of the returners return of serve within the central zones of the court. This can be achieved by strategically placing the 1st serve down the ''T'' near the center service line [2]. Another positive effect of an optimal positional play after serving is decrease of the first-shot error rate. During 2nd serves, the returner has a heightened opportunity to execute winning shots, especially via forehand returns. Physical attributes which coaches should consider in order to exploit these positional/tactical strategies may include coordinative abilities, dynamic balance, recovery speed, and reactive agility [8].

PRACTICAL APPLICATION:

Junior tennis players should utilize the serve as a 'set up' tool to effectively structure short rallies (<4 shots) for competitive success.

The server should increase success rate of the 1st service and develop a court position which enables optimal use of the forehand ground stroke (first-shot) to increase the chance of winning the point following the service.

The returner should optimize the use of their forehand ground strokes on second serve, or adopt the return of serve stance position within mid-court to increase time pressure on opponent.

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SURVEY OF FLEXIBILITY WITH 10-12-YEAR-OLD RHYTHMIC GYMNASTS

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Key words: *flexibility, physical ability, Rhythmic Gymnastics*

INTRODUCTION

Rhythmic gymnastics is a sport predominantly connected with beauty, exquisiteness, and originality of the compositions, but it is also a complex competitive discipline, requiring exceptional physical and technical qualities. I. Vankov thinks (1982) that the sports technical performance of a gymnast has a specific individual-personal character and its perfection is inextricably bound up with the development of motor qualities and skills.

The evolution of gymnastics sports is a natural process, connected with the changes occurring in the contents of competitive regulations (Dimova, Dobreva, 1985). G. Gantcheva (2002) thinks that the changes in the rules lead the sport to an accurate and flawless execution during a competition, higher difficulty of the exercises, high level of development of the motor skills, which in turn will lead to better standing and winning a medal. The author claims that the great diversity of body difficulties, which are becoming much more complex due to the higher requirements for their execution, imposes the necessity of possessing a great deal of flexibility within the boundaries of human possibilities (Gantcheva, 2013).

In the modern rhythmic gymnastics the possession of the quality flexibility is of great importance for the final success and many authors pay a special attention to its development and survey. According to I. Vankov (1982) the optimally developed flexibility is a guarantee for the successful realization in the sports-competitive activities. M. Mineva (1986) researches all forms of flexibility and develops a system for control and assessment with 9-13-year-old gymnasts. N. Hadjiev, K. Andonov, D. Dobrev, V. Petrov (2011) also research flexibility and conclude that its possession in the areas of the spinal cord, shoulder and coxofemoral joints is of great significance for the physical preparation in gymnastics. L. Zhu (2012) makes a test battery for determination of the level of the flexibility development with Bulgarian and Chinese gymnasts and concludes that the Bulgarians have greater extent of development of this motor quality in comparison to their Chinese peers.

For gymnastics the significance of flexibility in the shoulder joints, coxofemoral joints, and spinal cord is indisputable (Mineva, 1986; Hadjiev, Andonov, Dobrev, Petrov, 2011). Its systematic control and assessment are of utmost importance for the optimization of the physical preparation, and hence – for achieving high sports results (Vankov, 1982). Namely this importance of the motor quality in the different joint areas, the change in the rules, better technical than physical preparation, according to Gantcheva (2009), M. Yakimova's claim (2005) that the gymnasts work mainly on the convenient side, are the reasons behind our motivation to do this survey.

Aim: Survey of the transitory state of the motor quality flexibility with 10-12-year-old rhythmic gymnasts.

Tasks:

To establish the degree of homogeneity between the control and experimental groups.

To select motor tests for control and assessment of the motor quality flexibility in the areas of the ankle, shoulder, coxofemoral joints and spinal cord.

To offer new (author) tests, meeting the requirements of up-to-date gymnastics.

Organization: The survey was held in the period 15th February – 15th March, 2014. Researched individuals: 43 gymnasts, aged 10-12, divided into two groups:

- Control group - 16 gymnasts
- Experimental group - 27 gymnasts

Research methods:

- Observation – the gymnasts should be very well warmed up before the testing takes place and the accuracy and precision in the execution of the motor tests should be observed.
- Statistical procession of the results with SPSS Statistics 20:
  - ✓ Analysis of variance
  - ✓ T- criteria of Student for independent samples
- Comparative analysis of the obtained results between the control and experimental groups.
- Testing (10 different tests were used, standard and author's, for assessment of the researched quality).

1. Ankles static flexibility test

Necessary equipment: a wall, a meter.
Execution: The gymnast stands facing the wall, arms up, the body flat against the wall, the feet slide slowly backwards as far from the wall as possible. The whole foot should be on the floor, the knees are straight, and the chest should remain flat against the wall. The distance between the toes and the wall is measured in cm. The test is repeated 3 times and the biggest distance is taken.

2. Raising arms backwards and upwards from a lying position.

Necessary equipment: a skipping rope, a meter.

Execution: The gymnast is in first position – lying down, arms down. She executes arms raising (holding the skipping rope at shoulder length) backwards and upwards, the elbows are straight. Breasts are flat against the floor and fixed. The angle between the arms and body is measured with accuracy up to 1°.

3. Transverse circle with arms.

Necessary equipment: a skipping rope, a meter.
Execution: The gymnast is standing, her hands are holding the skipping rope; the width of the grip is minimum, according to her individual possibilities. A transverse circle is executed without folding the elbows. The distance between the two hands grip is measured with accuracy of up to 0,5 cm.

4. Raising arms from a lying position, arms are up.

Necessary equipment: a skipping rope, a meter.
Execution: The gymnast is in the first position, lying with her arms stretched up, the skipping rope is held in its both ends, so that the distance between the two hands is 46 cm. Arms are raised maximum upwards and backwards without moving one's nose off the floor. The vertical distance between the skipping rope and the floor is measured with accuracy of up to 0,5 cm. The test is repeated 3 times and the best result is taken.

5. Backbend.

Necessary equipment: a meter.

Execution: From the first standing position, arms up, the gymnast executes a backbend with her arms stretched and at shoulder length. Legs are also open at shoulder length with folded knees, toes point forward. Arms should be as close as possible to the heels, according to the gymnast's individual possibilities. The distance between the tips of the fingers and the heels is measured with accuracy of up to 0,5 cm.

6. Raising and bending the body from a lying position.
Necessary equipment: a meter.

Execution: The gymnast is in the first lying position, arms up. Legs are open at 20 cm. The body should be raised upwards and backwards until the hands hold the feet. The head should lean against the legs and the distance between the lower limbs and the head (chest) should be the least possible. The distance between the fontanel and the legs (back gluteus) is measured with accuracy of up to 0,5 cm.

7. Bend.

Necessary equipment: a meter.
Execution: The gymnast is standing on a chair or a bench 40 cm high, the toes are on the edge. A bend forward is executed with straight closed legs. The distance from the edge of the chair or the bench to the tip of the middle fingers is measured with the help of the meter with accuracy of up to 0,5 cm. The bend is executed symmetrically with both arms, smoothly, without any springiness.

8. Raising legs from a standing position.

Necessary equipment: a protractor.
Execution: Folding and leading away left and right leg. It is executed with an additional support of both hands on a gymnastics wall or a ballet barre; the straight leg is raised as high as possible and is held for at least 3 sec. the body is upright, the shoulder joints point forward toward the leg and lie in a line. The angle between the body and the raised leg is measured with accuracy of up to 1°.

9. Raising the leg from the first position - backbend.

Necessary equipment: a protractor, a meter.
Execution: The gymnast is in the first position backbend, with her leg raised at the vertical. The raised leg should be over or 180 degrees compared to the support foot; the hands are placed 10 cm off the support foot. The angle between the two feet is measured with accuracy of up to 1°. It is executed both with the left and the right leg, and the results are recorded separately.

10. Transverse straddling sitting position from two chairs.

Necessary equipment: two chairs or two gymnastics benches 40 cm high, a meter.
Execution: The gymnast is in the first position – a transverse straddling sitting position, with both legs placed on the two chairs (benches), with straight knees as much as possible. The exercise is done with both legs, and the distance between the ischium and the floor is measured with accuracy of up to 0,5 cm.

ANALYSIS OF THE RESULTS FROM THE TESTS:

Flexibility of ankle joints:

T1- Ankles static flexibility test.

Figure 2 shows that the best achievement is registered in the experimental group – 48 cm. The difference in the best results of the control group (46.5 cm) and the experimental group (48 cm) is not a big one. Significantly bigger is the difference in the minimum achievements of the groups, the lowest achievement being again in the experimental group (29 cm and 22.5 cm). The control group handled the test better, and shows greater average arithmetic value of its achievements – 37.2 cm (f**ig. 1**). The lack of big differences in the results is explained by the fact that bigger part of the children from the control group train at the same club and work with the same coach along the same methods. The deviations from the average value with the experimental group are greater (S=7,25) compared to the ones of the control group (S=4,50), since the children from the experimental group have been chosen from different clubs. The variation coefficients with both groups (12,1%; 20,8%) show that the dispersion is average and the sample is approximately homogeneous for this test. The T-criteria of Student for independent samples proves there is not a statistically significant difference between the control group and the experimental one (P=73,3%). The difference is accidental and presumes that both groups possess a relatively the same level of development of this motor quality.

Flexibility of the shoulder joints:
T2- Raising arms backwards and upwards from a lying position.
T3- Transverse circle with arms.
T4- Raising arms from a lying position, arms are up.

Figure 3 presents the difference in the mean values of the two groups for the three tests. It is insignificant with T2; the control group performed better than the experimental group (101° by 100,7°). With

T3 the best achievement has the least possible numerical value. The experimental group has performed better, with a better mean value (32,9cm), which contradicts the results from T2, where there is a slight difference, presumably accidental one. With T4 the experimental group has a bigger mean value (51cm) than the control group (47,4 cm), confirming the results from T3 with an identical for T3 difference between the two groups. The variation coefficients for both groups with T2 (15,3%; 11,5%) and T4 (28,4%; 15,6%) show that the dispersion is average and the sample is relatively homogeneous. With T3 the results show that the dispersion with the two groups is big – over 30%, i.e. the sample is greatly inhomogeneous, which leads to the conclusion that the work for flexibility of the shoulder joints is underestimated in this age group and is confirmed by the fact that both groups are not homogeneous. With all the three tests for determining the level of flexibility of the shoulder joints, the T-criteria of Student for independent samples proves there is no statistically significant difference between the control group and the experimental one (T2-P=5,8%; T3-P=55,3%; T4-P=72,8%). The difference is accidental and both groups have approximately same level of development of this motor quality.

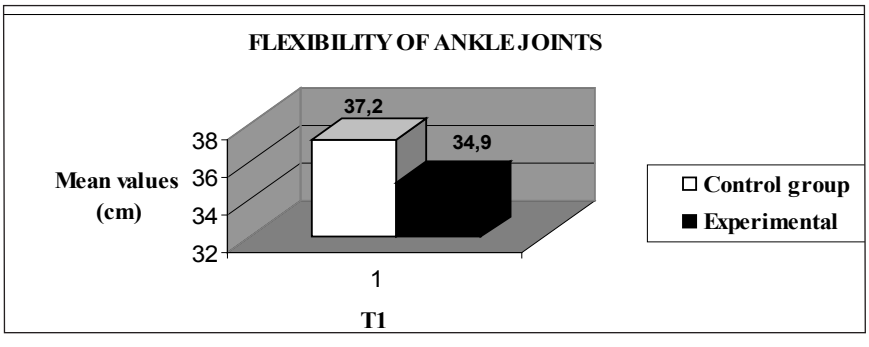

Fig. 1

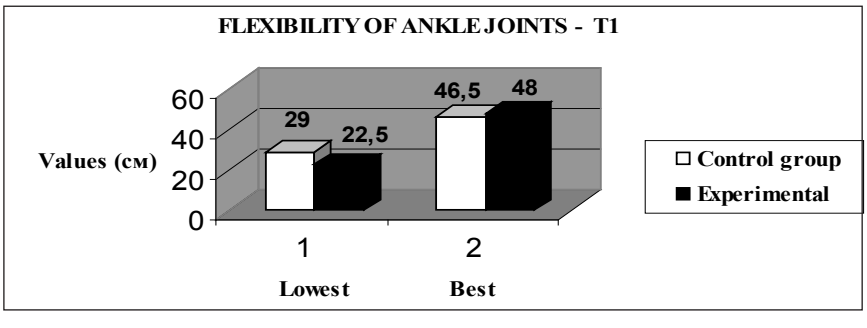

Fig. 2

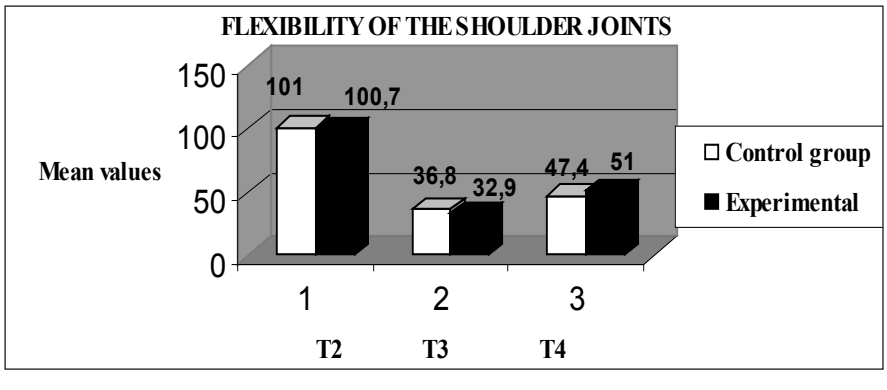

Fig. 3

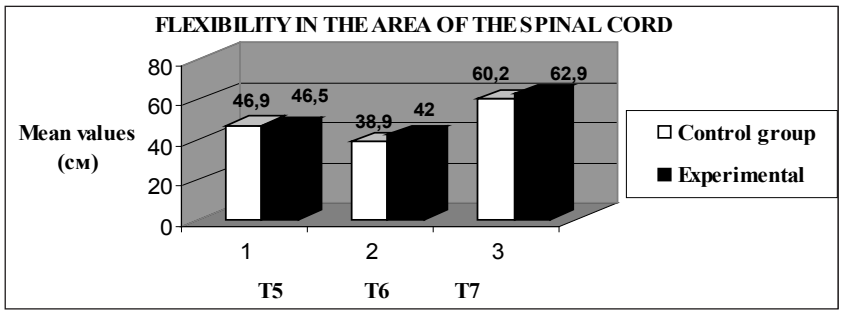

Fig. 4

Flexibility in the area of the spinal cord:

T5- Backbend.

T6- Raising and bending the body from a lying position.

T7- Bend.

With T5, T6, T7 50 was set as a numerical value of 0, i.e. 0 cm real result was taken for 50 in the statistical processing of the data. The arguments are that 0, as a result shown in the research should in reality reflect some level of development of flexibility, which the numerical value 0 denies, i.e. flexibility in the respective area is absent. That's why the index 50 is taken for 0, every lower achievement being recorded as a difference of 50 and the respective real units in the differences of numerical values, and every better result – as a sum of 50 and the respective units. The biggest numerical result is the best achievement in the three tests. With T5 both groups have shown the best achievement of 50 cm, the lowest achievement appearing with the experimental group – 25cm (**Fig. 5**). The control group performed better than the experimental one with a slight difference of mean values of 0,4cm (**Fig. 4**). With T6 the experimental group has a better mean result than the control one (Fig. 4), the difference between the two groups being 3,1cm, their best achievements have the same numerical value (50cm), but the difference in their lowest achievements is significant – 15cm (Fig. 5).

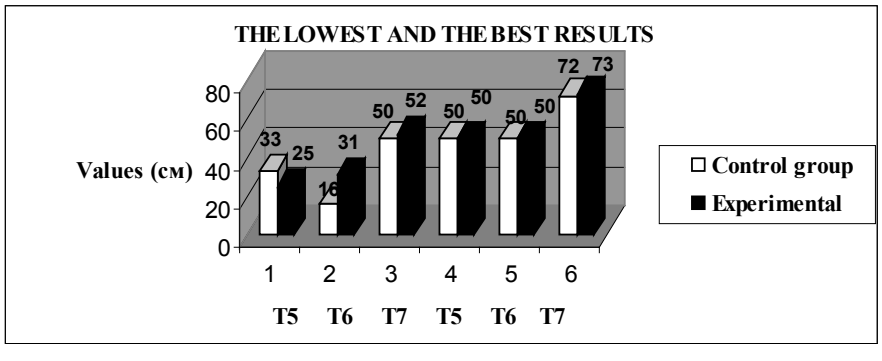

Fig. 5

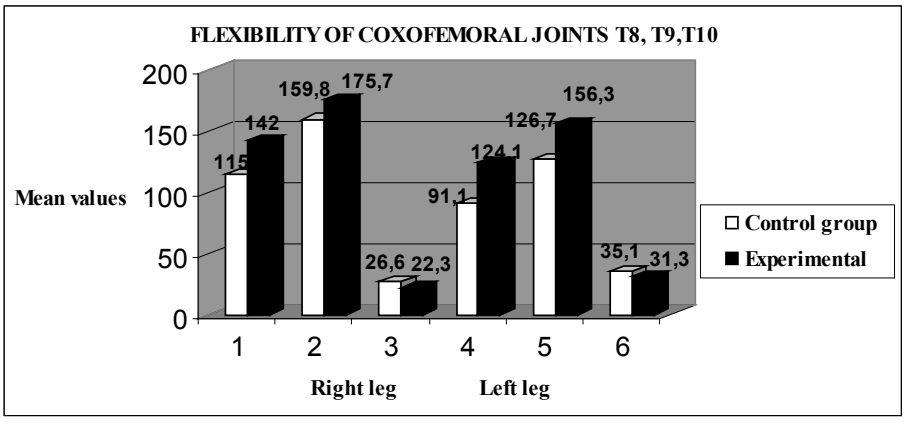

Fig. 6

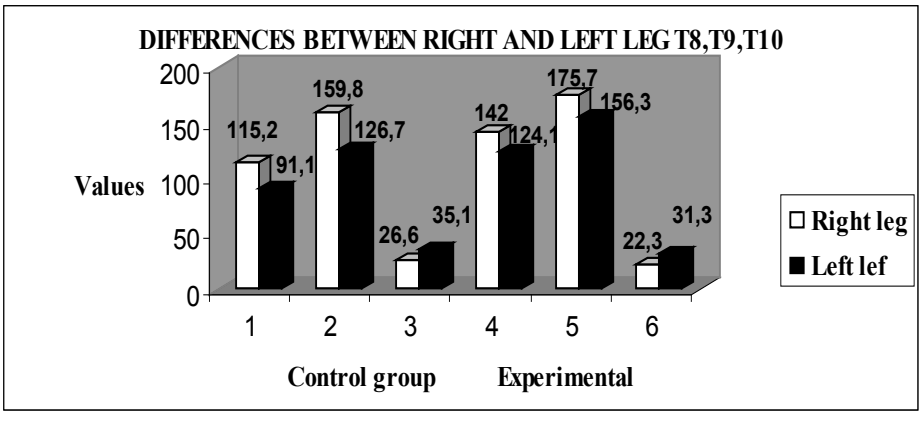

Fig. 7

The fact that the two groups have the same values of their best achievements (50 cm) and that there is a big difference in the lowest achievements makes us think that in order to reach its mean value of 38.9 cm with lowest value 16 cm, the control group have shown a greater number of results close to the highest achievement, while the numerical values of the experimental group are around or close to the mean value, having no significant diversions from it in both directions. In terms of mean numerical value the experimental group has a better performance (42cm against 38,9cm), but in terms of the number of the best achievements the control group is superior. Very often the achievements bordering the maximum human abilities are the most important thing in rhythmic gymnastics. Although the better mean value belongs to the experimental group, there are more individuals with a better level of development of flexibility in the control group. The results from T7 show that both groups possess approximately the same degree of development of flexibility with very slight differences in the mean values (Fig. 4). The best achievement belongs to the experimental group – 73cm with 72 cm for the control group. The lowest achievement for the experimental group is 52 cm against 50 cm for the control group. The differences between the two groups in both cases are slight and could be considered accidental (Fig. 5). The variation coefficients with T5 (14,9%; 10,9%), T6 (14,7%;26,8%) and T7 (12,9% for the control group) show that the dispersion is average and the sample is relatively homogeneous. With T7 (the experimental group) the variation coefficient (8,7%) shows a slight dispersion (the results are close to the mean value for the group), i.e. the sample is homogeneous. With the three tests for determining the level of flexibility in the area of the spinal cord the T-criteria of Student for independent samples proves there is no statistically significant difference between the control group and the experimental one (T5-P=16,2%; T6-P=77,4%;, T7-P=81,1%), which has proved our thesis that the difference is accidental and both groups possess approximately the same level of development of this motor quality.

Flexibility of coxofemoral joints.

T8- Raising legs from a standing position.
T9- Raising the leg from the first position - backbend.
T10- Transverse straddling sitting position from two chairs.

With T8, T9 and T10 (the minimum numerical result is the best achievement only for T10) the experimental group has performed better than the control one with greater mean values for both legs (Fig. 6). The variation coefficients with T8 (Right leg-24,7% and 17,3%; Left leg - 26,9% and 22,1%) show that the dispersion of the values is average, i.e. the sample is relatively homogeneous. With T9 for the right leg the dispersion (19,8%; 10,9%) of the values for both groups is average and the sample is approximately homogeneous. For the left leg the experimental group has again an average dispersion (15,2%) of the values, while the control group shows bigger dispersion (33,7%) which proves the sample for this test, this group, and this leg is greatly inhomogeneous. This fact leads to the conclusion that while all gymnasts work for their right leg, the work for the left leg is insufficient or omitted, which leads to the differences in the homogeneity of the control group. With T10 for the left leg the experimental group shows that the dispersion of the values (29,7%) is average, i.e. the sample is approximately homogeneous. The results from the same test for the control group (left and right leg - 34,8%; 40,7%) and the experimental group (right leg - 30,2%) show great dispersion which proves the sample is significantly inhomogeneous. T9 proved the difference in the gymnasts' level of flexibility of their left leg. T10 proved this fact for their right leg as well, although the results for the two groups for the right leg are better than for the left leg (**Fig. 7)**. It is obvious that some children lag behind in the development of this motor quality concerning the convenient leg as well. With T10, the T-criteria of Student for independent samples proves there is no statistically significant difference between the control group and the experimental one and the difference is accidental (P right leg=88,4%; P left leg=74,4%). Taking into consideration the mean values from this test for the control group (Right leg -26,6; Left leg.-35,1) and the experimental group (Left leg-22,3; Right leg-31,3) and the best possible result – 0, we consider both groups being homogeneous in the fact that not much is being done for the development of flexibility of the coxofemoral joints. With T8 and T9, conversely to T10, the T-criteria of Student for independent samples proves that the difference found according to the empirical data is not an accidental one. It is statistically significant and generalized for both the control group and the experimental one (T8-P right leg=99,8%; T8-P left leg=99,9%; T9-P right leg=95,4; T9-P left leg=99,4%). The results obtained from the

two tests show that the gymnasts from the control group lag behind in the development of the motor quality flexibility of coxofemoral joints in comparison to their peers from the experimental group.

With both groups the difference in the results for both legs for T8, T9, and T10 is impressive (Fig. 7). Although the flexibility of coxofemoral joints has been surveyed with three non-identical tests, the mean values confirm one and the same, namely the great differences in the development of the motor quality in left and right leg for both groups. The right leg does not reach 180° which is a necessary minimum according to the requirements of the modern rhythmic gymnastics, and the left leg lags behind in the results.

CONCLUSIONS:

The analysis of the results from the motor tests makes us consider that both the control group and the experimental one are homogeneous as regards the level of development of flexibility of ankle joints (P=73,3%), shoulder joints (T2-P=5,8%; T3-P=55,3%; T4-P=72,8%) and spinal cord (T5-P=16,2%; T6-P=77,4%;, T7-P=81,1%).

In the analysis of the motor tests T8, T9, T10 for flexibility of coxofemoral joints a certain contradiction is observed. With T10 (transverse straddling sitting position from two chairs) there is no statistically significant difference between the control group and the experimental one and it is accidental (P right leg=88,4%; P left leg=74,4%). This is not confirmed with T8 (raising legs from a standing position) and T9 (raising the leg from the first position - backbend) where the difference proves to be statistically significant and both the control group and the experimental one are homogeneous.

The difference in the mean values of the control group and the experimental group with T8 (right leg.-115/142; left leg-91,1/124,1), T9 (right leg-159,8/175,7; left leg-126,7/156,3), T10 (right leg-26,6/22,3; left leg-35,1/31,3), as well as the proved statistically significant difference of T8 and T9 gives reason to conclude that the gymnasts from the control group lag behind in the development of the motor quality flexibility of coxofemoral joints, compared to their peers from the experimental group, which sets the question for the efficiency of the applied methods in practice.

The difference in the results for right and left leg for the control group (T8-115/91,1; T9-159,8/126,7; T10-26,6/35,1) and the experimental group (T8-142/124,1; T9-175,7/156,3; T10-22,3/31,3) leads to the conclusion that there is lack of concord in practice when working for flexibility of coxofemoral joints. The development of this quality is not complex, but markedly one-sided.

For the motor tests for flexibility of shoulder and coxofemoral joints, where a maximum result 0 is determined (T3, T10), the mean values of both groups are far from zero (T3-36,8/32,9; T10-right leg 26,6/22,3; left leg 35,1/31,1) which proves that the number of gymnasts, possessing this quality to a great extent, is small.

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FACTOR STRUCTURE AND BASIC FACTORS OF THE PHYSICAL DEVELOPMENT AND THE SPECIFIC WORKABILITY OF GROWING UP BASKETBALL PLAYERS (12-19 YEARS OLD)

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Key words: *basketball, growing up basketball players, optimization, educational and training process*

INTRODUCTION

It is often needed in the basketball practice to evaluate the stage of the young basketball players' preparedness. In this way the necessary information is received which serves as a landmark about the level of their development – whether they have the necessary physical qualities and basketball skills, whether they go forward within the educational and training process and whether there is a perspective for their development as highly qualified competitors in the future [18].

The complex development of the motive qualities sets up the issue about the evaluation and control on the specific functional preparation of the competitors. For this purpose many researchers are developing specific basketball tests and indicators [2, 4, 5, 6, 7, 8, 9, 10].

It is indisputable that one of the main factors of the game effectiveness is the skill of the competitors to materialize their motor potential into rational technical and tactical activities. The studies in that field cover huge factual material [1, 10, 11, 13, 14, 16, 17].

The contribution of each of the indicators under study to the sport result of a given person or totality depends to the greatest degree on 3-4 basic factors. The disclosure of the factor structure of the physical development and the specific workability of growing up basketball players has high informative value for the optimization of the educational and training process [15].

Depending on the importance of the separate indicators for the sports achievement, their factor weights represent greater or smaller significance for the optimization of the training from strategic aspect. The evaluation of the results by normative tables provides the possibility for tactical (current) optimization of the training depending on the moment development level of each of the competitive effectiveness symptoms [6, 13, 14].

The aim of the present study is to reveal the factor structure and the specific workability of growing up basketball players.

METHODOLOGY

The present study is made during the period June 2010 – October 2013.

Subject of the study is the basketball game for growing up players.

Object of the study is the basic symptoms of the physical development, the special physical preparedness and the specific technical and tactical skills of 12-19 years old basketball players.

Borukova of the study is 264 boys at the age between 12 and 19 years.

Sport and pedagogical tests as per 20 indicators, bearing information about the basic symptoms of the physical development and the specific basketball workability, have been made for the needs of the study. Three groups have been set up for the purpose: 12-14 years old, 15-16 years old and 17-19 years old. The results of the tests have been subjected to processing by variation and factor analysis. Six basic factors have been extracted for each of the totality under study; they characterize the specific peculiarities of the respective factor structure.

ANALYSIS OF THE RESULTS

For the groups of the 12-14 years old basketball players from the sports schools, the factor structure is build up by 6 basic factors (Table 1), which explain the very high percentage of the initial dispersion of the phenomenon under study (84,36 %).

Table 1. Factor structure of the physical development and the physical fitness of 12-14 years old basketball players

№	Indicators	I	II	III	IV	V	VI	h^2	$1-h^2$
1.	Height	-102	833	150	326	-141	-89	861	139
2.	Horizontal stretch	-127	860	75	349	-66	-53	891	109
3.	Chest measurement – pause	-145	897	-87	-222	171	63	916	84
4.	Chest measur. – respir. difference	88	85	42	890	72	152	836	164
5.	Body mass index	12	746	-66	-398	299	164	836	164
6.	20 m sprint	184	5	-389	-646	205	-95	653	347
7.	Running between stands	53	-45	-834	-348	-180	-4	854	146
8.	High jump	-374	49	451	564	-80	-274	746	254
9.	Long jump	-327	240	381	713	-120	-107	844	156
10.	Triple jump								
11.	Throwing compact ball backwards	-169	678	282	465	158	28	809	191
12.	Abdominal press	-70	149	479	32	680	180	753	247
13.	“Shuttle” run	-422	109	-346	-215	680	-198	857	143
14.	Loops made by dribble	-126	0	807	17	-33	291	754	246
15.	Dribble between stands	192	-113	-868	-257	42	-77	877	123
16.	Leading the ball index	880	-97	-233	80	32	-118	858	142
17.	Moving in defense	922	-71	10	-245	56	-2	918	82
18.	Shooting while moving – coeffic.	926	-113	-123	-149	-190	36	944	56
19.	Shooting from place	-905	136	134	48	189	85	901	99
20.	Free throws	-118	35	272	84	18	907	920	80
$\sum a^2 =$ 84,36 %		20.62 %	17.99 %	17.01 %	15.89 %	6.70 %	6.15 %		

Except for the factor weights, the table presents data about the size of the explained (h^2), as well as of the non explained ($1-h^2$) initial dispersion of each symptom under study.

The analysis of table 1 shows that the first factor drawn up explains 20,62 % from the initial dispersion of the phenomenon under study. The following three have lower contribution to the general physical development and the specific workability of the basketball players (respectively 17,99 %, 17,01 % and 15,86 %), while the last ones are only supporting and the dispersion explained by them is much lower than 10%.

The first factor in the factor structure of the physical development and the specific workability of the 12-14 years old pupils at the sports schools in Bulgaria is determined by four basic indicators (fig.1) and, as it has already been noted, explains the highest percentage of the initial dispersion of the phenomenon under study (20,62 %). This factor discloses the great importance of the skills for leading the ball at high speed and moving in defense as well as the efficiency of the speed shooting while moving and

with a partner, for the general preparedness of the young basketball players from the totality under study. That allows identifying it as technique – tactic factor.

The second factor (17,99 %) can be determined as morphological. It discloses the place of the height-weight indicators in the factor structure which are a prerequisite for the higher results for throwing compact ball.

The third factor (17,01 %) can be identified as special speed of moving in attack both without and with a ball, which to a greater degree depends on the skill of the basketball players to masterly lead the ball in place (fig. 2).

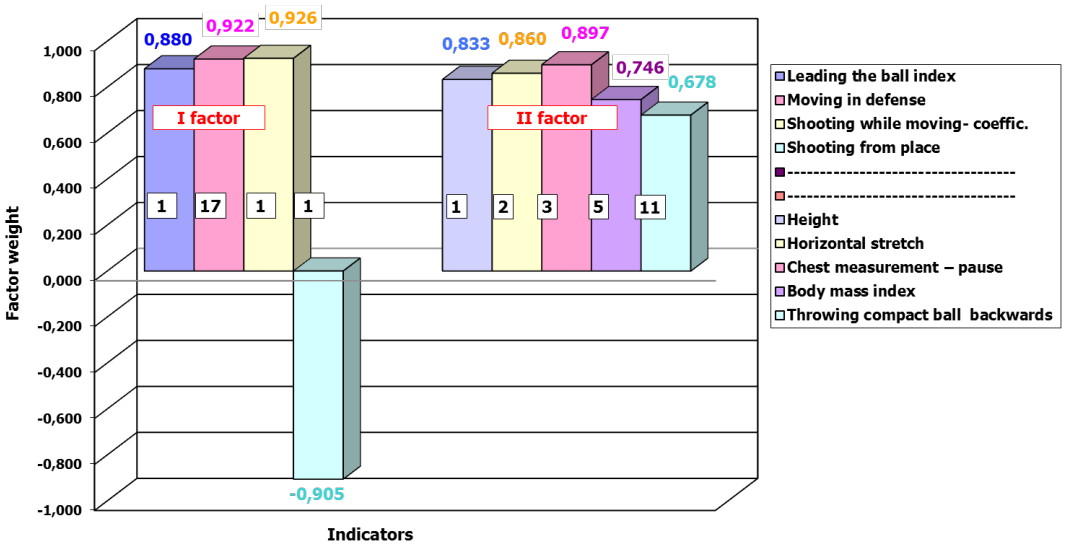

Fig. 1. Factor structure of the physical development and the specific workability of **12-14 years old** pupils from the sports schools – **I and II factors**

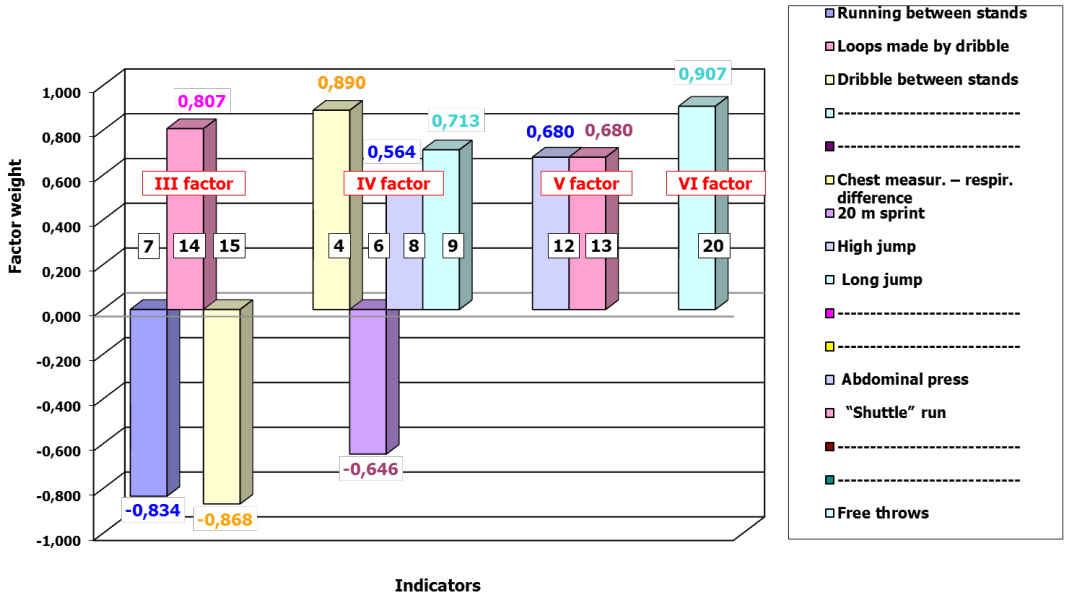

Fig. 2. Factor structure of the physical development and the specific workability **of 12-14 years old** basketball players from the sports schools – **III, IV, V and VI factors**

The fourth factor (15,89 %) determines the place of the special speed and the explosive strength of the lower limbs of the 12-14 years old basketball players in the factor structure both in vertical and horizontal muscle efforts and the positive impact on them of the functional capacity of the chest.

The fifth factor (6,70 %) can be determined as strength of the abdominal muscles and the speed endurance.

The sixth factor (6,15 %) defines the exactness of the shooting at the free throw line as occupying the last place in the factor structure.

Substantial modifications in the factor structure of the physical development and the specific workability occur in the following age group (15-16 years) (Table 2). As it can be seen from table, the drawn up factor structure for this group explains much lower percentage of the initial dispersion (70,72 %) of the phenomenon under study in comparison with the 12-14 years old group.

In comparison with the factor structure of the 12-14 years old basketball players, the importance of the high effectiveness of the speed shot on the run for the first factor (16,69 %) of the 15-16 years old ones (fig. 3) is preserved. At the same time an increase of the contribution of the lower limbs explosive strength, the speed endurance and the skill of ball handing to the general physical and technique-tactic preparedness is noted. A proof about that is the fact that these indicators for the 12-14 years old players are entered much lower in the ranking order of the indicators (they are placed respectively in the 4th, 5th and 3rd factor).

Table 2. Factor structure of the physical development and the physical fitness of 15-16 years old basketball players

№	Indicators	I	II	III	IV	V	VI	h^2	$1-h^2$
1.	Height	301	356	236	259	730	88	881	119
2.	Horizontal stretch	337	367	342	286	649	90	877	123
3.	Chest measurement – pause	11	-25	-86	853	257	-201	843	157
4.	Chest measur. – resp. difference	104	-36	256	-57	-35	862	825	175
5.	Body mass index	-19	172	-22	870	-43	83	797	203
6.	20 m sprint	-349	-623	267	-189	199	-94	666	334
7.	Running between stands	-173	32	869	16	223	76	842	158
8.	High jump	452	599	-146	186	-79	123	640	360
9.	Long jump								
10.	Triple jump	675	144	-302	-68	-46	289	657	343
11.	Throwing compact ball - backward	35	-88	112	634	75	-14	429	571
12.	Abdominal press	397	-1	247	55	-145	-580	579	421
13.	“Shuttle” run 252 m	-701	-40	-19	-17	-42	-12	495	505
14.	Loops made by dribble	669	-60	-102	-68	22	-168	494	506
15.	Dribble between stands	-370	57	757	85	204	74	767	233
16.	Leading the ball index	207	-828	-32	105	-75	143	767	233
17.	Moving in defense	-220	714	344	-106	253	1	752	248
18.	Shooting while moving – coef.	-783	96	166	-156	-135	68	697	303
19.	Shooting from place	74	177	-100	-33	-767	32	638	362
20.	Free throws	448	-333	520	-107	-432	-87	788	212
$\sum a^2$ = 70,72 %		16.69 %	12.77 %	11.95 %	11.52 %	10.82%	6.97 %		

The analysis of fig. 3 (in the middle) shows that importance of the speed abilities and the explosive strength of the lower limbs at vertical muscle efforts is increased for this age group while for the 12-14 years old players they are part of the fourth factor. At the same time one of the most important symptoms for the younger age – the skill of leading the ball at high speed and moving in defense posture here appear in the second factor (12,77 %).

The third factor (11,95 %) for the 15-16 years old players (fig. 3) is nearly identical with the third factor of the 12-14 years old ones. That is indicative that the special speed of moving in attack both without and with a ball keeps up its place in the factor structure of the physical development and specific workability of the basketball players in the period between 12 and 16 years of age. Moreover, an increase of the importance of the effectiveness of the shoot upon execution of free throws is noted while for the 12-14 years old ones, it is in the last, 6th factor.

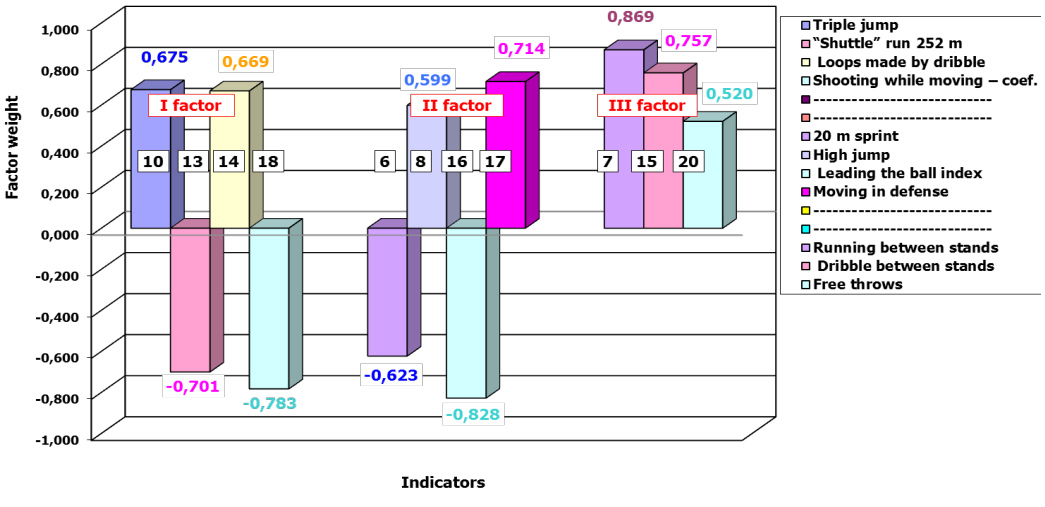

Fig.3. Factor structure of the physical development and the specific workability of **15-16 years old** pupils from the sports schools **I, II and III factors**

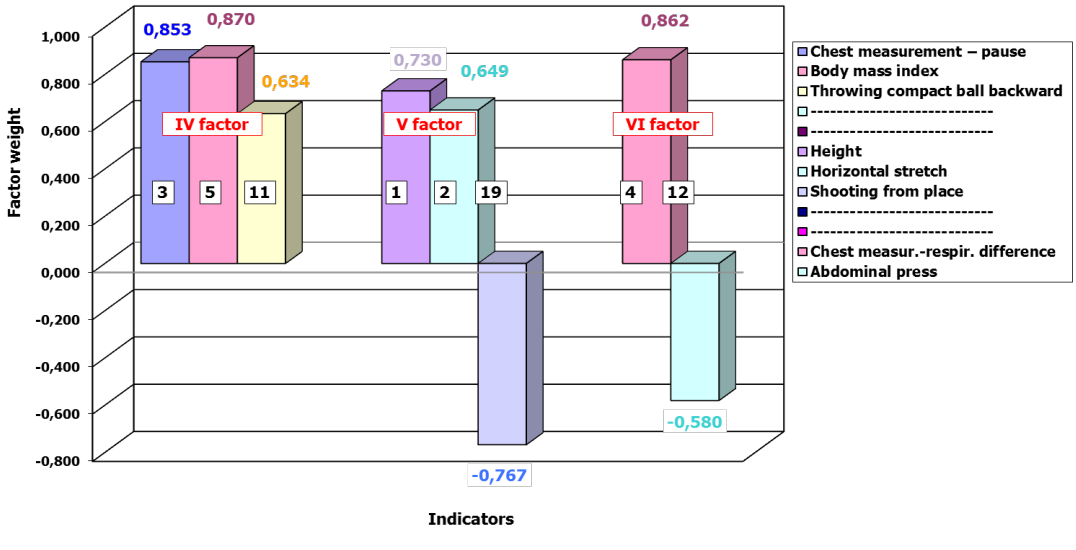

Fig.4. Factor structure of the physical development and the specific workability **of 15-16 years old** pupils in the sports schools IV, V and VI factors

The forth (11,52 %) and the fifth (10,82 %) factors for the 15-16 years old players, taken together form the second factor for the 12-14 years old ones. It means that the height-weight symptoms have lost their top place in the factor structure of the higher age group. The analysis of fig. 4 notes as well that the importance of the effectiveness of the shooting after a pass is decreased; it looses its place in the first factor and can be seen in the fifth one.

Table 3. Factor structure of the physical development and the physical fitness of 17-19 years old basketball players

№	Показатели	I	II	III	IV	V	VI	h^2	$1-h^2$
1.	Height	145	907	6	97	89	-18	862	138
2.	Horizontal stretch	-36	931	65	-105	112	138	915	85
3.	Chest measurement – pause	-40	475	797	-33	-54	-62	870	130
4.	Chest measur.-respir. difference	-431	405	155	-362	-35	225	557	443
5.	Body mass index	-93	23	917	-70	-138	80	881	119
6.	20 m sprint	234	178	60	-30	-48	867	845	155
7.	Running between stands	888	16	-115	-35	-196	87	849	151
8.	High jump	-554	162	72	582	96	-157	711	289
9.	Long jump								
10.	Tripple jump	-723	449	36	106	-69	-78	748	252
11.	Throwing compact ball backward	-476	563	516	54	187	142	868	132
12.	Abdominal press	-171	-88	-190	774	-267	137	763	237
13.	"Shuttle" run 252 m	569	-154	202	-202	341	-290	629	371
14.	Loops made by dribble	-531	47	-126	-710	-226	59	859	141
15.	Dribling between stands	860	67	-150	-58	266	80	848	152
16.	Leading the ball index	59	99	-80	-48	856	-3	755	245
17.	Moving in defense	792	48	82	144	-13	47	659	341
18.	Shooting while moving-coefc.	154	-625	-141	54	161	29	464	536
19.	Shooting from place	-247	434	-490	-4	-324	104	606	394
20.	Free throws	181	398	68	-83	-529	-572	811	189
$\sum a^2$ = 76,30 %		22.32 %	18.13%	11.51 %	8.91%	8.36%	7.07 %		

The last, sixth factor (6,97 %) for the 15-16 years old players discloses the place of functional capacity of the chest and the strength of the abdominal muscles in the factor structure of the physical development and the specific workability of the basketball players under study. These symptoms are entered respectively in the 4th and 5th factor for the lower age group.

The factor structure of the physical development and the specific workability of the 17-19 years old (X-XII grade) students from the sports schools explains 76,30 % of the initial dispersion (Table 3).

The first factor for the 17-19 years old players is defined by 7 symptoms under study and explains a very high percentage (22,32 %) from the initial dispersion. (fig. 43). The analysis shows that the importance of the special speed of traveling both without and with a ball is increased in this age group while for the lower age groups it forms the third factors. At the same time the explosive strength of the lower limbs both at vertical and horizontal efforts, the speed endurance, the skill of ball handling and the speed of moving in defense keep up their front place as one of the most important symptoms, characterizing the general preparedness of the young basketball players.

The analysis of fig. 5 and fig. 6 show that for this age group, as it is for the 12-14 years old players, the height-weight indicators, which are basic for the build up of the second (18,13 %) and the third (11,51 %) factors, are of high importance. Except these, the second factor covers the effectiveness of the speed shoot too, which for the 12-14 years old and the 15-16 years old ones has found its place in the first factor of the physical development and the specific workability.

The forth factor (8,91 %) for the oldest totality under study discloses the place of the explosive strength of the lower limbs under muscle efforts at vertical plane and of the abdominal muscles in the factor structure; they appear as necessary base for the successful ball handling.

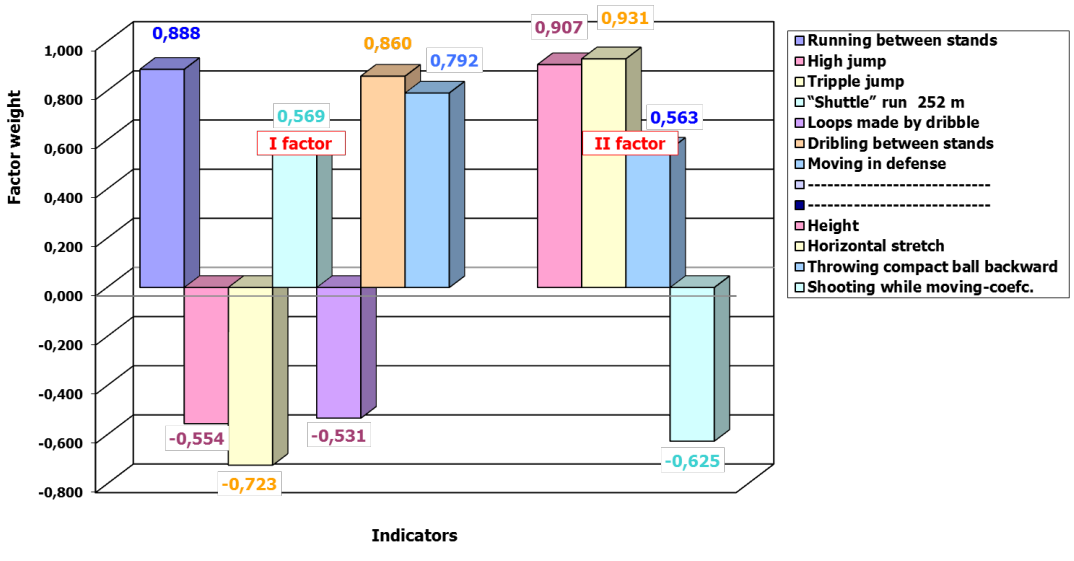

Fig. 5. Factor structure of the physical development and the specific workability of 17-19 years old students from the sports schools – I and II factors

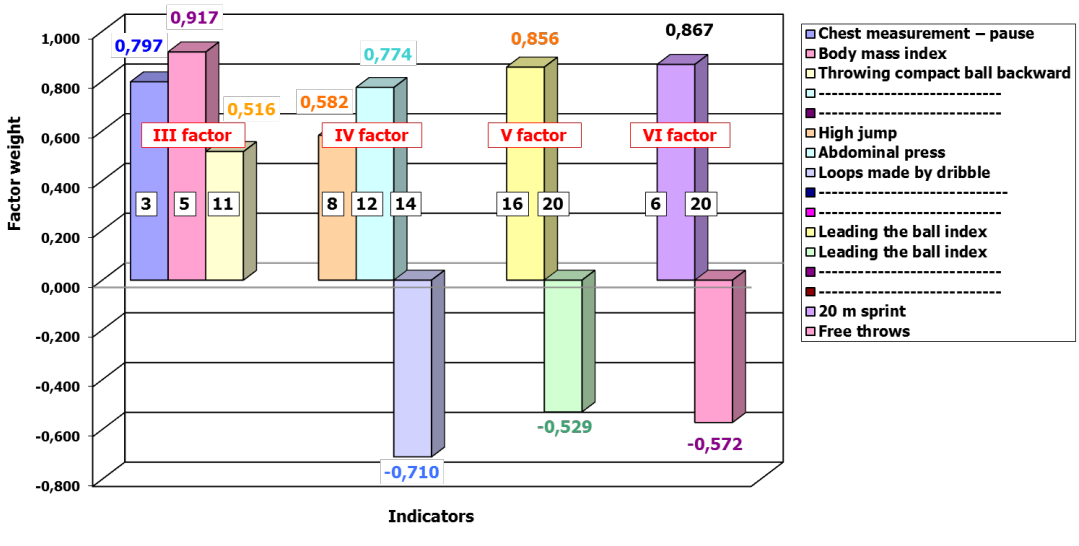

Fig.6. Factor structure of the physical development and the specific workability of **17-19 years old** students from the sports schools **III, IV, V and VI factors**

The fifth (8,36 %) and the sixth (7,07 %) factors for this age group (fig. 6) explain the lowest percentage of the initial dispersion. They show that the skill for leading the ball at high speed, the effectiveness of the shooting from the free throw line and the speed of the basketball players at short distances loose their importance as one of the most important symptoms of the physical development and the specific workability – something which is observed for the 15-17 years old players. According to us, the reason for that could be the fact that leveling of the abilities for masterly leading of the ball, the exactness of executing free throws and the speed of moving along the playing court is observed for the oldest students where part of them have already been entered in the men's elite group. That means that the symptoms cited do not by themselves provide an advantage for the basketball players under study.

CONCLUSIONS

The analysis of the results and the general outlook on the factor structure of the physical development and the specific workability for 12-19 years old basketball players provide us with the reason to formulate the following conclusions:

1. Most important for the general preparedness of the 12-14 years old basketball players is the so called technique-tactic factor, which discloses the high importance of:
   - ✓ the skills of leading the ball at high speed and moving in defense;
   - ✓ effectiveness of the speed shot on the run and shooting after a pass.
2. The down cited items have got the greatest contribution to the general physical, technical and tactical preparedness of the 15-16 years old players:
   - ✓ the high effectiveness of the speed shot on the run;
   - ✓ the explosive strength of the lower limbs;
   - ✓ the speed endurance;
   - ✓ the skill for handling the ball.
3. For the 17-19 years old basketball players of decisive importance is:
   - ✓ the physical preparedness;
   - ✓ the skill of the basketball players to move along the playing court both in attack (with or without a ball) and in defense.

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THE RELATIONSHIP BETWEEN MORPHOLOGICAL CHARACTERISTICS AND SPEED IN CHILDREN

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***Keywords**: relation, morphological characteristics, speed*

INTRODUCTION

Running speed, reaction time and quick footwork continually improved since the age of five until maturity (Bompa, 2000). From 9 years until the onset of puberty is a period of life that is characterized by a relatively balanced physical development, and attention is focused on monitoring development of muscle groups that are in most sports especially burdened: muscle groups fists and feet, thigh and calf muscles and stabilizers hull - abdominal and back muscles. In children until the end of growth process should take care of the process of ossification of long bones and spine, to avoid permanent deformation using inadequate training stimulus. Running speed, reaction time and quick footwork continually improved since the age of five until maturity. Looking at the particular forms of motor skills of children aged 5-6 years, Markosjan quote information of Leve-Gorinevske about running speed of these infants. The results of which she came, shows that the average running speed at 30m boys is 3.55 to 3.85 m/sec, and the girls 3:45 to 3.65 m/sec, according to (Stanković, 2007). The importance of speed point out Mikić, Biberović and Mačković, (2001) and find that it is important for most sports, because most athletes must run, move, or react quickly change direction. Further point out that a large number of sports experts believe that sprinters are born, not made, because the speed is mostly genetically determined and depends on the compensation of muscle-type athletes. In sports practice speed individual movements at low resistance, frequency of movement at low amplitudes and latent reaction time is usually exhibit complex, with a certain dominance of some of them. Thus, F.M. Henry (1961) found that there were people with fast reactions, which are relatively slow in movement and vice versa, according to (Željaskov, 2004). Efficacy of maximum speed is defined with frequency and length of stride. From the biomechanical point of view, step, as the basic structural unit depends on the eccentric-concentric muscle action cycles at action of moving. The association between frequency and stride length is individually defined and automated. Changing one of these parameters results in a change of the second. When the stride length increases, the frequency decreases, and conversely (Čoh and Žvan, 2011). Similar conclusions came and (Željaksov, 2004), who points out that one of the main factors that allows full expression of speed, sport technique, which is characterized by perfect innervation and coordination of movement at the maximum intensity neuromuscular effort. Morphological characteristics are mainly influenced by genetic and environmental factors. The influence of genetic factors is not the same for all latent morphological dimensions. The coefficient for the inherent dimensionality of the skeleton is approximately 0.98, body volume 0.90, and 0.50 adipose tissue. Thus, the greatest transformation under the influence of the process of sports training is possible in adipose tissue, followed by body volume, and almost neglect at the dimensionality of the skeleton (Malacko, 1991). Factor structure of the anthropometric variables everywhere in the world differ with respect to aspects of gender and age, as well as due to genetic factors and ekosocijalane (Bijelić and Simović, 2005). Under the morphological characteristics of anthropological status of the man commonly understood processes of human growth and ontogenetic development (Malacko and Rađo, 2004). Based on research, most often identified four main factors that determine the morphological structure of man, which is applied in practice: longitudinal dimensionality of the skeleton, transverse skeletal dimensions, mass and volume of the body and subcutaneous adipose tissue (Ibid.). In a study (Mikić et al., 2001), points out that the height of the

body during early school age children up to 8 years of age retains the previous pace of increase, while later than 9 years of life increase significantly slows the pace. For bone growth in width responsible factor transversal dimensionality of the skeleton. Since a large number of parameters that define the structure of this factor, in this scientific work are analyzed: the diameter of the knee joint, ankle joint diameter and width of the foot. A factor that is often called factor circular dimensions of the body, which is responsible for the overall mass and volumes of the body, is the factor of mass and volume of the body. He showed that he had the strongest associations with motor skills and is considered to be one of the most important factors in morphological space. Since a large number of parameters that define the structure of this factor, this paper analyzed: body weight, circumference of thigh, calf circumference and chest circumference. As stated Herlok, older preschoolers characterized by stepwise increase in muscle mass, and this increase amounted to 75% by weight of muscle, according to (Stanković, 2007.). For bone growth in length is a factor responsible longitudinal dimensionality of the skeleton. Since a large number of parameters that define the structure of this factor, this scientific work analyzed: body height, leg length, upper leg, lower leg length and foot length. Since it is considered that maximum running speed biologically evolving from 5 to 8 years, this study was conducted with the aim of determining the correlation between the morphological characteristics and entails sprint speed at the age of 9 years of age in order to obtain information about those morphological characters that at this age may contribute to prolonging the development speed.

METHODOLOGY

The study was conducted on a sample of 71 child aged 9 years (+/- 6 months) and 37 male and 34 female subjects, who underwent a physical examination and without health problems or problems with locomotor apparatus. Respondents were not involved in sports clubs or any organized forms of physical exercise. Measurement of morphological characteristics was carried out in a sports hall in the morning, while running tests conducted at the City Stadium in Banja Luka in the afternoon. Respondents were wearing sports equipment. There are used standard anthropometric instruments calibrated before each measurement. Techniques and conditions of measurement of morphological characteristics were conducted in accordance with the International Biological Program (IBP), and here are used the following Instruments: anthropometer by Martin, sliding divider and a metal measuring tape. For evaluation of morphological characteristics were used longitudinal measures (body height, leg length, upper leg, lower leg length, foot length), transversal dimensionality (diameter of the knee joint, ankle joint diameter, the width of the foot) and the voluminous and body mass (body weight, thigh circumference, the volume of the lower leg, thorax), while the expression of sprint speed is analyzed based on the results of the achieved tests in running at 10m and 20m from a standing start and 20m from a flying start (Bala, Stojanović, M. Stojanović, M. 2007.). In order to formulate valid conclusions, is used the statistical program SPSS (version 17.0), and are applied the following statistical procedures: descriptive statistics, correlation and regression analysis.

RESULTS

Table 1. presents the results of descriptive statistics results of tests for the assessment of longitudinal dimensionality of the skeleton in both sexes. Before analyzing the results, was tested normality of distribution of all results on the basis of Komogorov-Smirnov test (KS test), which showed results significantly more than 0.05 which indicates that the results have normality of disposition.

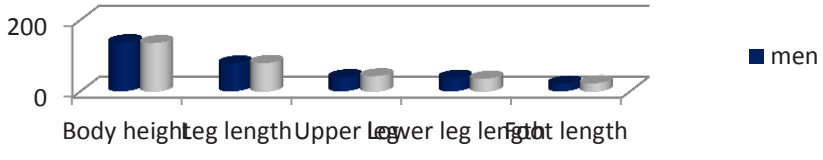
Table 2. presents the results of descriptive statistics of tests results for the assessment of transversal dimensionality of the skeleton in both sexes. Before analyzing the results, was tested for normality of distribution of all the results on the basis of Komogorov-Smirnov test (KS test), which showed results significantly more than 0.05 which indicates that the results have normality of disposition.

Table 3. presents the results of descriptive statistics of tests results for assessing voluminous and body mass in both sexes. Before analyzing the results, was tested normality of distribution of all the results on the basis of Komogorov-Smirnov test (KS test), which showed results significantly more than 0.05

which indicates that the results have normality of disposition. Measures of asymmetry skewness and kurtosis a shows positive and negative values which do not differ significantly from the arithmetic mean.

Table 1. Descriptive statistics results of longitudinal dimensionality of the skeleton in both sexes

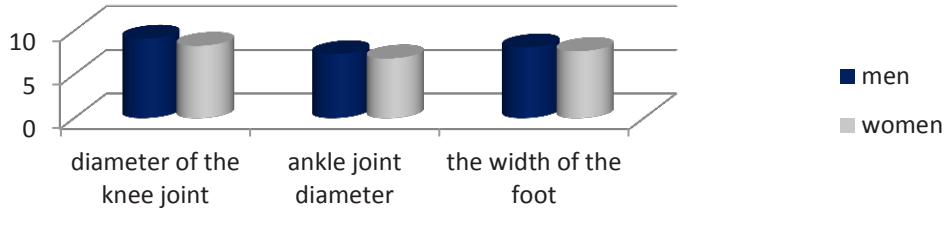
men	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
Body height	37	23.00	127.00	150.00	137.73	5.79	33.53	0.14	-0.76	0.23
Leg length	37	26.00	64.00	90.00	78.02	6.26	39.22	-0.12	-0.29	0.96
Upper leg	37	18.00	33.00	51.00	39.88	4.67	21.81	0.56	0.15	0.73
Lower leg length	37	10.70	31.00	41.70	38.11	2.47	6.09	-0.66	0.50	0.97
Foot length	37	8.00	17.10	25.10	21.83	1.87	3.05	-0.90	0.83	0.47
women	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
Body height	34	35.00	113.00	148.00	135.03	7.61	57.97	-0.70	0.75	0.61
Leg length	34	21.00	66.00	87.00	78.87	4.89	23.99	-0.97	0.39	0.10
Upper leg	34	13.00	35.00	48.00	42.16	2.73	7.48	-0.28	1.12	0.60
Lower leg length	34	19.00	24.00	43.00	35.18	5.14	26.43	-0.54	-0.81	0.21
Foot length	34	5.90	19.00	24.90	22.20	1.41	2.00	-0.47	-0.19	0.42



Picture 1. Average values of the results of longitudinal dimensionality of the skeleton

Table 2. Descriptive statistics of results for transversal dimensionality of the skeleton in both sexes

men	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
diameter of the knee joint	37	7.24	5.96	13.20	9.10	1.85	3.45	.045	-0.46	0.60
ankle joint diameter	37	5.89	3.91	9.80	7.32	1.68	2.83	-0.36	-0.90	0.42
the width of the foot	37	5.99	5.51	11.50	8.09	1.44	2.09	0.30	-0.19	0.84
women	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
diameter of the knee joint	34	4.20	6.60	10.80	8.27	1.14	1.30	1.22	0.36	0.06
ankle joint diameter	34	4.80	5.00	9.80	6.82	1.47	2.18	0.99	-0.29	0.08
the width of the foot	34	3.50	6.20	9.70	7.65	0.95	0.91	0.92	-0.18	0.07



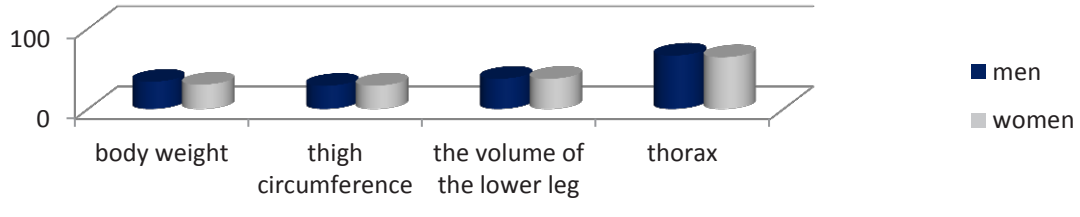
Picture 2. Average values of results for transversal dimensionality of the skeleton

In Table 4. presents the results of descriptive statistics, the results of tests for the assessment of sprint speed in both sexes. Before analyzing the results, was tested for normality of distribution of all the results on the basis of Komogorov-Smirnov test (KS test), which showed results significantly more than

0.05 which indicates that the results have normality rosporeda. When analyzing the difference between the maximum and minimum results, or the rank values in male and female patients, the results of the test running time on a 10m high start in males and results of the running time on a 20m high by females showed at least a scattering of results. While at the test results during the run at 20m flying start in males and the test results during the run at 10m high by females observed maximum scattering results.

Table 3. presents descriptive statistics and results of voluminous body mass in both sexes

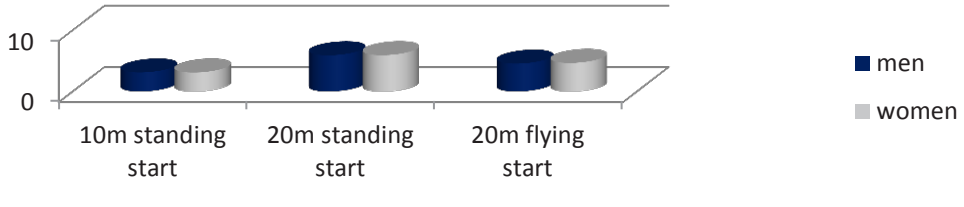
men	N	L	Min	Max	M	SD	r	Skj.	Kur.	KS
body weight	37	20.00	26.00	46.00	34.03	4.98	24.84	0.76	0.29	0.18
thigh circumference	37	11.70	24.30	36.00	28.94	3.16	9.99	0.78	-0.16	0.50
the volume of the lower leg	37	18.70	30.30	49.00	37.69	4.58	21.04	0.68	0.49	0.96
thorax	37	42.60	49.40	92.00	66.57	7.04	49.63	1.42	4.71	0.07
women	N	L	Min	Max	M	SD	r	Skj.	Kur.	KS
body weight	34	20.00	19.00	39.00	30.39	4.95	24.58	-0.32	-0.52	0.94
thigh circumference	34	10.10	25.00	35.10	29.15	2.53	6.42	0.69	0.21	0.51
the volume of the lower leg	34	15.00	32.00	47.00	37.63	3.91	15.35	0.20	-0.55	0.55
thorax	34	21.90	57.00	78.90	64.47	4.30	18.50	1.09	2.50	0.59



Picture 3. Presents average values of the results of voluminous and body mass.

Table 4. Presents descriptive statistics of results of tests for assessing sprint speed in subjects of both sexes

men	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
10m standing start	37	0.9	2.8	3.7	3.13	0.24	0.05	0.42	-0.54	0.72
20m standing start	37	1.1	5.4	6.5	5.93	0.29	0.08	0.02	0.35	0.39
20m flying start	37	1.8	3.9	5.7	4.57	0.38	0.14	0.64	1.32	0.70
women	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
10m standing start	34	1.3	2.4	3.7	3.11	0.29	0.08	0.28	0.00	0.72
20m standing start	34	1.0	5.5	6.5	5.94	0.26	0.07	0.04	-0.32	0.54
20m flying start	34	1.2	3.9	5.1	4.67	0.31	0.09	-0.50	-0.75	0.29



Picture 4. Presents average values of test results 10m standing start, 20m standing start and 20m flying start

Table 5. Correlation between the longitudinal dimensionality of the skeleton, and sprint speed

Independent variable	Corel	Depend variables					
		10m standing start		20m standing start		20m flying start	
		men	women	men	women	men	women
body height	r	0,07	-0.17	0,10	-0.19	0,06	0.04
	p	0,68	0.34	0,52	0.27	0,71	0.78
leg length	r	-0,08	-0.20	0,04	-0.14	0,06	0.05
	p	0,65	0.24	0,83	0.44	0,71	0.77
upper leg	r	-0,18	-0.31	-0,11	-0.10	-0,04	-0.23
	p	0,30	0.07	0,53	0.55	0,80	0.18
lower leg length	r	0,13	-0.09	0,32	-0.10	0,24	0.27
	p	0,44	0.60	0,05	0.56	0,15	0.11
foot length	r	0,00	-0.24	-0,02	-0.06	-0,11	0.00
	p	0,97	0.16	0,91	0.70	0,52	0.98

Table 5a. The effect of longitudinal dimensionality of the skeleton (the length of the lower leg) test results 20m standing start

Participants	Independent variable	Unstandardized coefficients		Standardized coefficients	t	p.	Depend variables
		ß	SE	Beta			
Men	constanta	4.52	0.70		6.39	0.00	20m standing start
	lower leg length	0.04	0.02	0.32	2.00	0.05	

When analyzing the numerical correlation between the results of longitudinal dimensionality of the skeleton and the results of tests for assessing sprint speed, there was a statistically significant correlation only measures the length of the lower leg with male participants. All measures of longitudinal dimensionality of the skeleton that were investigated in this study did not show a statistically significant association with female subjects.

Table 6. Correlation between transversal dimensionality of the skeleton, and sprint speed

Independent variable	Corel	Depend variables					
		10m standing start		20m standing start		20m flying start	
		men	women	men	women	men	women
diameter of the knee joint	r	-0,01	-0,02	-0,08	-0,28	0,07	-0,13
	p	0,93	0,90	0,63	0,10	0,65	0,44
ankle joint diameter	r	-0,03	-0,15	0,17	-0,25	0,30	-0,04
	p	0,83	0,38	0,29	0,14	0,06	0,79
the width of the foot	r	-0,03	-0,00	0,00	-0,30	0,18	-0,07
	p	0,81	0,97	0,99	0,08	0,26	0.62

When analyzing the numerical correlation between the results of transversal dimensionality of the skeleton and the results of tests for assessing sprint speed, it was found that there was no statistically significant correlation with all measures in both sexes.

Table 7. Correlation between voluminous and body mass and sprint speed

Independent variable	Corel	Depend variables					
		10m standing start		20m standing start		20m flying start	
		men	women	men	women	men	women
body weight	r	-0,03	-0,08	-0,22	-0,13	-0,23	0,20
	p	0,82	0,65	0,17	0,43	0,15	0,25
thigh circumference	r	-0,06	0,05	-0,26	-0,00	-0,36	0,06
	p	0,71	0,77	0,11	0,97	0,02	0,71
the volume of the lower leg	r	-0,12	0,03	0,00	-0,09	-0,04	0,11
	p	0,47	0,86	0,96	0,61	0,81	0,51
thorax	r	-0,15	-0,05	-0,15	-0,27	-0,15	0,05
	p	0,37	0,75	0,35	0,11	0,35	0,75

Table 7a. Influence voluminous and body mass on the test results 20m flying start

Participants	Independent variable	Unstandardize coefficients		Standardized coefficients	t	p.	Depend variables
		ß	SE	Beta			
Men	constanta	5.81	0.50		11.60	0.00	20m flying start
	thigh circumference	-0.03	0.01	-0.36	-2.28	0.02	

When analyzing the numerical correlation between the results and voluminous mass of the body and the results of tests for assessing sprint speed, there was a statistically significant correlation only measures the volume of the thigh in male subjects. All measurements and voluminous mass of bodies that were investigated in this study did not show a statistically significant association with female subjects.

DISCUSSION

Greater dispersion of results for individual tests that were used in this study is explained by the fact that there is a possibility that reduced multilateral development can lead to missing the mutual coordination of the legs and arms. How to hand movements directly influence the frequency of leg movements, low level of coordination and hand strength shoulder belt prevents the child‘s ability to run faster (Mikić et al., 2001). Respondents males showed a lower average value, and thus better results on tests run on 20m high by 20m and running on a flying start, while the female respondents showed a better average scores on a test run to 10m high start. In the analysis of longitudinal dimensionality of the skeleton in subjects of both sexes comparisons with the results of some previous studies. The study of a large sample of boys and girls (2572 respondents), (Medved, 1987), the received data is the average height of boys aged 9 years centimeters 130.42 and girls 127.97 centimeters, according to (Mikic et al., 2001) . The research Yugoslav Institute of Physical Education in Belgrade in 1973., the average height of boys aged 9 years were in the range from 124 to 137 centimeters, and the girls 123 to 136 centimeters, according to (Marinkovic, 1977). The results obtained in this study compared to the studies mentioned above deviate significantly, averaging about 7 inches in both sexes, in comparison with previous research (Medvedev, 1987). Rank values in longitudinal dimensions have certain values which indicate that there are significant differences within the sample that was investigated in this scientific work. The differences between these ages are the result of the nonlinear characteristic of growth in this age group, showing periods of faster and slower intensity (Bijelić and Simović, 2005). Rank values in transverse dimensions have certain values which indicate that there are significant differences within the sample that was investigated in this work. The differences between these ages may be the result of the characteristic periods in which there are respondents. Since this period is characterized by un-

even growth, so can lead to differences in transversal dimensionality of the lower extremities. Cross correlation analysis which are applied with the goal of gaining insight into the levels of correlation correlation between the morphological characteristics and kinematic parameters sprint athlete found positive correlation connection leg length, body height and foot length with kinematic parameters of stride length, which may lead to a finding that the stride length in athletics sprint depends the longitudinal dimensions, primarily on the length of the legs and body height (Likić, Smajlović and Bilić, 2012). A more detailed analysis, it can be assumed that respondents with greater length of the lower leg can achieve better results in sprinterskoj speed. The coefficient for the inherent longitudinal dimensionality of the skeleton is approximately 0.98, which means that any exogenous factors can affect their increase (Malacko, 1991). The morphological characteristics of their application in the selection of athletes, where it can be expected that respondents with greater length of the lower leg can achieve better results in the manifestation of sprint speed. This statement can be confirmed based on the results in Table 5a. which show that the respondents for longer shanked 1 cm to achieve better results on the test 20m high start for 0.04 seconds. Subcutaneous adipose tissue continues to grow, which slowed in the pre-school period and ends at the time of post puberty. Medved 1987. conducted a survey of a large sample of respondents in this age. Results of this study show that the average weight of boys at this age is 27.61 kg and 27.22 kg girls (Mikić et al., 2001). In the research Yugoslav Institute of Physical Education in Belgrade in 1973, the average weight of boys aged 9 years were in the range 24-31 kg, and girls 25 to 31 kg (Marinković, 1977). The results obtained in this study compared with research Medvedev in 1987. deviate significantly, averaging around 7 kg for boys and girls 3 kg. The average weight of the girls in this study are within the interval arrived at by the Institute of Physical Education in Belgrade, while the average weight of boys deviate significantly, averaging around 3 kg. It can be assumed that the reason for these discrepancies result of reduced activity and modern lifestyle that requires more seating. When explaining the role of muscles in athletes, (Tončev, 2000) states that the muscles of runners have three basic functions. The coefficient for the inherent morphological characteristics of volume and body mass is about 0.90, which means that certain exogenous factors can affect their increase (Malacko, 1991). This statement can be confirmed based on the results in Table 7a. which shows that if the volume of the lower leg increases by 1 cm with male participants, the results of the test, 20m flying start, will improve for 0.03 seconds.

CONCLUSIONS

Knowledge of principles which are most manifest in the form of a relation between morphological characteristics and basic motor skills, it is necessary because the effectiveness of any motor skills may present only through effectors that represent muscles, bones and joints. Research results have shown that certain morphological characteristics may be associated with expression of sprint speed only with male participants aged 9 years old. It was found that the longitudinal dimension of the skeleton of the respondents only measure the length of the lower leg affects the expression of sprint speed. The results are justified, and a large number of previous studies that have also come to the same conclusions (Tončev, 2000. Mikić and Bjeković, 2004. Mihajlović, 2010. Likić et al., 2012). But how is innateness longitudinal dimensionality of the skeleton around 98%, the morphological characteristics of their application in the selection of athletes, where it can be expected that respondents with greater length of the lower leg can achieve better results in the manifestation of sprint speed. Also, analysis of the obtained results showed that the volume and mass of the body, such morphological characteristics play a part in a share in the exercise of sprint speed. Of all the measures that were analyzed in this scientific work, only measures the volume of the upper leg was significantly associated with sprint speed, but also on the basis of this measure vital statistics to predict results in the manifestation of these abilities. The results are justified, and a large number of previous studies that have also come to the same conclusions (Tončev, 2000. Jovović, 2003. Mikić and Bjeković, 2004). The coefficient for the inherent morphological characteristics of volume and body mass is about 0.90, which means that certain exogenous factors can affect their increase. Morphological characteristics that determined the transverse dimensions of the

skeleton, showed no statistically significant effect, even any association with the results of tests sprint speed in subjects of both sexes. On the basis of the results obtained, it can be concluded that in this study showed the link between the length of the lower leg and thigh volume with expression of sprint speed in boys aged 9 years, while at the girls has not showed any correlation between the morphological characteristics to achieve results in sprint running. The results can be adaptable to the training process as well as the selection of future athletes in sports that require greater expression of sprint speed.

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THE EFFECTS OF THE RUNNING PROGRAM ON BODY COMPOSITION

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Key words: *effects, experimental program of running, body composition*

INTRODUCTION

Under the morphological characteristics of anthropological status of the man commonly understood processes of human growth and ontogenetic development (Malacko and Rađo, 2004). Malacko (1991) further says that on the basis of previous factor of many morphological space research identified a number of factors, which provide significant initial information about a specific morphological structure dimensions. Malacko and Rađo (2004) are based on previous studies of morphological space, even though they were few and independent of the direction consitution, singled out certain taxonomic structures that support the general morphological model. Based on this state the following, the skeleton morphology which is responsible for the longitude and partial skeleton of the bones, piknomorfija which is responsible for the prevalence of fat athletic morphology which is responsible for the size of the muscle and skeletal dimensionality, and in the end, endogenous morphology which is responsible for the prevalence of muscle and fat (Ibid). Information about the structure of the morphological characteristics are very important in terms of their transformations. Morphological characteristics are mainly influenced by genetic and environmental factors. The influence of genetic factors is not the same for all latent morphological dimensions. The coefficient for the inherent domain of subcutaneous adipose tissue is 0.50. It means that the greatest transformation under the influence of exogenous factors is possible in adipose tissue (Malacko, 1991). The question that was to answer this survey, which is unfortunately more widespread nowadays, is a front sit way of life that leads to a decrease in functional ability, increased fat tissue which causes less work capacity and faster fainting. The solution offered by this training is that it is designed so that a targeted effect on the reduction of subcutaneous fat. The first task of the research is related to the selection of a representative sample, which will be carried out experimental training runs, in order to credibly be able to use the research results obtained. The next task was oriented to select the proper method of athletic training. Depending on the state of the functional abilities of patients, using the experience of a large number of models of athletic training for the development of specific skills that are in athletic practices proven to be successful, the experimental training run is targeted effected on the reduction of subcutaneous fat. Training is contained within itself such methods which are tried for a relatively short period of time lead to reduced earning harmful body fat. The next task was referred to the selection of proper research variables that will credibly show the results of this research. At the initial measurement before applying the experimental training program are set out the results of the morphological status of the respondents, and after the experimental training is followed final measurement of these variables which were measured prior to its implementation. The final task was to analyze the results, and that these results obtained present and preferably as soon as practical application. From the large number of parameters which determine body composition in this study were analyzed: body mass index, total weight of fat mass, percentage of total body weight, which is composed of fat, the weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass weight and total body water. Since the composition of the body includes an assessment of body size and components of the body, including muscles, bones and fat, then measure body composition is often used when trying to determine the success of training programs, monitoring growth characteristics of elite athletes and those in the sports divided by physical categories. This research was conducted in order to determine the influence of the program running on the body composition of young people in order to get information on possible changes that occur.

METHODOLOGY

The sample is defined as a deliberate considering the age of the respondents, and random with respect to the choice of each respondent who participated in this study. Group were students of the second grade of secondary school, age 16 years (+/- 6 months). The sample consisted of 107 male patients. Respondents were not involved in another aspect of sports activities and before the application of experimental training were subjected to medical examination. For this sample was administered an experimental training program running, which ran for a period of eight weeks with interval training twice a week for 45 minutes. The reason is elected this age category is the fact that this is the period of puberty, which represents the most active period of extrauterine period of human life. The age category was chosen deliberately because it was assumed that the new training model to show your most influence in this sample. The study was conducted in the morning, in the Cabinet for antropomotorics, where is found the body composition of subjects in the Athletics Hall of the Faculty of Physical Education and Sport in Banja Luka, and where is conducted experimental program. Body composition were determined before and after the implementation of the experimental program. Body composition was perceived through variables: body mass index, total weight of the fat mass, the percentage of the total weight of the body which is composed of fat, the weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass of a total body water. Because of the way of collecting the data, the subjects were dressed in underwear and no socks, were prepared according to the protocol method of bioelectrical impedance. Measurements performed one timekeeper. First, according to the protocol and methods of measurement of anthropometric dimensions of the IBP, using the retractable metal tape with a gradation of 1mm, measured body height, and body composition analyzers brand Tanita model BC-418 MA III determined physical composition of respondents. Before carrying out the measurements, all subjects were familiar with the procedure. After the measurement data are sorted and processed statistically. For the analysis of differences between the results of the initial and final measurements of the respondents were applied descriptive statistical procedures. Comparative statistics is applied in order to analyze differences in arithmetic means of large correlated samples, which aims to assess whether there were differences of initial and final measurements of the morphological characteristics of the domain of body composition. At the end of the canonical discriminant analysis was used to evaluate differences and hierarchies of variables and measures that have contributed to the differentiation results in the final compared to the initial measurement. Statistical analysis was performed by personal SPSS statistical software (version 17.0).

THE EXPERIMENTAL TRAINING PROGRAM RUNNING

The experimental program running was administered over eight weeks, with intervals of exercise twice times a week for 45 minutes. As part of the planning and preparation of experimental training run for a period of eight weeks for the impact on the morphological characteristics of the domain of subcutaneous adipose tissue have been defined and implemented goals and objectives, complied with cycle times as well as the necessary technical and material conditions. To this end, it was the selection of exercises, load dosage and schedule of training content adjusted to individual abilities and characteristics of respondents. The experimental training program run is designed in a way that specifically affects the reduction of harmful body fat. Training subjects began with heating and preparing for a major part of the training. Prior to conducting the training for each subject was determined by anaerobic threshold and aerobic zones and anaerobic modes. Each workout is followed by the training computer. The experimental program running training is equally used both aerobic and anaerobic modes in training. One of the variants of aerobic exercise that was used in this training was directed at improving the utilization of oxygen. This mode of operation of the training involves activities of lower intensity that can be maintained long-term. Aerobic training requires large amounts of oxygen to ensure their energy for the long-term activity (running). For these reasons, this version was used aerobic training to improve the transfer and utilization of oxygen, and also acted in a better nerve - muscle work, because it improves the structure of the movement, coordinates the work of antagonists, agonists and synergists, and also

to thus saving energy. Another variant of aerobic exercise that was used in an experimental training was aimed at raising the level of lactate threshold. The reason for using this version of aerobic exercise can be justified following claims. The lactate threshold- LT (lactate threshold) is the intensity of exercise at which lactic acid begins to accumulate in bloodstream. When this happens, it means that lactic acid is produced faster than the metabolism gets removed. This threshold is sometimes called the anaerobic threshold -AT. When the intensity scale exercises drops below LT blood without problems manages to "take away" the lactic acid from the muscles, so that it does not accumulate (then does not occur and there is no "sore muscles"). The lactate threshold is a good measure to determine the intensity of training or running in endurance sports. This value can significantly increase training (Vujičić, 2009). Aerobic training sessions, which were used to raise the level of lactate threshold were aimed to postpone the entry of the organism athletes in the anaerobic zone. There are used interval trainings to improve the body's ability to temporarily exceed the above lactate threshold, and then recover in a way to reduce the concentration of lactate in the blood, while still performing physical activity into operation under the lactate threshold. Versions of anaerobic training that were used in the experimental training were addressed to increase anaerobic capacity and improve the tolerance of lactic acid. Trainings in anaerobic mode which influenced the raising of anaerobic capacity were consisted of a large number of short shares at maximum speed considerably over the anaerobic threshold, with longer breaks between sets to full recovery, while trainings which influenced the increase in tolerance of lactic acid are consisting running of longer shares with submaximal speed around the anaerobic threshold, with short breaks between sets that are not afforded a full recovery. The third variant of the training that was used in an experimental training run was in the aerobic-anaerobic regime that aimed to increase cardiovascular endurance. These trainings consisted of some strength exercises, which were performed according to the principle of circuit training in multiple series. The principle of operation was to do as many repetitions of exercise in a given time interval, with a short break between exercises. The break between series lasted until complete recovery.

RESULTS

Table 1. Initial state measures in the domain of subcutaneous adipose tissue

Varijables	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
body mass index	107	14.80	15.80	30.60	21.40	3.35	11.24	0.87	0.28	0,05
total weight of the fat mass	107	20.60	10.50	31.10	16.84	4.75	22.52	1.00	0.33	0,05
the percentage of the total weight of the body which is composed of fat	107	23.80	4.80	28.60	11.66	5.16	26.62	1.25	0.99	0,00
the weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass	107	39.50	38.40	77.90	55.19	7.54	56.82	0.06	-0.21	0,96
total body water	107	29.30	27.40	56.70	40.41	5.64	31.85	0.07	0.01	0.99

Table 1. presents the results of descriptive statistics measures in the domain of subcutaneous adipose tissue of subjects at the initial measurement. Results based on Komogorov-Smirnov test (KS test) for the analysis of normality schedule for most measures in the domain of subcutaneous adipose tissue was significantly above 0.00, except for a measure the total weight of fat mass, where the value of KS test is 0.00, what does not satisfy the normality schedule. After the logarithmic transformation of the data obtained to measure the total weight of fat mass, the results have met the normality schedule. Logarithmic transform of the data, was dealt a lot of researchers, among others, Trajković (2009).
When analyzing the difference between the minimum and maximum score or rank values, measured in weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass observes the largest

value and the smallest value in ranking measures the total weight of the fatty mass. Measures of asymmetry Skewness shows in all measures positive asymmetry, which means that the distribution of positive direction, and that the fault tilts to higher results. All values skew curves show a larger deviation from normality of distribution, except measures the percentage of the total weight of the body which is composed of fat is 1.00.

Table 2. Logarithmic transformation of the data to measure the total weight of fat mass

Varijable	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
the percentage of the total weight of the body which is composed of fat	107	1.78	1.57	3.35	2.37	0.40	0.16	0.43	-0.38	0.35

Table 3. Final state measures in the domain of subcutaneous adipose tissue

Varijables	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
body mass index	107	14.30	15.40	29.70	21.21	3.49	12.18	0.76	-0.12	0,05
total weight of the fat mass	107	22.60	8.40	31.00	15.50	4.83	23.33	0.99	0.23	0,05
the percentage of the total weight of the body which is composed of fat	107	21.10	4.10	25.20	10.65	5.12	26.23	1.14	0.47	0,00
the weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass	107	40.10	37.40	77.50	55.21	7.71	59.45	0.07	0.02	0,97
total body water	107	28.90	28.10	57.00	40.40	5.52	30.44	0.06	-0.21	0,95

In Table 3. presents the results of descriptive statistics measures in the domain of subcutaneous adipose tissue of subjects at the final measurement. Results based on Komogorov-Smirnov test (KS test) for the analysis of normality schedule for most measures in the domain of the subcutaneous tissue mason well above 0.00, except for a measure the total weight of fat mass, where the value of KS test is 0.00, what does not satisfy normality schedule. After the logarithmic transformation of the data obtained to measure the total weight of fat mass, the results have met the normality of schedule.

Table 4. Logarithmic transformation of the data to measure the total weight of fat mass

Varijables	N	L	Min	Max	M	SD	s	Skj.	Kur.	KS
the percentage of the total weight of the body which is composed of fat	107	1.82	1.41	3.23	2.26	0.44	0.20	0.36	-0.55	0.15

When analyzing the difference between the minimum and maximum score or rank values, measured in weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass observes the largest value and the smallest value in ranking measures the total weight of the fatty mass. Measure of body mass index, total weight of the body consisting of fat, total fat mass and weight of the total weight of water in the body are shown in lower average values of the final measurements. The reason for decrease in the average value of these measures on the final measurements can be justified by the influence of experimental training runs. Measure weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass is the final measurements showed a higher average value relative to the initial measurement. able 5. shows the differences in arithmetic means of the initial and final measurement domain subcutaneous adipose tissue of subjects. Based on the 0.05 level of significance, it was concluded that there is a statistically significant difference between mean values of the initial and final measurements measures body mass index, a percentage of the weight of the body which is composed of fat, the total weight of fat mass, while the lean body mass measured by weight consisting of muscle, bone, tissue and other

lean mass and weight of total body water, there were no significant differences between mean values of the initial and final measurement.

Table 5. Difference between mean values of the initial and final measurement

M (i)	M (f)	t	df	Sig.		
Pair 1	body mass index	21.40	21.21	2,19	106	0,03
Pair 2	total weight of the fat mass	16.84	15.50	7,36	106	0,00
Pair 3	the percentage of the total weight of the body which is composed of fat	2.37	2.26	7,87	106	0,00
Pair 4	the weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass	55.19	55.21	-0,13	106	0,89
Pair 5	total body water	40.41	40.40	0,10	106	0,92

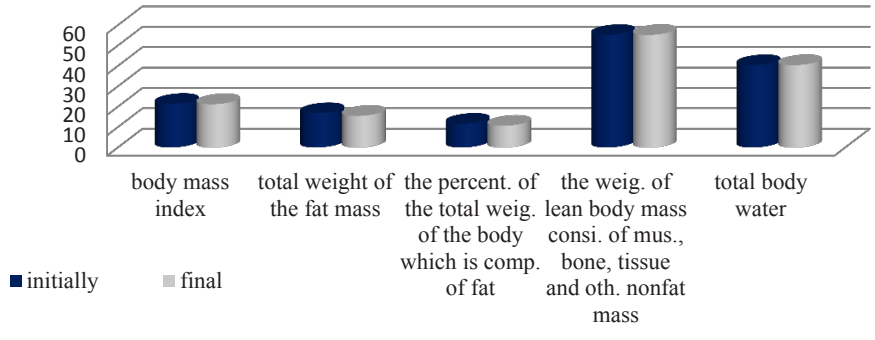

Figure 1. Results of the initial and final measurement domain subcutaneous adipose tissue

Table 6.Significance isolated discriminant function in domain of subcutaneous adipose tissue

Function	Eigenvalue	Canonical Correlation	Wilks' Lambda	Chi-square	df	Sig.
1	0.10	0.30	0.91	20.17	5	0.00

Table 6. shows an important function medium high intensity (CC=30%), which indicates where the correlation data set on the basis of which was performed discriminant analysis of the obtained data.

Table 7. Factor structure of isolated discriminant function

	Root 1
body mass index	0.44
total weight of the fat mass	0.31
the percentage of the total weight of the body which is composed of fat	0.09
the weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass	-0.00
total body water	0.00

Table 7. presents the structure of discriminative function participation of tests, the domain of subcutaneous adipose tissue in the formation of significant discriminant functions. The present results show that the greatest contribution to the discriminant function is a measure of the domain of subcutaneous fat, a percentage of the weight of the body which is composed of fat (FAT=0.44), then the total weight of the fatty mass (FATMASS=0.31). Other measures of domain subcutaneous fat, body mass index (BMI=0.09), then the weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass (FFM=-0.00) and the weight of the total body water (TBW=0.00) have no significant contribution because of their correlation with the discriminant function have a significant contribution in the field of subcutaneous adipose tissue.

Table 8. Centroid measurement

Measurement	Root 1
1 initially	0.32
2 final	-0.32

Table 8 shows the results of the discriminant function of centroid based on all measures in the domain of subcutaneous adipose tissue, which at initial measurement amount to 0.32, and the final -0.32.

DISCUSSION

Based on the results of Table 2. we can assume that a group of patients showed significantly higher values of the weight of the body which is composed of fat. Results of an initial measurement, they left a lot of room for improvement in reducing these measures during the implementation of the experimental training runs. It was assumed that the higher values of body weight that consists of fat reason lifestyles of most students today. Most of them apply front seat way of life, with very little of physical activity. Kurtosis measures the asymmetry also shows the values that do not deviate from normality schedule. All measurements have a positive value unless measures the total weight of fat mass and lean mass weight consisting of muscle, bone, tissue and other non-fat mass, having a negative value. This negative value indicates a deviation results according rounded curve, that is wrong flattened and expressed greater dispersion of results. Larger scattering results of these morphological measures justified by the time what boys total fat mass increases by ten years of age, and significantly reduces the period of rapid growth. For this reason, the average boys during puberty slimmer (family doctors, 2010). However, while respondents in the same chronological age does not necessarily mean that the same biological age. On this basis it can justify higher scattering results of these morphological measures. Analyzing the results of Table 4. may be concluded that the experimental training runs had a positive effect on the increase in mass consisting of muscle, bone, tissue and other non-fat mass. Based on an analysis of measures in the domain of subcutaneous adipose tissue, it can be concluded that the experimental training runs proved its implementation and led to the reduction and elimination of harmful fat, and led to an increase in muscle mass, which is at the end was the aim of this experimental application training. Measures the asymmetry Skewness show in all measures of positive asymmetry and all values skewed the curve does not show a larger deviation from normality schedule and strive for greater results. All values skew curves show a larger deviation from normality of distribution, except measures the percentage of the total weight of the body which is composed of fat which is 0.99. Based on these results it can be assumed that a group of patients showed higher values of total body weight that consists of fat. However, these values are still lower than the initial measurement. Measures of asymmetry Kurtosis also shows the values that do not deviate from normality schedule. Two measures have a positive value, while three measures have a negative value. This negative value indicates a deviation results according rounded curve and shows a greater dispersion of results. Based on the analysis of the arithmetic mean of the initial and final measurements in Table 5. it can be determined that the final measuring impairment of all measures that determined the size of the fat in the body of the respondents. In this connection it may be assumed that the experimental training program run showed a positive effect on the reduction of body fat, which is considered an aggravating factor in athletes. Mišigoj-Duraković, Matković and Medved (1995) point out that the optimum amount of body fat, along with other anthropometric characteristics, one of the important prerequisites of success in the sport. Also point out that it is known that an excessive amount of body fat as ballast weight adversely affects the motor and functional abilities of the organism. Based on the average values of these measures on the final measurements, we can conclude that the experimental training program run had a positive impact on the reduction of body mass index, total body weight that consists of fat, total weight, fat mass and weight of the total body water, and also and the weight increase lean body mass consisting of muscle, bone, tissue and other non-fat mass. In the end it can be concluded that the reduction in measures of subcutaneous fat on the final measuring result of experimental training, which is its essence, and modes of operation in training and activities in these practices influenced their reduction. Statistically significant differ-

ences between the initial and final measurement domain subcutaneous adipose tissue can be seen in Figure 1. where the visually presented these results. Results of discriminative strength tests (Table 6) that measured the domain of subcutaneous adipose tissue, are given with Wilks' Lambda test which amount is (0.91), which indicate that the differences between the initial and final measurement in the space domain subcutaneous adipose tissue are significant (Sig=0.00), and it still confirms the size of the Chi-square test, which has plenty of high value (chi-square=20.17). Significance of shown centroid measurements (Table 8), which has been tested through the significance of the discriminant function indicates that their discrimination is significant. The negative value of the final centroid measurement indicates that there has been a reduction measures in the domain of subcutaneous adipose tissue, after conducting an experimental training program running. The positive influence of the program of training on reducing the percentage and overweight of harmful ballast fat mass in the body, is reflected in the fact that the chronological age of the respondents subject more tends to greater increment of harmful fat in the body. However, the experimental training program run had a positive impact, because their method of work and replacement of aerobic and anaerobic training regime led to the burning of harmful fatty ballast masses and led to a reduction in their body. This reflects the regularity and the positive impact of this new model of training to reduce fat deposits in the body.

CONCLUSIONS

Based on analysis of the results of the comparative statistical procedures initial and final measurements of subjects, it was concluded that the final measurements of the five measures of body composition, no statistically significant difference for three measures (body mass index, percentage of total body weight which consists fat and overall weight of fat mass), while two measures (weight of lean body mass consisting of muscle, bone, tissue and other non-fat mass and a total body water) is not statistically significant difference. Based on the analysis of body composition, confirmed the influence of the training program running, because after its implementation noticed a positive effect on the reduction of body fat, which is considered disrupting factor in athletes. More specifically, the experimental training had a positive effect on reducing the body mass index, total weight of the body consisting fat, fat mass of the weight and the weight of the total body water, and led to an increase in weight of lean body mass consisting of muscle, bone, other tissues and other non-fat mass. The scientific contribution which this experimental model of training wanted to achieve was associated with a deficit of free time to engage in physical activity, which brings the modern lifestyle. The solution of this problem was found in research in this scientific work, in the fact that this training is relatively short, with a small interval training with small duration of a training session, and has been shown that have a positive effects on the reduction of body mass index, total body weight that consists of fat, the total weight of fat mass and the total weight of water in the body, and lead to weight gain lean body mass consisting of muscle, bone, tissue and other non-fat mass. Also, the scientific contribution of this research was sent to the settling of upcoming problem today while, and it's front seat way of life that leads to a decrease in functional ability, then, to an increase of body fat causing less work capacity and faster fainting. The solution offered by this training is that it's designed so that have a targeted impact on reducing body fat and eliminating fatigue.

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ANALYSIS AND EVALUATION OF THE PHYSICAL DEVELOPMENT AND THE SPECIFIC PREPAREDNESS OF 17 YEARS OLD JUNIOR MEN BASKETBALL PLAYERS FROM THE "CHAMPION 2006" BASKETBALL CLUB

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Key words: *basketball, sports preparedness, evaluation, optimization*

INTRODUCTION

Control, as part of man's cognitive knowledge, is a process where information is gathered and the actual status of a given object is evaluated in view of its purposeful (planned in advanced) development and perfection [4]. According to the authors, the main aim of control in the field of the sports mastership is the optimization of the training and competitive processes on the basis of the objective information about the effect of the applied training impact on the athlete.

The permanent control on the development level of the basic motive qualities allows the coaches to define the basic directions for the optimization of the educational and training process and to work more effectively about the development of the specific technical and tactical skills of the growing up basketball players [5].

Transversal studies in age aspect with growing up basketball players (13-19 years of age) are implemented by R.Tsarova (1981). The author reveals the particularities of the game effectiveness and the specific workability of the boys and girls from the basic age groups (13-15, 16-17 and 18-19 years of age) and develops a normative base about the control, evaluation and optimization of the game effectiveness and the specific workability of each of them [7].

The aim of the present study is optimization of the educational and training process of the growing up basketball players from the "Champion 2006" BC team through analysis and evaluation of the basic parameters of their physical development and specific workability.

METHODOLOGY

The present study is made during the period April 2012 – December 2012.

Subject of the study is the physical development and the specific workability of 17 years old basketball players.

Object of the study is the basic symptoms of the physical and technical and tactical preparedness in basketball.

Contingent of the study is 12 boys (born 1995/1996) from the "Champion 2006" BC team, having participated in the State basketball championships for the respective age group.

For the needs of the study a sport-pedagogical tests of all competitors from the team have been made by 22 indicators bearing information about the physical development and the specific basketball workability (**table 1**).

The following ***methods of study*** have been applied for the implementation of the set up aim and the tasks of the study: ***survey study of the specialized literature, anthropometry, expert evaluation and sports-pedagogical tests***

The results of the study have been subjected to ***mathematical-statistical*** processing by v***ariation analysis and sigma method of evaluation.***

Table 1. List of the indicators

№	Indicators / Parameters	Unit of measure	Measurement exactness	Direction of increase
1.	Height	cm	1,0	+
2.	Horizontal stretch	cm	1,0	+
3.	Chest measurement - pause	cm	1,0	+
4.	Chest measurement – respiratory difference	cm	1,0	+
5.	Weight	kg	0,1	
6.	(Body Mass Index	kg/m²	0,01	
7.	Running 20 m sprint	s	0,01	-
8.	Running between stands	s	0,01	-
9.	High jump	cm	1,0	+
10.	Triple jump	m	0,01	+
11.	Throwing compact ball backward	m	0,01	+
12.	Abdominal press	number	1,0	+
13.	“Shuttle” run - 252 m	s	0,01	-
14.	Loops made by dribble in place	number	1,0	+
15.	Dribble between stands	s	0,01	-
16.	Leading the ball index	s	0,01	-
17.	Moving in defense	s	0,01	-
18.	Speed shooting while moving – time	s	0,01	-
19.	Speed shooting while moving - number			+
20.	Speed shooting while moving – coefficient	s	0,01	-
21.	Shooting while jumping after a pass	number	1,0	+
22.	Free throws - % successful	%	0,01	+

ANALYSIS OF THE RESULTS

The results of the variation analysis of the initial data show that the values are normally distributed. As a whole, the indicators under study of the physical development and the physical and technical-tactical preparedness are stable and relatively stable and the totality under study is homogeneous in relation to the symptoms about which these indicators bear information. Only in relation to the skill of the basketball players to move along the playing ground by leading the ball in high speed, the results are not homogeneous.

For solving the aim and the tasks of the study, the initial data are evaluated by the sigma evaluation method. The evaluations are standardized values, presented in a $50^{\text{-examination}}$ mark system (from 1 to 50 – at an interval of 1 point) allowing to compare the achievements according to the variously fixed tests and indicators (measures in s, cm, kg, number, etc.).

Fig. 1 presents the generalized average evaluations of the physical development indicators. It is seen in the figure that the lowest evaluation is for the height of the players while the value of the evaluation is under the average level for this age group in Bulgaria (23,02 p.). This is an indicator of particular importance for the basketball game and more over at that age where the phase of the selection is completed and the best players have remained. The generalized average evaluation of the physical development is above the average level (T=28,31 p.).

The analysis of **fig. 2** shows that 1/3 of the competitors have marks under the average level. D.Gaidarov has received the highest individual mark of 36,46 while the rest are within the range of 27,35 points to 35,41 points.

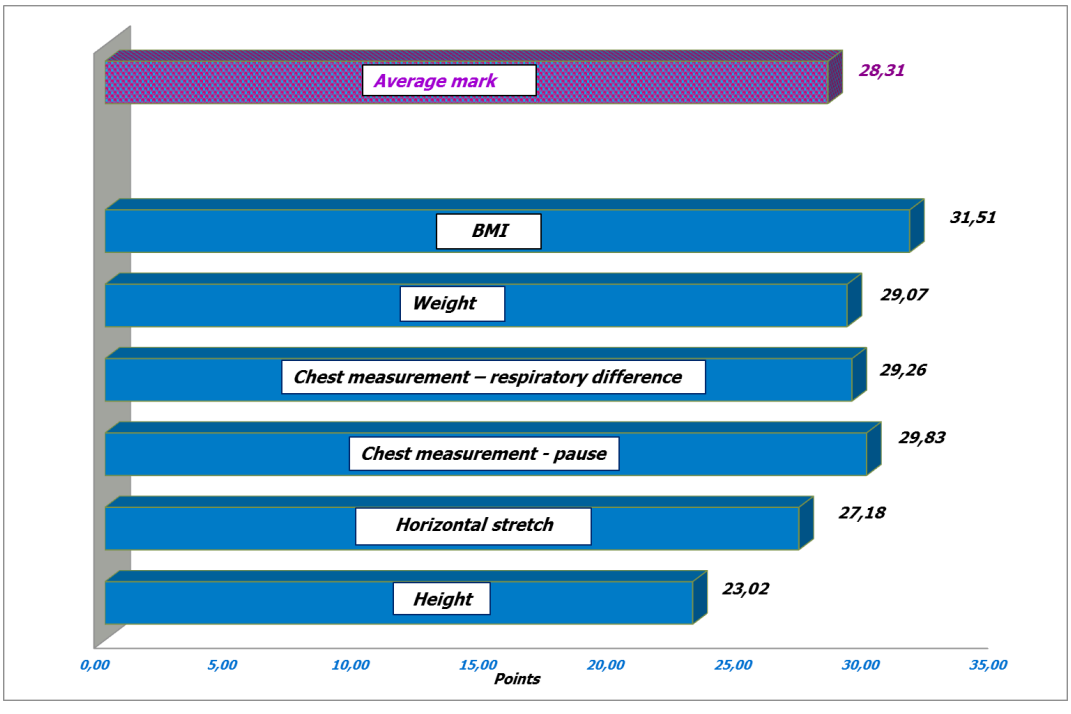

Fig. 1. Generalized average marks of the **physical development** indicators

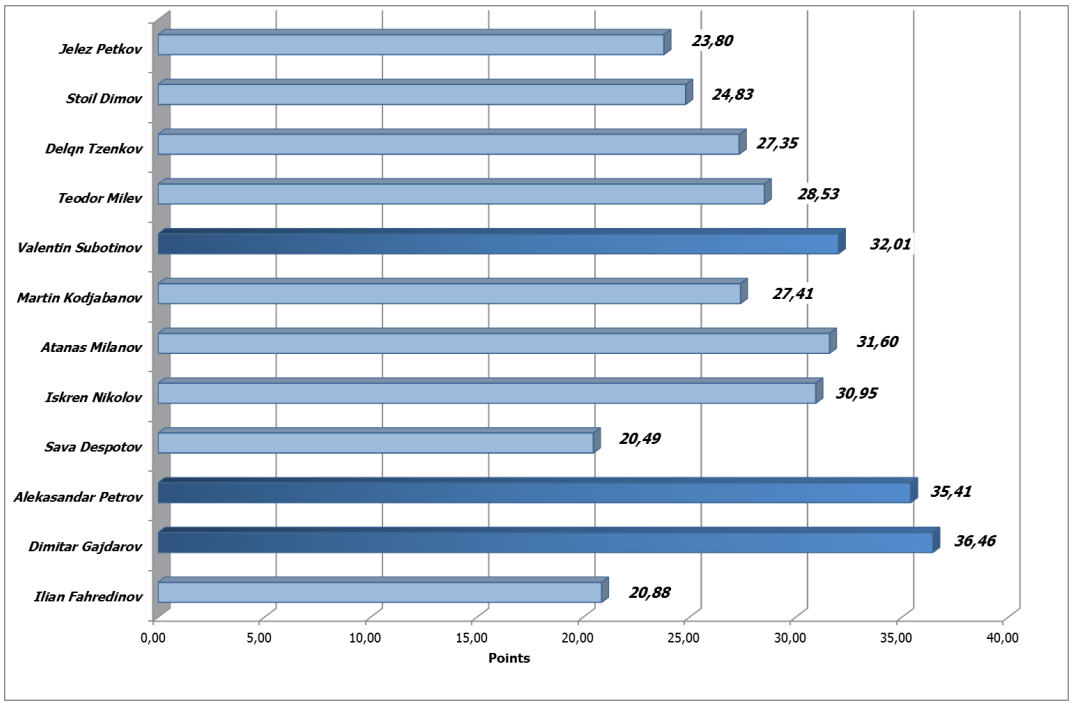

Fig. 2. Individual average marks of the **physical development** indicators

Fig. 3 presents the average marks of the physical preparedness indicators; it is seen from the analysis that in relation to the abdominal muscles dynamics and the explosive strength of the lower limbs at vertical efforts, the totality under study is under the average level for the same age in Bulgaria. The good marks of the competitors are related to the special speed of traveling along the playing ground without a ball (29,83 p.) and the explosive strength of the upper limbs and the shoulders (33,27 p.). Their abilities related to the speed endurance (25,08т.), the explosive strength of the lower limbs for coordination-complicated movements in space (25,58 p.) and the speed qualities (27, 08 p.) are evaluated to be around the average level. The average mark of the team in relation to the physical preparedness indicators is 30,60 p.

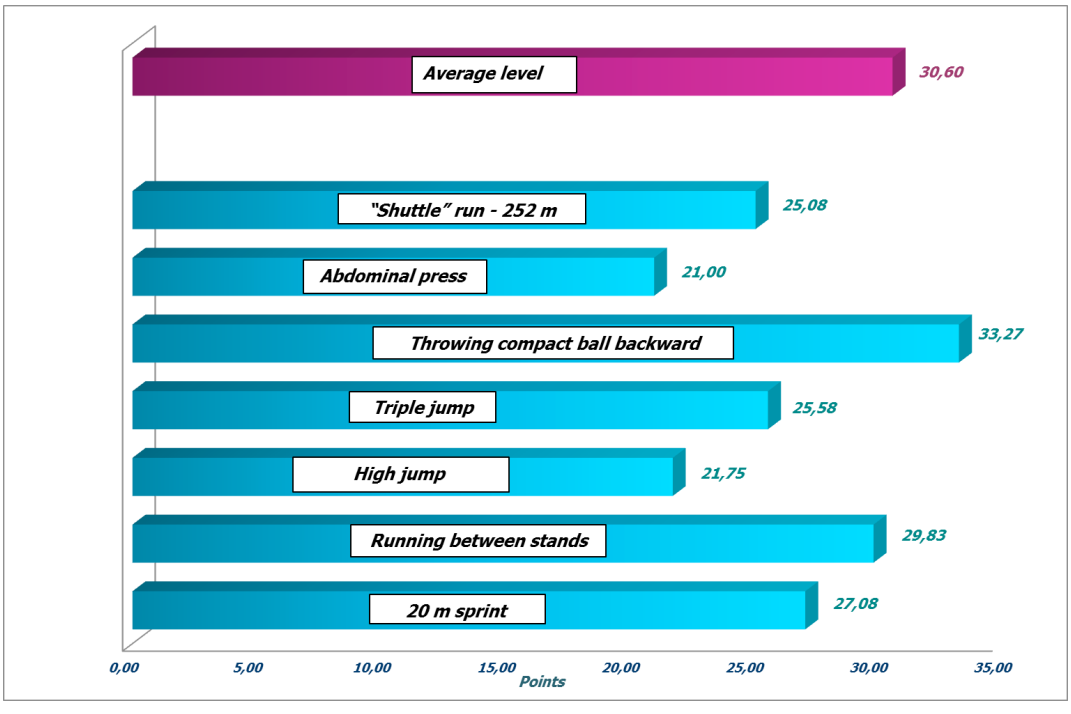

Fig. 3. Generalized average marks of the **physical preparedness** indicators

The individual average marks of the physical preparedness indicators (fig. 4) show that 10 of the basketball players have received marks within the range of 25,48 p. - 37,48 p.

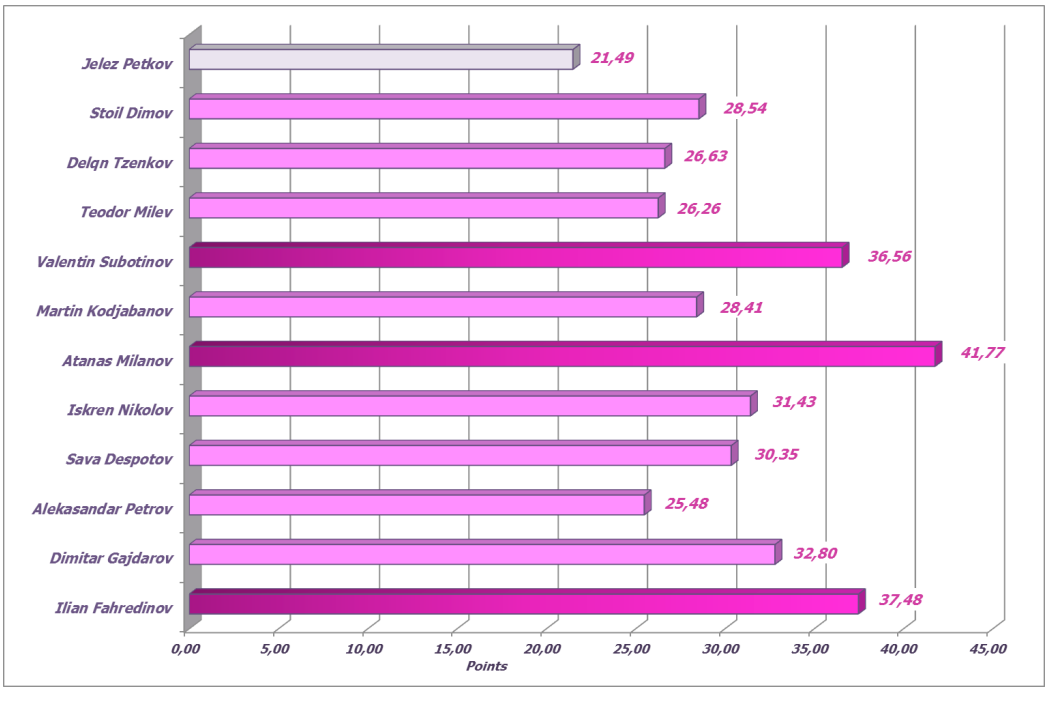

Fig. 4. Individual average marks of the physical preparedness indicators

Two players were left – At. Milanov – having received the highest mark (41,77 p.) and respectively J.Petkov – the lowest mark of (21,49 p.).

Each young basketball player should have a high level of technical and tactical preparation in order to develop and perfect in sport. It can be seen from fig. 5 that for their technical-tactical preparation, four players have received marks under the average level, four of them are evaluated between 25,34 p. to 28,12 p and the rest 1/3 of the team is evaluated by around 30 points (28,30 p. – 34,91 p.).

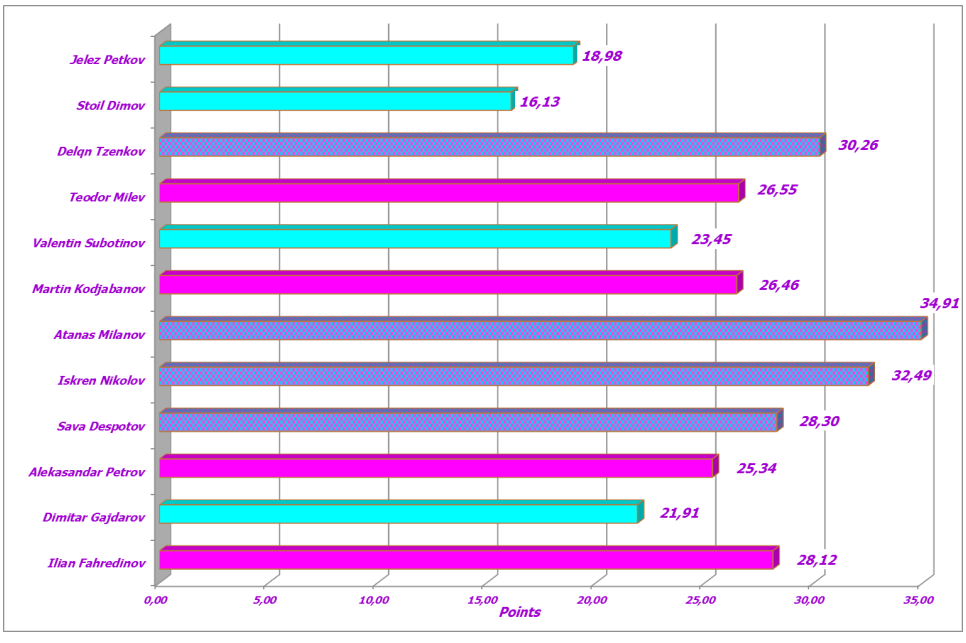

Fig. 5. Individual average marks of the **technical-tactical preparedness** indicators

Impression is made that from the three groups of indicators, the competitors have the lowest generalized average mark of 26,08 p. (fig. 6) for the technical-tactical preparedness indicators.

Fig. 6. Generalized average marks of the technical-tactical preparedness indicators

The highest marks of the players are related to their skills to strike free throws (35,08 p.), to execute quickly the specific for the basketball moving in defense (31,17 p.) and the ball handling (28, 83 p.). Their marks for "shooting from a place after a pass" (24,58 p.), of the speed shooting as time and successful shots are under the average level while the "leading the ball index" indicator is of the lowest evaluation with 21 points. The age and the sports experience of the persons under study require from them higher level of the basketball skills.

The so-called generalized individual marks of the physical development, the physical and technical-tactical preparedness of the basketball players under study are evaluated on the basis of the marks for all symptoms under study (fig. 7).

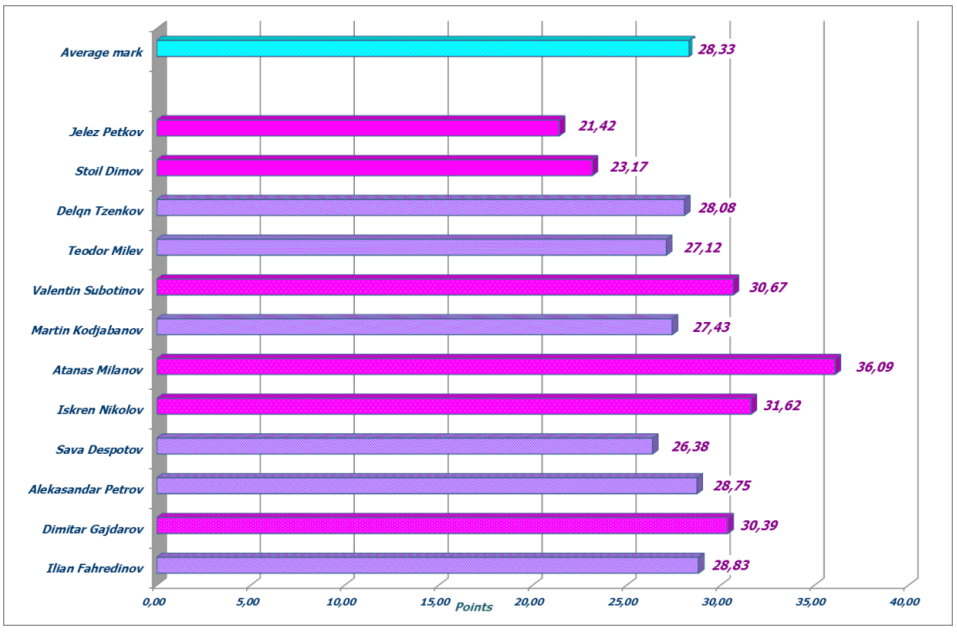

Fig. 7. Generalized individual marks

The analysis shows that in relation to the level of the technical-tactical preparedness, ½ of the team under study is around the average level for that age in Bulgaria, four players have got more than 30 points while the highest mark is again for At.Milanov (36,09 p.). The rest two players are under the average level. The average generalized mark for the team is 28,33 points.

For the needs of the study we have made an individual model for the separate indicators of the player At.Milanov who has the highest marks (fig.8). From the figure it can be seen that the lowest marks relate to indicators №7, №12, №19 and №20 (“running 20 m sprint”, “abdominal presses”, “speed shot on the run – number”, “speed shot on the run - coefficient”). This provides us with the information that the competitor has got weaker speed qualities, which is confirmed by the low effectiveness of the shot on run, i.e., he needs more time to make a goal shooting while moving with high speed, performed after mastering the ball and speed dribble by changing the direction. During the future educational-training process, the sports pedagogues’ efforts should be directed to solving these problems.

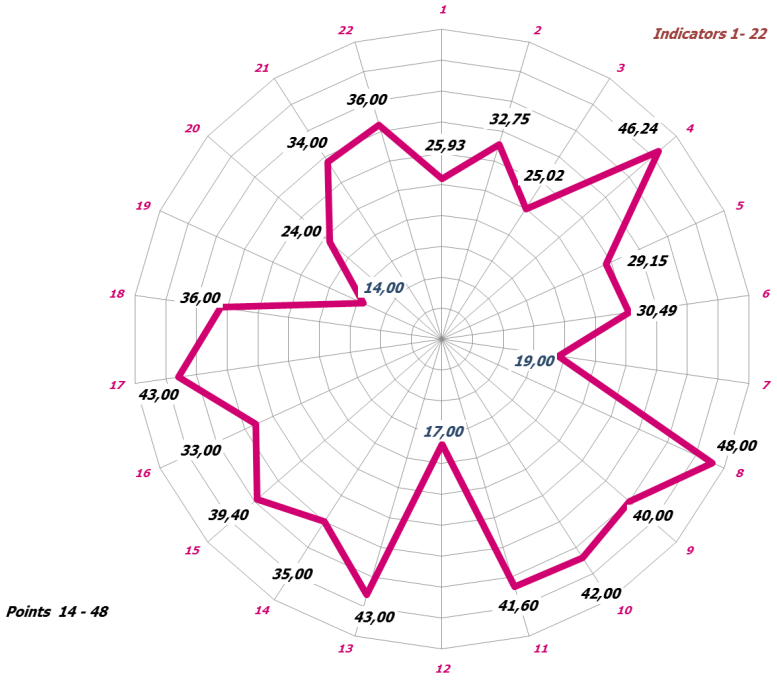

Fig. 8. At. Milanov’s individual model of the marks related to the separate indicators

CONCLUSIONS

The results from the analysis made of the physical development, special physical and specific technical-tactical preparedness of the 17 years old basketball players under study from the "Champion 2006" BC (Sofia), allow formulating the following conclusions:

1. The low mark for the "height" indicator shows that the team has got problems in relation to the structure.
2. The highest marks for the physical preparedness symptoms relate to:
   - ✓ the explosive strength of the upper limbs under front-rear efforts;
   - ✓ the special speed of moving along the playing court without a ball.
3. The level of the following is evaluated by lower marks:
   - ✓ the level of the abdominal muscles development;
   - ✓ the speed endurance;
   - ✓ the explosive strength of the lower limbs under vertical efforts and coordination complicated movements.
4. According to the generalized average marks, the totality under study has got higher level of the development of the physical preparedness than the technical-tactical preparedness.

Recommendations:

1. The accents of the future educational-training activities with the whole team should be directed to the development of the::
   - ✓ speed and explosive strength of the lower limbs;
   - ✓ speed endurance;
   - ✓ jumping endurance;
   - ✓ realization skills of the competitors;
   - ✓ specific basketball exercises should be performed by higher speed.
2. The structure of the team should be improved by entering players of better height.
3. The information received from the study should be used by the coaches when implementing the individual training activities with the competitors.

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DETERMINING THE MOTOR SKILLS DIFFERENCES AMONG STUDENTS MALE AND FEMALE 12 YEARS OF AGE

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Keywords: *measurement,motor abilities,testing.*

1. INTRODUCTION

Each movement reflects some kind of motor skill. There is no motor skill that can be performed without a specific form of movement. There is not one form of performed movement without motor addictive. This unity is reflected especially in learning of the movements.

Psychomotor (motor) skills are dimensions of the human personality, that participate in the successful resolution of the tasks related to movement[3].

Motor habits or structure movement are partly innate, some are built upon and have effect throughout a whole life. There are plenty built upon motor habits. They are created under different conditions and therefore - being different. A various built upon motor habits can be upgraded with self-learning and experience[1].

Motor skills are numerous. They are a basic form of motor habits. Capabilities can be displayed to a greater or lesser extent, and depends of the individual performing. Therefore, how much and how the capabilities occur and recur individually depends on the concept, their development and improvement [2]. Motor habits can be developed under the impact of targeted information and thinking (cognitive functions affected).

The main goal of this research is the determination of motor skills in the sample of respondents aged 12, as well as the differences in motor skills. Knowing the periods of development of motor skills in students is one of the basic assumptions of rational planning and development of the teaching process[3].

2. METHODS

Sample: The population which the sample is drawn from ,is defined as the population of people (m&f)-200, aged 12 years from Skopje, R.Macedonia. Sample of variables:1) anthropological variables: height(TVIS) and weight(TT). 2) motor abilities variables: sit-ups(POTP), tapping with a better hand (TPR), standing long jump (SDAL), flexed arm hang (VISZ), running 5x10m. and forward bend on a bench (DPK),(EURO FIT – standards).

Method of data processing: The central and dispersive statistical parameters were calculated for each motor variable: arithmetic mean (AS); standard deviation (SD); the assessment of the distribution of the results is tested by skewness (Sk); the homogeneity of the results is tested by kurtosis (Ku), minimal results (Min); maximal result (Max), analysis of correlation and T-test to determine the differences of the arithmetic means of the two measurements.

3. RESULTS

The influence of the motor abilities on the central and dispersive parameters for each motor variable are individually presented in **Table1.**

The results given in the first variable (body weight), means that the arithmetic average of the male respondents is AS 57.16, while among female respondents its value is AS = 52.27, ie male respondents aged 10 years average are heavier about 2 pounds than the female respondents. Skyunis values for both sexes are within moderate symmetry, while homogeneity (CS) indicates platikurtic form of distribution.

Table 1. Central and dispersive parameters of the motor abilities

Variable	Gend	N	Mean	Min	Max	St.Dev	Skew	Kurt
TT	M	100	52,27	35	86	13,70	1.15	0.81
Weight	F	100	57,16	36	90	12,59	1,09	1,32
TVIS	M	100	160,46	149	176	7,53	0.32	-0.72
Height	F	100	162,56	154	175	5,67	,56	-,59
POTP	M	100	19,88	12	25	3,35	-0.43	-0.15
sit-ups	F	100	17,05	4	28	4,62	-,32	1,26
TPR	M	100	19,37	12,60	100	14,48	0.20	-0.75
tapping	F	100	16,08	11,40	20	2,16	-,22	-,72
SDAL	M	100	164,50	110	200	17,98	-0.86	2.44
standing long jump	F	100	144,60	100	195	21,42	,46	-,01
VISZ	M	100	20,87	1	62,10	15,31	1.12	0.76
flexed arm hang	F	100	13,67	1	41,10	9,55	1,17	1,36
T5X10	M	100	22,63	13,32	28,39	2,74	-1.20	4.9
	F	100	24,96	20,79	31,41	2,24	,53	,46
DPK	M	100	21,60	11	35	3,15	-1.04	1.41
forward bend on a bench	F	100	22,49	8	39	4,32	-,37	,42

The arithmetic average (AS) on the second variable - body height, is indicating a difference of about 2 cm. in favor of the female respondents (AS = 162.56), or the females are on average higher than the male respondents (AS = 160.46) for 2cm. The values of kurtosis (Ku) suggest a platikurtic homogeneity of results, while values indicate skyunis mezokurtic - symmetry of normal bell curve.

The variable - raising the trunk from the ground, the male respondents have better arithmetic average values AS = 19.88, as opposed to the values of the females (AS = 17.05), by about 3 reps. Both subsamples present values within the normal symmetry of the bell curve, while homogeneity (CS) is indicating platikurtic distribution.

Differences in test taping with better hand, in terms of arithmetic average of AS = 19.37 male and female respondents AS = 16.08, are indicating better results of the males for 3 strokes.

The 5th variable – long jump from place, we notice that the female respondents AS is 144.60, while the male respondents AS = 164.50, ie male respondents are better in the long jump from place for 20 cm. than the female respondents. The homogeneity of results (CS) in both subsamples has platikurtic form while symmetry with moderate asymmetry in both subsamples.

The 6th variable is very specific - flexed arm hang (VISZ) where the values of the skyunis indicates relatively difficult test (Sk values over 1.00). Homegenic results indicates platikurtic shape - values of Ku. While arithmetic average suggests better results with male respondents AS = 20.87, against the female respondents AS = 13.67, ie male respondents are better for 7 seconds than female respondents.

The differences are notable in the homogeneity of results among respondents from both subsamples in variable 7 (running 5h10m.), among those, the results of the male respondents indicate mezokurtic-normal distribution, and that distribution among the female respondents has platikurtic form. The value of AS of the male respondents is 22.63 while the female respondents AS = 24.96, respectively males are on average 2.3 seconds faster than females.

Table 2. Korelation-male

	TT	TVIS	POTP	TPR	SDAL	VISZ	T5X10	DPK
TT	1,00							
TVIS	,55	1,00						
POTP	-,13	-,01	1,00					
TPR	-,36	-,09	,32	1,00				
SDAL	,04	,18	,41	-,07	1,00			
VISZ	-,36	-,30	,33	,20	,54	1,00		
T5X10	,46	,17	-,25	,04	-,36	-,57	1,00	
DPK	-,25	-,57	,39	,01	,14	,40	-,11	1,00

Table.3. Korelation-Females

	TT	TVIS	POTP	TPR	SDAL	VISZ	T5X10	DPK
TT	1,00							
TVIS	,70	1,00						
POTP	,08	,30	1,00					
TPR	-,03	,05	,38	1,00				
SDAL	-,28	,05	,51	,45	1,00			
VISZ	-,43	-,13	,16	,00	,65	1,00		
T5X10	,30	-,02	-,29	-,43	-,64	-,42	1,00	
DPK	-,23	,06	,23	,33	,51	,57	-,35	1,00

Table.4. T-test

	Mean	Std.Dv.	N	Diff.	Std.Dv.Diff.	t	df	p
TT	52,22	13,31						
TT	57,17	12,59	101	-4,95	17,59	-2,83	99	,006

Table 5. T-test

	Mean	Std.Dv.	N	Diff.	**Std.Dv.Diff.**	**t**	**df**	**p**
TVIS	160,5	7,53						
TVIS	162,6	5,67	100	-2,10	8,91	-2,36	99	,020

Table 6. T-test

	Mean	Std.Dv.	**N**	**Diff.**	**Std.Dv.Diff.**	**t**	**df**	**p**
POTP	19,88	3,35						
POTP	17,05	4,62	100	2,83	5,91	4,79	99	,000

Table.7. T-test

	Mean	**Std.Dv.**	**N**	**Diff.**	**Std.Dv.Diff.**	**t**	**df**	**p**
TPR	19,37	14,48						
TPR	16,08	2,17	100	3,29	14,51	2,27	99	,025

Table 8. T-test

	Mean	Std.Dv.	N	Diff.	Std.Dv.Diff.	t	df	p
SDAL	164,5	17,99						
SDAL	144,6	21,42	100	19,90	28,95	6,87	99	,000

Table. 9. T-test

	Mean	**Std.Dv.**	**N**	**Diff.**	**Std.Dv.Diff.**	**t**	**df**	**p**
VISZ	20,87	15,31						
VISZ	13,67	9,55	100	7,20	19,01	3,79	99	,000

Table 10. T-test

	Mean	**Std.Dv.**	**N**	**Diff.**	**Std.Dv.Diff.**	**t**	**df**	**p**
T5X10	22,63	2,74						
T5X10	24,96	2,25	100	-2,33	3,45	-6,75	99	,000

Table 11. T-test

	Mean	Std.Dv.	N	Diff.	Std.Dv.Diff.	t	df	p
DPK	21,60	3,15						
DPK	22,49	4,33	100	,89	1.17	,21	99	,834

The test - forward bend on a bench, indicates better flexibility for females (AS = 22.49), unlike male participants with arithmetic average values of 21.60, ie females are about 0.89 cm. better than males.

The results obtained from the correlation matrix (attached), correlation analysis indicate a specific grouping of coefficients of correlation. The median positive relationship between variables body weight and body height observed in the male examinees level of always removed.55. Positive correlation among variables noted in flexed arm hang and long jump from place to level from .54. A negative relationship is observed between variables in flexed arm hang and running 5h10m., Level of -.57, while a positive relationship at the level of .46 observed in variables 5h10m running and weight of the .46 level.

We assume that this relationship is a result of the biological characteristics of the respondents of this age. The negative relationship between the variables in the flexed arm hang and running 5x10m. due, we assume the existence of a different major muscle groups of the upper and lower extremities, as well as various mechanical properties of strength, in one case a static force of arms and shoulder belt, and in the other case the repetitive force of the lower limbs. Although speed has a negative sign, it still has a positive correlation (inverse structure for speed, ie, the minimum score is actually the best).

The results obtained from the correlation matrix (**Table2&Table3**), the females respondents have little different connection of variables, medium positive relationship between variables body weight and body height observed in male participants of the .70 level.

Positive correlation is also noted among variables for raising the trunk from the ground and long jump from place to level from .51. A negative relationship is observed between variables in flexed arm hang and running 5x10m., Level of -.42 running 5h10m and long jump from place to level -.64 and running 5x10m and taping a hand-level of .43 .While positive association level of .51 observed in variables forward bend on a bench and long jump from place, as well as variables forward bend on a bench and flexed arm hang level thereby favoring the .57 level.

T-test

Statistically significant difference is noted at the level of 5% ($p < .05$) if the value of T-test is 1.96 or more, and if the difference is the level of 1% ($p < .01$) value of T-test was 2:58 and more.

Analyzing the results obtained with T-test we see statistically significant differences in all analyzed variables except for the variable forward bend on a bench (**Table4-Table11**).

By analyzing Central and dispersive parameters of the motor abilities , we notice that the central and dispersive parameters, as general indicators of the motor abilities of the students and the calculated measurements of variability, indicate a relatively acceptable degree of homogenization of the distribution, i.e. it may be assumed that the individual parameters of the respondents are within the limits of the allowed values. There are also statistically significant differences noted in the measurement, indicated by the results obtained with the T-test.

4.CONCLUSIONS

Seeing the results achieved we notice that the distribution is within acceptable parameters, and the results are within the arithmetic average for students of this age in the area of the Balkan countries. We observe a relatively high number of correlations between a specific variables which in turn would allow us to effectuate them using PE[3] exercises covering muscle groups in correlation to the corresponding motor activity. Especially significant are the data obtained from the T-test which in turn indicate the significance of differences in motor skills between students of both sexes.

The more in this period [4] should take account of gender differences and motor activities are practiced, especially in the second part of the hour when through various physical exercises most influence on the development of locomotion students.

The survey established statistically significant differences in all variables that had been treated. Applying the obtained data can positively influence the planning and programming of the PE teaching process in the elementary education.

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MOTOR AND FUNCTIONAL ABILITIES OF CHILDREN AFTER 16 WEEKS OF DIVING TRAININGS

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Key words: *diving, functional abilities, motor abilities*

INTRODUCTION:

As the SCUBA (Self Containing Underwater Breathing Apparatus) diving in children below 14 years is not suggested (5), sport schools and sport clubs in Serbia who train children to dive are mostly based on swimming and diving games. Swimming and diving games imply that children which attend on those classes will be learned to swim, to dive shortly during many games and underwater polygons. Through those games diving training should be positively influence motor and physiological abilities of children. Age of 14 years is by some authors considered as the limit for SCUBA because younger children are not emotionally mature enough to meet the demands of the diving sport (2). Previous research show many benefits of children involved in water sports such aquatic fitness and swimming (3, 6) but there is significant lack of research in water sports with accent of diving.

The aim of this study was to analyze the influence of 16 weeks of diving trainings on motor and functional abilities of 10-12 year old children.

METHODOLOGY:

Groups

This was prospective controlled study, which included 48 children divided in two groups – training and control group. Both group consisted 24 children, 10-12 year old. Children from training group were included in diving trainings 4 times per week per 60min during 16 weeks of the study. Children from control group didn't participate in organized physical activity except for mandatory physical education classes in school.

Training protocol

Training protocol of training group consisted of 16 weeks diving training, 4 sessions each week per 60min. Every session consisted of 5 minutes warm up out of pool, 5 minutes dynamic stretching, 40 minutes of swimming and diving exercises and games and 5 minutes of static stretching.

Testing and battery test

Testing was performed 24 hours before and after 16 weeks of the study, and it consisted of following tests:

Speed:

1. Running 20 meters

Strength:

1. Sit-up 2kg medicine ball throwing from chest position

Flexibility:

1. Sit and reach test
2. Shoulder flexibility test with a stick
3. Adductors flexibility test

Balance:

1. Star excursion balance test (SEBT)

Coordination:

1. Diving polygon of 3 rings with diameters of 60cm. After pushing from pool wall, children dive 4 meters, after which they have to go through 3 rings placed at the distance of 2 meters between each other and to touch the ring. Rings are not placed in a row, center of rings is places 1.5 meters on righr/left from previous ring.
2. Star wall test: Child need to touch the wall once with left hand, once with right leg, once with left leg, twice with right hand – it is one circle. Goal is to make as circles as possible in 15 seconds.

Endurance:

1. 800 m running

Pulmonary function testing

1. VCmax
2. FEV
3. FEV1

Statistical procedure

Statistical procedure was done using PASW 18 statistical package.

RESULTS

Results summarized in Table 1 show values of final testing with *p* value in which children from Training group had significantly better result at the end of the study. It needs to be noted that the values of Adductor flexibility test are shown in relative ratio to the child height. Children from Control group were significantly better than children in Training group in 20m running test and SEBT but it wasn't statistically significant.

Table 1. Tests with statistical significance after 16 weeks of training

Test	Training group	Control group	p
Sit-up 2kg medicine ball throw	3.7m	3.4m	≤ 0.05
Sit and reach test	3.6cm	1.2cm	≤ 0.05
Adductors flexibility test	0.62	0.47	≤ 0.05
Coordination in water	39s	51s	≤ 0.05
Running 800m	212s	231s	≤ 0.05
VCmax	3.22 l	2.83 l	≤ 0.05
FEV	3.11 l	2.65 l	≤ 0.05
FEV1	2.54 l	2.21 l	≤ 0.05

DISCUSSION AND CONCLUSION

Diving is sport which implies stay of person under the water, and it is divided on Apnea and SCUBA diving. In last decade there is an increased number of children attending in SCUBA diving. Today, still, there is lack of studies examining influence of both Apnea and SCUBA diving on human and especially children motor abilities and physiological performances. Winkler et al. in their study found that changes in lung function following the cold air exercise challenge did not predict the responses to SCUBA diving (1). In our study after 16 weeks of training, children from Training group had better results in 7 tests in compare to children from Control group. It should be noted that Training group children had significantly better results in all three measured respiratory values (Table 1). Significantly better results those respiratory values may come as a result of aerobic training regime, explanation lie in the fact that children hyperventilated during training process or that training process had positive effect on structure and function of respiratory muscles (4, 7). These pulmonary results and aerobic regime of training

program give an explanation for significantly better result in running abilities of children in training group. Coordination in the water test was expected to be better by children who attend on dive trainings, because of test specificity with training exercises.

In conclusion we can say that 16 weeks of diving training have positive effects flexibility, coordination, strength, endurance and pulmonary functions in children after 16 weeks of training.

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SOCIOL ASPECT OF SPORT AND PHYSICAL EDUCATION – SOC

THE MODEL OF THE SPORTSWOMAN AND SIMON DE BEAUVOIR'S FEMINIST

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Key words: *Gender, Sport, Feminist, Simon de Beauvoir, Philosophy of Sport,* ***Simon de Beauvoir's Contribution:***

INTRODUCTION:

This paper is focused on comparative analysis between feminist theory of Simon de Beauvoir and the contemporary model of the Bulgarian sportswoman. We insist that Simon de Beauvoir's feminist theory is incomplete because of missing model of sportswoman. The sportswoman in the top-level sport, has very important social significance, moreover the coming generation follows her example, so we have to know her. Our work is focused on the contemporary Bulgarian situation. In our paper we discussed some new theories about sportswoman, her representation in Bulgarian pop culture and some problems which rose according to the feminist point of view.

For this reason we used as underlying concept, and *methodology*, namely Simon de Beauvoir's gender philosophy and we choose this as the theoretical background of the contribution as well as starting point for guidance on. On the basis of this gender philosophy, it was possible to reduce the enormous number of questions relating to woman's sport. In our research we are focused on central structural elements as well as on significant international issues (Olympic games) and the representation of girls and women within the social structures in Bulgaria (Bulgarian National Sports Academy, Bulgarian National TV channels etc.) and women in decision - making committees of sport organizations (Bulgarian Olympic Committee , IOC etc.); support of top-level athletes and finally "best - practices" in regard to the main problems in the studied field.

Simon de Beauvoir's feminist theory started a new era of thinking about woman's position in society. Her book *The Second Sex* has become a classic in feminist philosophy. De Beauvoir offered a new understanding of the social relations between man and woman. According to her understanding woman create her femininity as **Other.** She insisted that *"One is not born woman, one becomes this".* No biological, psychological or economical fate determines the figure that the human female presents in society, it is civilization as a whole that produce this creature, intermediate between man and eunuch, which is described as feminine. Beauvoir explained our sense of Self – the subjectivity through exist philosophy i.e. one exists, first and through one's acts, one becomes something. The individual, accordingly Beauvoir, has absolute control over their fate, and neither society nor organized religion should limit our freedom to live authentically. We construct our sense of Self in relation to something 2which is not "our self" - an Other. But since men have claimed the category of Self, of Subject, of themselves, woman is relegated to the status of Other. As a result, the model of woman has no substance except as an extension of male fantasy and fear (2).

Since all cultural representations of the world around us have been produced by men, women read themselves in terms of masculine definitions and "*dream through the dream of men*". Women are required to accept her status of Other, "make herself object" and "*renounce her autonomy*". "*This status of Other can be changed if women learn to access the subject hood they have so far been denied. Women must achieved complete economic and social equality, which will enable an inner metamorphosis to take place. When a female become a woman, she will be a Subject, and an Other to man in as much as he is Other to her*."(De Beauvoir, 1953, p.614)

THE SPORTSWOMAN IN THE DE BEAUBOIR'S PHILOSOPHY

Despite that in Beauvoir's philosophy is missing separate chapter about the role of sportswoman (probably because in her times women had no access to the major sports and sportswomen did not have this social impact which they have in contemporary society), according to Beauvoir, the female that plays sport is more self - sufficient and with higher self - confidence than the female that does not play any sport. Girls that are involved in sport have the possibilities to get know their bodies and to feel their feminine, to sublimate their aggression and to discover the world around them by its own senses. Beauvoir stresses out that for the growing girl is very important to climb, to fight, to feel the straight of her own arms. In contrast girl that does not practice any sport is very passive and does not know her own body and it could be a problem latter in her development. *"Moreover, in many countries"* stresses out Beauvoir*," most girls have no urge towards sports; since scuffles and climbing are forbidden, their bodies have to suffer things only in a passive manner; much more definitely than younger, they must give up emerging beyond what is given and asserting themselves above other people: they are forbidden to explore, to venture, to extend their limits of the possible. In particular the* ***competitive*** *attitude, most important to young men, is almost unknown to them". (*De Beauvoir, 1953*, p.329)* Young women can compare with each other but sport's competition, challenge, is something much more vivid and important than this passive comparative. "*The free beings confront each other as having on the world of hold that they purpose to enlarge; to climb higher than a playmate, to force an arm to yield and bend, is to assert one's sovereignty over the world in general. Such masterful behavior is not for girls, especially when it involves violence".* (De Beauvoir, 1953, .p.329)

Nowadays girls in our western civilization are free to practice any sport that they wish, but (sic!) they are not socially recognized and even more they are judged by their societies. Girls that play wrestling, boxing, soccer etc. are claimed to be lesbian and not enough feminine. Parents prefer their girls to play ballet or rhythmic gymnastic, to be beautiful, tender and graceful, instead to climb, fight and compete with each other. So we do not have repressive laws but our society use its symbol power to repress those girls. Man could be aggressive, it is part of his masculinity but when woman is aggressive she is considered as mad, bad educated and not stable. The positive, legitimate violence is forbidden for woman, despite that "*violence is the authentic proof of each one's loyalty to himself, to his passions, to his own will, radically to deny oneself any objective truth, it is to wall oneself up in an abstract subjectivity; anger or revolt that does not get into the muscles remains a fragment of the imagination. It is a profound frustration not to be able register one's feelings upon the face of the world." (*De Beauvoir, 1953, p. 330)

Beauvoir very often is criticized that she regrades motherhood as mainly woman' s obligation and as a way man to control woman and she does not see any other possibilities. In fact, since the beginning of 3our civilization motherhood *is* mainly woman obligation! In the contemporary society this situation is not different. Motherhood means that woman should stop her career development, many young women despite that they are well educated and even more prepared for a given job are not accepted and do not get the job because of the men whose are less prepared but they are not going to miss from work because of their parenthood. The statistic is enough obvious. Most top and high-power positions in businesses and companies in Europe are held by men. Women currently hold only 4.4 percent of Fortune 500 CEO roles and as little as 4.4 percent of Fortune 1000 CEO roles. Research has shown "a consistent difference favoring men in accessibility to, and utility of, resources for power". (7) Thus, business

and industry worldwide still sees a harsh split between the genders in terms of who has control. If we look in our everyday situation we will see that still children 's education and care is regarded as mother work, the same is with the housework. In our society housewife is regarded as stupid and lazy woman that is not in position to earn her own money, her work at home is not paid and even is not a value for the bigger part of the society. Woman that earns her own living is obligated to be mother, house wife and to has bright career which is very difficult and stressful for the majority of women.

THE CONTEMPORARY MODEL OF THE SPORTSWOMAN

Motherhood is serious problem for sportswoman. Logically pregnancy and baby care will put her body in condition that she could not use it for purpose. 99% of the cases with top-level sportswoman show that pregnancy means stop of their careers. For the sportsman only the age could be a problem, but latter they can start business or to become very good coaches and sport managers. If we think about male coaches immediately in our mind are coming several male names,but if we think about females the situation is completely different.

Olympic games are significant example in this perspective. Olympic Games in London, 2012, for the first time in Olympic history, every country competing included female athletes. Saudi Arabia included two female athletes in its delegation; Qatar, four; and Brunei, one (Maziah Mahusin, in the 400m hurdles). Qatar made one of its first female Olympians, Bahiya al-Hamad (shooting), its flagbearer at the 2012 Games. Also at the 2012 Olympics, runner Maryam Yusuf Jamal of Bahrain became the first Gulf female athlete to win a medal when she won a bronze for her showing in the 1,500m race.

The only sport on the Olympic programme that features men and women competing together is the equestrian disciplines. There is no "Women's Eventing", or 'Men's Dressage'. As of 2008, there were still more medal events for men than women. With the addition of women's boxing to the program in the 2012 Summer Olympics, however, female athletes were able to compete in all the same sports as men. In the winter Olympics, women are still unable to compete in the Nordic Combined. There are currently two Olympic events in which male athletes may not compete: synchronized swimming and rhythmic gymnastics (15).

So we can see that there are some good perspectives and good practices in sport's fields but still unsatisfied and again any success that woman gains, means much more work, the sportswoman has to suffer privations to be successful as man is. It is not strange that in developed country population growth is negative – women are not welling to give birth to more than one, maximum two kids, because of their careers and obligations.

BULGARIAN PERSPECTIVE

The situation in contemporary Bulgarian society is not very different than this in Europe as a whole. 4Despite that physical education is for all in the school, girls are not motivated to practice sports as boxing, wrestling or hiking. Those sports are not regarded as typical for woman and the society stereotypes regarded women in this fields as lesbian, not feminine enough and even sick. It is on all level of our contemporary Bulgarian society. In her research, Domuschieva- Rogleva stresses out, that women in Bulgaria that compete in single combat sports are less self assured than men in the same field, moreover it is stable tendency that sportsmen are much more self - sufficient and with higher self - confidence than sportswoman. (4) Bulgarian society is far away from the equality between two sexes. Equality means at least 50% from decision - making positions to be hold by women, the same should be in pop culture, mass media and educational institutions. Unfortunately women are less than 30 % in all those institutions in some places even less than 10%. There is a very big paradox - during the socialist regime (Bulgaria is post -communist country) women 's emancipation was regarded as State ideology, but in fact woman were not independent they were much more under pressure and at the end they "won" more obligations than rights.

For instance, in the present Bulgarian Olympic Committee there are two women managers – Stefka Kostadiona is chairman and Yordanka Blagoeva is vice president. Other 6 vice presidents and the general

secretary are men, it means that only 25% are women. In the Executive committee of the BOC women members are Vanya Gesheva, Zdravka Yordanova, Maria Grozdeva and Tanya Bogomilova. In the Control board of the BOC the only woman is Ecaterina Dafovska. There are 10 women among 30 individual members, which means as little as 33,33% are women. Their names are: Albena Denkova, Vanya Gesheva, Vesela Letcheva, Evgenia Radanova, Ekaterina Dafovska, Zdravka Yordanova, Yordanka Blagoeva, Rumyana Boytcheva, Svetla Otsetova, Stefka Kostadinova. (8)

In the same time International statuesque is even worst, there has never been a woman chairman in the IOC. (9) Women are -0%!

The situation in Bulgarian National TV is not good as well. We are still far away from the equality. In the Bulgarian national televisions there is not a woman author of sports broadcasting. Among the most famous television personalities are Boryana Toncheva, Svoboda Madanska, Radina Jekova, Antoniya Bliznakova, but none of them has her own show. There is not Krum Savov female version.

Some women are chosen as television personalities in sport's programs rather because their physical beauty, "to adorn", not because of their journalistic skills and sports culture. Or their abilities are estimated just because they are beautiful or someone's daughter or wife. There are even more strange examples. Petya Petrova said in an interview that before she gained popularity as a journalist, she was often "booed by the audience" because of her big bust ?!

Despite black statistic there are some good examples. The journalist Antonya Bliznakova is among first women to break into pieces that claim that football is preserve of men. She has been reflected football games more than 14 years. (10)

Unfortunately Bulgarian pop culture is full with sexist examples. For instance: "Miss National Team" is a reality, radiating in parallel with the World Cup. It is aimed primarily at male audience. It's a beauty contest for girls who love sports. The winner gets prestige to replace pendant plush bear, usually "hyping" the national football team to win. The other two girls are respectfully talismans of national teams of basketball and of volleyball. It is noteworthy that the motto of the reality is written by typo. And also ponder whether the format "Mr. National Team" would have such success? Hardly, because women, unlike men, do not accept the opposite sex as a subject. (11)

5The image of the famous women athletes is commonly used in media advertising. It will be good if they present youth sports clubs and after their active top-level sport careers are involved in sport politics and stress mass attention with their successful careers as coaches, sport managers, sport journalists etc, but instead they become just advertising images. Wafer "Golden Stanka"..., Tereza Marinova advertises dish washing detergent, Maria Grozdeva advertises bank. After Stanka Zlateva won the reality format "Vip Brother" she became famous far beyond the sport world. This fact is written in her Wikipedia biography alongside her sport's awards...despite her silver medal in the 72 kg category wrestling which is our best performance of the last Olympics in London 2012, but unfortunately she is recognized by the masses because of her reality success -which is "suitable for woman".

Stefka Kostadiona is one of the most iconic figures in Bulgarian sport. Except she is a chairman of the BOC, her world record of 209sm high jump remains surpassed to this day. However, her beauty - spot provokes men 's imaginations and rises even mass discussions.

Ivelina Kirilova is one of the few female power-lifter competitors in Bulgaria. In most of the national competitions she even participates alone in category. That doesn't stop her motivation because her goal is to be better than men. With her personal weight of 50kg she is the best according to the coefficient Wilks at National Championship in March, 2014. That is the coefficient l to assess the achievement, based on personal weight of the weigh-lifter. That means that she is the first, with best results, not only among women, but among all men participated in the competition, as well. Despite this success she is completely unknown by the masses and not recognized by sportsmen. Moreover, Bulgarian weightlifting federation provides financing only for male athletes but not for women! So her participation is on her own account and her achievements do not earn money to her club. (12,13)

The same is the situation with the Bulgarian female soccer, in her dissertation on "Improvement of training women footballers" Stansilava Tsekova writes that "despite the fact that contemporary female football started in 1981 we have not managed to create normal structures and models to prepare for different age stages. (…) Discrimination of women`s and girls' football, lack of vision and policy in this area can only prove the existence of inequality between male and female in the soccer and non-compliance with European values and guidelines in this regard." (5)

In the other fields the situation is not so different. There are few qualified enough and practicing sports psychologists in Bulgaria and most of them are women. Among these are the names of Professor Tatyana Yancheva (European champion in rhythmic gymnastics from Madrid 1978 and World Vice from Basel 1978, honored master of sport) with more than 100 scientific publications (6) and Professor Julia Mutafova (long years basketball athlete in *Locomotiv Sofia*, played in Youth national basketball team, announced by Bulgarian High Institute for Physical Education "Georgy Dimitrov" for "Sea Queen" because of her record of 3 minutes and 20 seconds for diving) with more than 150 scientific publications.

Nadezhda Lekarska is the only Honoriscausa woman of Bulgarian National Sports Academy "Vassil Levski", chosen on 22 may 1997. To date, this medal is awarded to 22 people, which means 4.2 % !!! are women. So far, NSA "Vassil Levski" has never been led by woman Rector. Prof. Daniela Dasheva is the only woman, from four vice – Rectors. (14)

Iliana Raeva, coach of the national rhythmic gymnastics team (our most successful sport in the last three years), manifests in other backgrounds. Besides being a jury of dancing show "Dancing stars", she also founded a political party "United Bulgaria" and headed it as its chairman. This is a single 6example but at least example for a well presented female top-level athlete.

CONCLUSIONS:

Unfortunately, according to this research, females are still regarded as second sex and nearly one century after De Beavoir's research we are still far away from the so yearned equality between sexes. Sport is still male's territory and the world as a whole is male's. The attitudes in Bulgaria are not drastically changed, but they have to, women are still regarded in accordance with patriarchal stereotypes. But despite all difficulties, and provided by us black statistics, sportswomen succeeded to take part in contests and to win few (under 30%) decision – making positions and at least to show that women are good enough and they have to seek more!

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LEADERSHIP AND DRIVING FORCES IN LOCAL HEALTH ENHANCING PHYSICAL ACTIVITY (HEPA) POLICY DEVELOPMENT IN ROMANIA

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Keywords: *leadership; driving forces; health enhancing physical activity - HEPA; policy development, local*

INTRODUCTION

Collaboration was identified as one of the key components that support the development of evidence based health policies [1].

Leadership and driving forces in local policy making are some of the most important assents to increase the communication and collaboration among different stakeholders when designing a policy. The level of existing leadership and driving forces can also be used to indicate the path a local policy development process will have. The World Health Organization recognizes the role of local governments and local leaders in creating favorable environments for developing policies on active lifestyle and providing leadership and legitimacy for the implementation of these policies [2].

A study conducted in Canada on 265 directors of applied research organizations about their practice on transferring knowledge to decision makers in policy making processes identified that a strong leadership is important for knowledge transfer and that leadership and legislative mandates may exert reciprocal influences on each other [3]. Leadership was identified as an important predictor of collaborations and partnership [4] while the lack of leaderships was identified as a barrier to policy making [5].

In order to have evidence informed health policy World Health Organization (WHO) has launched in 2004 the Global Strategy on Diet, Physical Activity and Health which encourages the development of policies and actions to support physical activity: "National and local governments should frame policies and provide incentives to ensure that walking, cycling and other forms of physical activity are accessible and safe" [6]. National and local policies and programs that target physical activity have to focus on the leadership and driving forces that would support such actions at national or local level, and better understand the system and processes that stand behind such actions.

So far, several studies were conducted in Romania on the civil society and their experience in public health policy and planning [7, 8, 9] but the information available is general and no specific publication was retrieved on the leadership and driving forces in local HEPA policy development.

In order to stimulate the development of strong, standalone policies for health enhancing physical activity (HEPA) more in-depth understanding of the leadership and driving forces that act upon the policy making process is needed.

Our study objective was to explore the internal and external driving forces and the leadership roles of stakeholders in local HEPA policy development in Romania.

METHODOLOGY

Definitions

For a better understanding of the concepts that were studied, we will define "driving forces" and leadership and describe the relation between leadership and driving forces.

Most of the definitions of (internal and external) driving forces are given in the context of organizational change [10, 11, 12]. For the purpose of this paper, we will propose different definitions, as the current study focuses on collaboration within local networks of organizations involved or relevant to local policy development, and not organizational change in itself.

Driving forces are internal and external factors that are the influencing the decisions, policies and activities of an organization [13]; driving forces motivate (the internal ones) or enforce (the external ones) organizations to behave or act the way they do.

Internal driving forces are internal organizational goals and activities related to HEPA policy development that are addressing a need identified in the system, but not framed as a constraint from the system. These driving forces overpass the requirements from the system, and have the role of creating progress in the organization and the system.

External driving forces are factors external to the organization that shape the goals and the consecutive activities of the organization, by answering to a requirement from the system or a need expressed in the system. Their main function is to ensure that tasks that are being assigned from the system to the organization are being fulfilled and that expressed needs are addressed.

The system represents all the stakeholders involved in and/or accountable for local HEPA policy development from the public, private and civil society sectors and their relations as well as the recipients of the HEPA policy, the population.

We define leadership as the roles and attributes an organization involved in local HEPA policy development play given its position in the system, its capacity and the internal and external driving forces that are experienced by the organization.

Hence, in the current paper internal and external driving forces are considered factors contributing to the shaping of the leadership roles of the public, private and civil society national and local organizations in the local HEPA policy development (**Figure 1**).

Data collection

Figure 1. The relation between driving forces and leadership in local HEPA policy development and their influence on HEPA policy development.

The local HEPA policy development structure and processes have been explored using: 1) document analysis, 2) stakeholders' interviews and 3) official requests for public interest information.

Cluj-Napoca municipality was used as a case study for analyzing local HEPA policymaking in Romania. The stakeholders involved in local HEPA policymaking were identified through a snowballing recruitment method [14]. The stakeholders involved in the development of a Cluj-Napoca HEPA policy, analyzed under previous REPOPA research activities, The protocol for organizing sport activities for children in Cluj county - "Cluj Champions" [15] were asked to identify persons or institutions they have been working with in the past or that they knew could play a role in local HEPA policymaking. Stakeholders identified through this procedure were asked to identify other relevant institutions and stakeholders.

This process was followed by the document analysis. The websites of the following public institutions: City Hall, City Council, County Council, County School Inspectorate, County Public Health Department, Faculty of Physical Education and Sport, and Children Palace were explored in search of documents

comprising the departments within the identified institutions and their legal attributions in local HEPA policy development, as well as the activities they conducted in this regard. Also, the websites of previously peer-identified local private and civil society organizations were explored in search for HEPA activities and driving forces for the development of these activities – presented in the forms of organizational objectives, mission or goals.

The centralized Romanian administrative system [16] involves a high degree of guidance and control from central to local administration institutions. Hence, we also explored the websites of the Ministry of Youth and Sport and the Romanian Sport for All Federation, the Ministry of Education and the Ministry of Health for finding strategies and programs related to HEPA policy development.

Thirteen interviews were conducted, as it follows: (1) ten face-to-face local interviews with representatives of the following Cluj-Napoca public and private local organizations: County Sport for All Association, City Council (two interviews), County Council, County School Inspectorate, County Youth and Sport Department, County Public Health Department, Faculty of Physical Education and Sport, County Children Palace, Napoca Cycle Tourism Club and (2) three face-to-face national level interviews with the representatives of the The Romanian Sport for All Federation, The Ministry of Education and The Regional Public Health Institute. The local interviews were conducted in the timeframe February-May 2013 and the national interviews in April 2014. The interviewees were asked to identify the roles of their institution in local HEPA policymaking, discuss potential driving forces for policy development and describe the nature and the outcomes of their interactions with other local stakeholders.

Not least, we submitted public interest information petitions, accordingly to the Law no. 544/2001, for free access to public information, to the Cluj-Napoca City Council, the Ministry of Education and the Ministry of Youth and Sport [17].

RESULTS

There are national as well as local stakeholders from both the public, civil society and private sector involved in local HEPA policymaking in Romania. The driving forces and leadership roles of these stakeholders in the policy development vary between sectors and domains.

Driving forces in local HEPA policy development in Romania

The most important **internal driving forces** for HEPA policy development were identified within the private sector and civil society representatives. The local private sector representatives get involved in the development of HEPA policies or programs for promoting their brand and products to the population and creating a larger pool of potential customers. Civil society representatives, NGOs and sport associations get involved in order to promote a certain sport specialty or to promote sport for health (e.g. health promotion oriented NGOs). However, they also have financial incentives as most of them are organizing sport competitions throughout the year that require a registration fee. Not least, some of the sport associations involved in HEPA policy and programs offer training courses for the sport specialty they promote, from courses for children that have the opportunity to learn a sport in a performance oriented setting to courses for adults that have the opportunity to take beginner/leisure oriented lessons.

The analysis we conducted did not revealed any internal driving forces of institutions or persons from the public sector in regards to HEPA policy development, their activity being mostly oriented to achieving the goals set by the national institutions in their strategic planning or stipulated in the responsibilities of local administration institutions according the national health law [18, 19].

External driving forces are exerted in the system of local HEPA policy development by the national institutions from the sport, education and health domains, on their local branches, that have to implement at local level nationally developed programs, accordingly to the Government strategy. Also, at local level, external driving forces are experienced by public administration, private and civil society organizations, even though the nature of these driving forces is different (**Figure 2**).

The influences from ***national level institutions*** mostly comprise of: (1) giving direction to law, acts

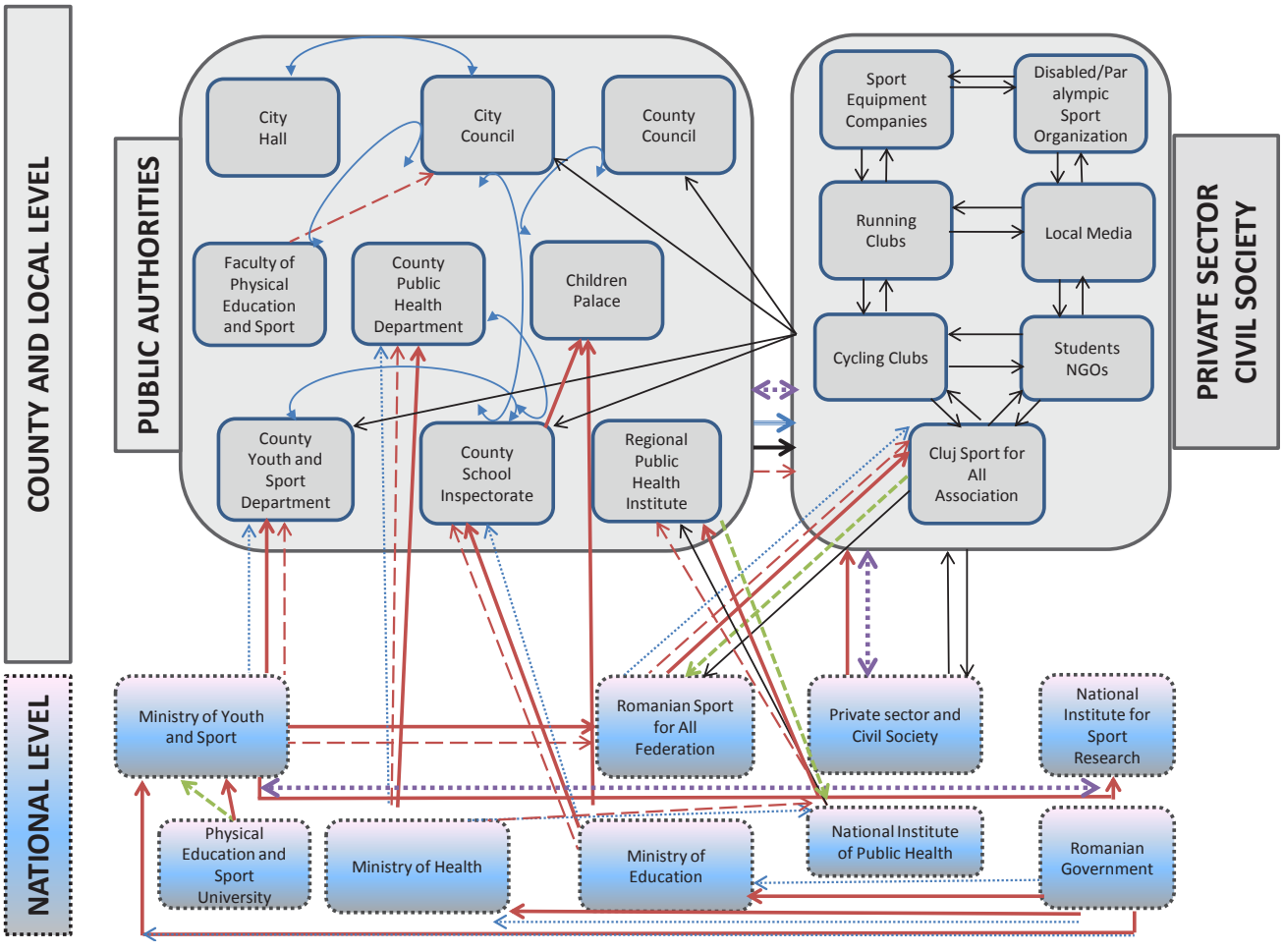

Figure 2. Stakeholders and driving forces in Romanian local HEPA policymaking.

The case of Cluj-Napoca Municipality.

and interventions, (2) offering guidance and advice for policies and programs and (3) financing and allocating other available resources, such as infrastructure. All these external driving forces exerted from national to local level are in accordance with the hierarchical relations that exist between national institutions and their local branches and the legislation that stipulates the attributions of each of the institutions in the local HEPA policy development.

The ***public administration institutions***, the City Hall, the City Council and the County Council, have the responsibility to support HEPA initiatives, as part of their legal binds for ensuring public health services for the population [18]. Thus, although the public health related attributions are a part of these institutions own responsibilities, this is an external driving force, given that it is exerted from the system, more specifically from an expressed need in the system – for example, from the population or from the civil society representatives. Conversation and interaction between and within the public, civil society and private sector, in which they express their wishes or requirements, or exchange knowledge or experiences, also represent external driving forces that influence the way all these stakeholders act in the HEPA policy development system.

Some of the most important external driving forces for HEPA policymaking for the ***civil society organizations*** are related to the allocation of resources formal and informal acceptance and interaction or transfer of knowledge with the public sectors. More specifically, their calendar of activities is somewhat dependent on the collaborations with the public institutions for (co-) financing the activities, for offering support in regards to using public infrastructure (such as sport venues) or human resources (medical and security coverage or referees for amateur sport competitions). The civil society representatives

are also influenced in their activity by each other's experiences, their interaction being sometimes materialized in joint activities. However, the competition for sponsors for financing their own activities represents a factor reducing the collaboration between civil society organizations.

The ***private sector*** organizations external driving forces for involvement in local HEPA policy development are related to the request for financial and logistic support addressed from public and civil society organizations. Their input consists of sponsoring HEPA events with own products, funding the prizes or agreeing to offer their own sport infrastructure for the development of HEPA events.

Leadership roles in local HEPA policymaking in Romania

The internal and external driving forces presented above are influencing the leadership roles that public, private and civil society organizations take in the local HEPA policy development.

The local public administration institutions have the leadership in providing resources – financial, making available free of charge sport infrastructure, human (medical and security coverage) for civil society developed policies or programs. Instead, the civil society stakeholders have the inner drive, interest, specialized human resources and experience in developing HEPA policies and programs, thus being the most important policy developers and actual implementers.

The majority of the local HEPA policies, programs and events are designed, developed and implemented by the civil society institutions with logistic support from the public institutions or from private sector organizations. These programs are branded as collaborative projects, even though the public and private sectors' involvement in the development and implementation phases is rather minimal.

The sport sector has the leading role in local HEPA policy development in Romania. The public, private and civil society organizations from this sector with attributions and activities related to HEPA have the legal bounds, legitimacy and resources to act and the internal (in the case of civil society) driving forces that determine their leading role in local HEPA policy development.

Table 1. Leadership roles of public, private and civil society organizations in local HEPA policy development

Sectors	Leadership roles
Public	Providing resources (co-financing, sport venues, referees, volunteers, medical and security coverage) for private and civil society developed policies, programs and events
Private	Financial support (e.g. equipment, prizes) for both public and civil society HEPA policies, programs and events
Civil Society	Expertise and experience in their area of activity, specialized human resource (e.g. former athletes), development and implementation of local HEPA policies, programs and events

DISCUSSION

Internal driving forces, such as the need for brand promotion, developing sport competitions and providing training courses, mostly influence the roles and activities of civil society and private organizations in local HEPA policy development. External driving forces, such as legal provisions that establish accountabilities and the expressed needs from stakeholders in the HEPA policy development system are influencing the activity and leadership of national and local public institutions. The sport sector has a leading role in local HEPA policy development, due to its accountability, legitimacy, and resources. While national and local public administration organizations have the strategic, financial and resources allocation leadership in local HEPA policymaking, the civil society organizations are leading the process of policy and programs development and implementation. The private organizations offer financial support to both public and private initiatives.

The leadership of sport sector and the centralized political and administrative system in Romania influ-

ence the development of local HEPA policies, in terms of both policy content and accountability and expertise of stakeholders involved. Our results are different from the results of a study conducted on 27 national physical activity promotion policies in European countries, that revealed the involvement of the health sector (The Ministry of Health) in almost half of the policies analyzed, making health the most frequently involved sector in the policy development phase [20]. Nonetheless, the same study found limited evidence of intersectoral collaboration in the development phase of physical activity policies, in most cases policy documents being drafted by a single ministry. These results are consistent with our results that revealed public-private-civil society collaborations in local HEPA policies implementation, consisting in sharing resources, but not in the policy development phase. Also, a study of HEPA related policies in seven European countries revealed that the Ministry of Health was identified most frequently as the HEPA policy development coordinating organization [21]. The influences of different leading sectors in local HEPA policy development on both policy content and outcomes should be further studied.

The most important strengths of this study are related to the mixed methods used for exploring driving forces and leadership in local HEPA policy development (document analysis, stakeholders' interviews and petitions for public interest information), and by the fact that we covered in our analysis stakeholders from both national and local level, and from public, private and civil society sectors.

Some of the study limitations are related to: 1) the incomplete or unstructured data found on the official websites of public and private organizations regarding their roles and activities in local HEPA policy development, 2) the difficulties in communication and collaboration with stakeholders approached, in terms of explaining the concepts approached and thus being able to answer the questions asked during interviews, and 3) the exploratory nature of the study that only had the purpose to identify and describe the driving forces and the leadership roles in local HEPA policymaking, without trying to make and inference on policy outcomes in the current or other system arrangement.

More studies on driving forces and leadership roles in local HEPA policy development are needed, so as to be able to elaborate on the advantages and drawbacks of HEPA policy development systems in high compared to middle-low income countries and to develop a set of recommendations regarding necessary improvements in each type of system so as to contribute to more effective HEPA policies.

CONCLUSIONS

The leadership roles of the stakeholders involved in local HEPA policymaking in Romania are influenced by their position in the system that determines their responsibilities and their resources and by the internal and external driving forces experienced by these organizations.

Internal driving forces influence the leadership roles of private and civil society organizations and external driving forces the leadership of public organizations. The mixed public-private-civil society leadership and the integration of HEPA policy in the sport sector policy influence policy objectives and potential outcomes.

More research needs to be conducted into the limitations of the current local HEPA policy development system and the potential improvements that could lead to more effective, impacting policies.

ACKNOWLEDGEMENTS

This work has been done as a part of Research into Policy to enhance Physical Activity (REPOPA) Consortium; www.repopa.eu. The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under the grant agreement no. 281532. This document reflects only the authors' views and neither the European Commission nor any person on its behalf is liable for any use that may be made of the information contained herein.

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HISTORY OF THE NSA "VASIL LEVSKI" – ISSUES AND SOLUTIONS 1982-2013

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INTRODUCTION

For a period of 10 years the physical education teacher Marko Damianov, Associate Professor, gathered and researched a huge amount of archive and documentary material. On the occasion of the 40th Anniversary of the Academy in 1982 he published "Materials on the History of VIF (documents 1942-1982; departments and dons). It would not be an exaggeration to say that he laid out the foundation for the systematic rendering of the existing massive amount of information, without ignoring the collaboration of the academic and administrative staff. Thus, it became possible for the historical development of the National Sports Academy to be traced in the next thirty years by specialists and experts. It must be specified that their contribution is not being underestimated, only it is treated as a different and specialized subject matter.

The year 2013 marks the beginning of a research project to be accomplished by the end of 2015. The panel of authors includes four specialists - in History, Pedagogy and Archives study, employed on a contract basis by the NSA "Vasil Levski". The project is dedicated to some unresolved issues related to the historical development of the Academy, especially - formulation of a comprehensive and consistent compendium for the tutors. The period after 1982 is marked by the Academy's rapid development, which poses a conundrum of scientific research problems caused by the following issues:

1. Archive materials – personal data, individual files, professional testimonials, career development records for the academic staff, biographical data etc. being scattered in different administrative sections, thus making access and use extremely difficult
2. Up to date no clear system for data conservation and use has been devised
3. Academic staff members – their departmental affiliations, their internal movements, appointments, retirements, academic career, etc. – are sometimes controversially fixed
4. It is not a sole instance for the presence of some colleagues in the Academy to be indicated by their name only, without any further record for their activity. Their identities are established by publications in the academic press or by personal testimony of some colleagues.
5. The above mentioned issues under points 3 and 4, together with cases of deceased individuals, or temporary appointments, coupled with destruction of documents thwart the establishment of precise statistical data for the number of the academic personnel of the Academy as by the required reliable standards
6. A lot of the existing documentation has not been processed and there is no established uniformed data base

OBJECTIVE OF THE PROJECT

To accumulate a comprehensive data base, which is to serve the teaching process, as well as scientific research projects; and to be published in the form of an illustrated book with proposed title: "A Contribution to the History of the National Sports Academy "Vasil Levski" – individuals, dons and departments (1982 – 2013)". Thus Marko Damianov's efforts will be continued.

METHODS OF RESEARCH

Up to date the research has been organized in the following way:

1. The study's framework encompasses the academic staff actuality for the period 1982-2013

2. The study is focused on establishing a standardized directory for the available staff – a record of the employed personnel before 1982, together with a list of people who continued their academic career after date. Record of the rest of the staff has been established in the process of the study and by their date of appointment
3. Four-type-listing is to be established for the purpose of comparison in cases of contradictory or inaccurate information, cross-coordination and final clarification: separate departmental files (after Damianov's material); up–to-date record as by remuneration documentation, file for present and former lecturers as by departments academic branches, retraced by local assistants; and a list of tutors, who do not figure out anywhere else except in the Academy's scientific publications
4. To establish an information map encompassing three basic information groups – biographical record, academic career, and professional contributions within the Academy and elsewhere. The mapping cards are at the disposal of all departments and academic staff, and are to be filled in personally
5. Currently the data is being processed and the established academic staff number comes to 400. Thanks to the efficient help of the Academy's governing body the personal information cards have been distributed to all departments and the entire academic staff. By date 163 individual cards only have been filled in.

RESOLVED ISSUES UP TO DATE

1. The personal mapping card design has been finalized. It can be used for the newly appointed staff and for the first group of questions, thus procuring also a data collection and conservation culture.
2. The research has amassed data for the 50% of the academic staff
3. The publication design and structure of referential type has been devised and coordinated with the Academy's publishing department
4. The collected data include the progression and development of some academic sections
5. Currently the received referential information is being processed, structured and systematically arranged.
6. Colleague, who are presently employed by the Academy, but do not submit their personal data, will be represented in the publication by name only.

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REMINISCENCE ABOUT THE SWISS TEACHERS IN GYMNASTICS

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In May 120 years ago at Sofia central train station arrived a special group – the first experts in gymnastics from Switzerland. They were invited in 1894 at a government level by Mr. George Zhivkov, the then Minister of Education at Stambolov's administration (1887-1894). They were allocated in ten of the biggest Bulgarian cities – an act which inaugurated the start of the professional teaching in gymnastics and the structuring of Bulgarian gymnastics system.

Known or obscure were the Swiss in Bulgaria? The specialists in the field were surely well informed. The public was aware of their dedicated efforts during the preceding twenty years. Alois Bunter, Daniel Blanchoud, Jacques Fardel, Louis-Emil Eyer, George de Rejibus, Charles Champaud, Ougiust Beker, Emil Kiupfer, Viktor Roberti, Charles Diuvenal occupied a respectable position in the field of gymnastics, physical education and sport and had already become part of the Bulgarian cultural and sports history. As a gesture of respect to their efforts, the Bulgarian Day of Sport (17 May 1894) was related to their arrival in Bulgaria and was designated with a government decree in 2006. They were widely discussed and written about; their achievements were celebrated in schools and places they worked. Streets were named after them, as was also the sports stadium in the town of Silistra. Books and papers reflected graciously their compassionate interest in the Bulgarian cause during the Balkan wars and the WW1 (1912-1918). They merit a significant mention at The Olympic Games, for Bulgaria was one of the 14 countries that resurrected the games thanks to the Swiss, who represented Bulgaria in 1896 Athens initial meeting.

The point of the present reminiscence is to recollect the major historical data linked to the activities and contributions of the Swiss teachers. The available sources allow the following basic conclusions:

1. The number of teachers who arrived in Bulgaria was 10
2. They were teachers in Gymnastic as by the XIX c. terminology
3. The total number of the group was assumed as 12 people (until mid 60s). The miscalculation was due to the only photograph taken on the arrival of the group and consisting of 12 people. The extra two were Professor Oden and George Ramiu, who had worked in Bulgaria prior to 1894 and actually met their compatriots at the station. Their own professional engagements in Bulgaria are far from clear, but in any case, were not related to gymnastics.
4. Most of the sources refer to Professor Oden as French language teacher at the University of Sofia. There is one single reference about George Ramiu – as a Manager of the Boris Garden in Sofia. The above data are provided by the sports activist Tenio Georgiev, who had obtained them from Lui Marsel's son.
5. Still unsolved is the question about Charles Diuvenal's and George de Rejibus's arrival. Some contemporary memoires refer their arrival two months in advance of the others. According to Proffessor Vasil Tsonkov, Diuvenal had arrived in Sofia two months before the group. George de Rejibus is documented as being a teacher at Varna's state man's gymnasium.
6. It is not perfectly clear why the date 17 May was designated as the Day of Sport by the Council of Ministers. Most of the available sources refer to 13 May 1894.
7. The names of the teachers are often misspelled, due to different transcriptions – Charl – Karl, August Veker – Ogiust Beker, Blanshu – Blanchoud, Aier – Aie, Alois – Aloiz. Their biographical details are not entirely secured either.

8. Charles Champaud represented Bulgaria to the Athens Olympic games in 1896. The number of disciplines he participated is controversial. In addition some researchers suggest participation of other Bulgarians as well. In the protocols of the Games the name of Charles Champaud is listed as Shampov – a competitor in the discipline pommel horse jump.

9. Four of the teachers remained in Bulgaria until the end of their professional career. Alois Bunter worked from 1894 to 1929, (Turnovo and Varna), when he retired. He passed away in 1934 in Varna, where is his grave. Daniel Blanchoud (Kiustendil, Sofia, Solun, Bitolia) retired with honors in 1929. As by unconfirmed data, he returned in Switzerland and lived up to 1945. Jacques Fardel worked in Kazanluk and Sofia. Besides the gymnastics classes, he also thought French language for eight years. His grave is in Sofia (1942 or 1945). Louis-Emil Eyer was a teacher in Lom, Silistra and Rousse. He was killed in WW1 (1916 or 1917) and his grave is in Macedonia near the Doiran lake.

10. It can be categorically stated that the Swiss teachers should not be separated from the personality of Todor Ionchev. Bulgaria cannot be imagined without the first experts, but they cannot do without the person, the ideologist, the support, the understanding and the convictions of Todor onchev.

The reasons for the inaccuracies and controversies surrounding the Swiss teachers are predominantly related to sources. By and large they are memoires of their contemporaries, published in periodicals, and their reliability is uncertain. Some of the teachers were in Bulgaria for a short period of time and the sources are poor.

But the point of their historic role is the development of gymnastics and its scientific foundation. These aspects are researched and analyzed together with their comprehensive participation in Bulgaria's cultural life.

The life and activities of the Swiss teachers deliver a clear message to the modern teacher.

„SERBIAN SOKOL“ IN DETROIT (MICHIGAN)

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Key words: *Sokols, sokol societies, America, conference (session), Union (Zupa).*

INTRODUCTION

Serbs in America[1], in the first mid of 1909 accept Sokolism as a way of gathering and body workout, first of all for the spiritual and body strengthening, as also for the uplifting of their people. In that period began first initiatives for forming of Serbian sokol societies, and in the middle of that year started the formation of first Serbian Sokol societies. By the end of 1909 two of them were formed, in states Ohio and Michigan. First Serbian sokol society in America was formed in May 1909 in Cincinnati (Ohio), and the second one on October 10th 1909 in Detroit (Michigan). [20; 3]

In the following years the founding of Sokol Societies were continued in many places around America in which Serbs lived. By the June of 1914, there were more than 40 active societies. Beside Serbs, other Slavic nations such as Russians, Czechs, Slovakians, Bulgarians and Croatians were also founding societies of their own.

This study as a subject of its interest has Sokolism in America, with the aim to tear off from oblivion and highlight the founding and work of Serbian Sokol Society in Detroit and its contribution to development of Sokolism in America.

METHOD

Historical method was used during writing this paper. Numerous historical sources originated in the time of the society's existence, as well as sources originated after that were critically reviewed and analyzed. The goal of this paper is to highlight the appearance, work and contribution of this particular Society to the development of Sokolism in America.

RESULTS AND DISCUSSION

Founding of Serbian sokol society and its work until end of 1911

First data about its activities and work were found in the first edition of "Serbian Sokols in America" magazine, which was launched November 1st 1911. At the first meeting of representatives of Sokol societies from America, which was held October 1st and 2nd 1911 in Gary (Indiana), the representative of the society from Detroit was Djuro Kecic.

On Sunday evening of October 1st, Serbian Sokols from Gary have organized a dinner which, besides representatives of Sokol societies, attended a significant number of Serbian men, women, and other Slavic guests from Gary, as well as from other places. During dinner, speeches were held, and among others, Djuro Kecic has been one of the spokesmen. On October 2nd 1911, when Serbian Sokol Union in America (SSUA) was founded, Serbian Sokol society from Detroit became a member of the Union. The society counted 70 members then, of which 25 regular, and 45 helpers. [11; 13]=

First row, from left to right: seventh in a row, sitting, Djuro Kecic from Detroit

Njegovan Bogdanov, a Serbian Sokol from Detroit, was chosen to be a member of Supervisory Board of SSUA and as deputy leaders Milan Rebraca and Lazar Dobric, both also from Detroit.

[1]America – the term used in this paper refers to the area of USA.

On Sunday, October 22nd same year, Serbian Sokols had organized their annual celebration, in Mita Petljanski gymnasium in Detroit. Prior to the celebration, few workouts and parties were also organized for Serbs from the region. At the beginning, Serbs did not pay enough attention to the institution, but if they had given just a bit more time to the institution, especially those who were not its members, "[…] the time which they would usually spend doing nothing, that Serbian colony would have had a strong Serbian Sokol with many more members and a better financial position." [15]

Fig. 1. The first Serbian Sokol meeting in America [11]

A letter was sent to the SSUA, which was read on a meeting on November 15th 1911, asking that the Union would send one example of the workout suit, so the same could be acquired for all the Sokols. It was decided to give them what they asked for. [12]

On a meeting held December 15th 1911, the Head of the Union Luka R. Grkovic informed present members that the suit was sent to "Serbian Sokol" from Detroit and that the shipment coasted 3.75 dollars. [1]

By the end of 1911, twenty more members joined the "Serbian Sokol" in Detroit. Ten regular[2]: Njegovan Bogdanov, Joca Damjanov, Lazar Dobric, Slavko Drazic, Dusan Jasin, Kosta Kacanski, Trivun Kacanski, Stevo Kojic, Ivan Nikolic, and Sredoje Tolmacevic; and ten helpers[3]: Milan Bogojevac, Djuro Vikov, Milivoj Gagic, Djuro Kecic, Mladen Leskovac, Lazar Miskovic, Ivan Nedeljkov, Petar Rajcic, Rakila Rajcic and Stevo Stankov.

The address of "Serbian Sokol" was: 1177 Russell St.,Detroit, Mich. [16]

Society's work since the beginning of 1912 until the end of June 1914

In the following 1912, the society continued its work. At the annual meeting, held January 25th 1912, besides filling reports about previous year and workout locations, sessions which were held etc., new Administration committee has also been chosen. New administrators were: Head of the committee Njegovan Bogdanov, his deputy Kosta Kacanski, secretary Djuro Kecic, treasurer Lazar Miskovic, leader Lazar Dobric, assistant leader Stevan Bicanski, and members of the committee Joca Damjanov, Triva Kacanski and Stevan Kojic. As the supervisory committee, Ciro Vukov and Stevan Stankov, economic Slavko Drazic, record verifiers Dusan Jasic and Svetozar Kojic.

[2]Regular members were those ones accepted by Government and those ones who regularly pay monthly fee determined by the society's assembly, and their rights were: "1. after they get 18 (eighteen) they can elect and be elected as members of Government when they get 21 (twenty one); and 2. to wear society's uniform and badges." [10]

[3]Helping members (helpers) "[...] are those members who pay yearly fee according to local situation, all at once or in monthly payment. They have all rights as regular members." [10]

Since they did not have their own office space or gym, the decision was to perform at the Slovenian Sokol Gym and maintain their meetings at the apartment of Stevan Sibula. At the end of 1911, previous Administration has left 168.28 $, of which 160.00 $ at the account in the National State Bank, and 8.28 $ at the cash register. After finishing reports about previous year "[…] accepted to all heart's mind" [17] the meeting has been brought to an end.

The address of the society has been changed, and the new one was published in the journal "Soko". New address was: 424 Kirby Ave, Detroit, Mich.

"Serbian Sokol" collaborated not only with Serbian societies and organizations, but also with those of other nations, primarily Slavic. So, on Saturday evening, April 20th 1912, in Detroit, along with Serbian charity society "Innocent Victims" no.194 and United Serbs Alliance "Harmony", a party was organized for the members of the mentioned societies, as well as for all other citizens. [18]

In the first half of month May of 1912, while preparing the First Serbian Sokol Slet, they had received 114 Slet Pins (badges) from SSUA administrators with an instruction "[…] for collecting voluntary contributions for Slet".[2]

At the beginning of May 1912, Lazo Stevanov came to "Serbian Sokol" in Detroit with an application from "Serbian Sokol" from Cincinnati. The Administration of SSUA has been informed about that on a session on May 20th 1912.

The Administration of "Serbian Sokol" announced an invitation to all Serbian men and women from Detroit in the journal "Soko" issued on June 1st 1912, to attend a gathering planed on Sunday, June 9th at 2 p.m. at the Mr. Petljanski gymnasium, 461 Kirby Av., with a mission to "[…] agitate Serbs to enter a membership of the society, ant that is why it is recommended to be present that day". [19] Data about the gathering mentioned earlier haven't been found in the reviewed sources, so it remains unknown if it has ever been held.

At the first Sokol Slet in Chicago, June 22nd and 23rd 1912, besides everyone else, the Head of the Serbian Sokols from Detroit Njegovan Bogdanov was also present. As a member of Administration of SSUA, Njegovan Bogdanov from Detroit has been reelected by the supervisory committee.

At the beginning of December 1912, a group of members from "Serbian Sokol" from Detroit has sent a letter to the SSUA, which was read on a meeting of the Union on December 15th. They informed the Union that, due to the departure of many members, "Serbian Sokol" is no longer active. [7]

The society was re-activated in January 1913, after a short break. Same month, the Head of Serbian Sokols Njegovan Bogdanov sent 5.60 $ to SSUA for the sold-out copies of "Chronicles of Serbian Sokols in America" and journal "Soko", and demanded they would send him ten more copies of the Chronicles. The letter was read on a session of the Union on January 31st, and it was decided to send him the asked. [5]

The society did not have many activities by June 1913, so it was almost inactive, and Serbs "[…] in Detroit felt a gap, and willing to change the situation, honorable Serbs on Vidovdan" [20] the same year arranged a gathering to re-establish the work of "Serbian Sokol". They elected the new Administration. Mihailo Gardic was chosen as the Head of the society, and as his deputy Vojin Plavsic. Leader was Djuro Bogojevac; Secretary Matej Stijacic; Treasurer Novak Herceg; as President of steering committee Ivan Nedeljkov; and as members Nikola Gavric and Marko Erdeljan. As supervisory committee: president Milanko Smiljanic and members Marko Djurdjevic and Milan Novakovic. [20]

Right after re-establishing the society, new members started to enroll, and soon there were 57 members (34 regular and 23 helpers): Zarko Andjelic, Simo Babic, Simo Bjelica, Djuro Bogojevac, Spasoje Boljanovic, Djuro Brankovic, Jovan Vujadinovic, Lazar Vujic, Acko Vukovic, Nikola Gavrilovic, Mihailo Grdic, Pero Golic, Zivan Dikic, Marko Djurdjevic, Marko Erdeljan, Kosta Ziskov, Dusan Ivancevic, Andjelko Jokic, Nikola Jurjevic, Stevan Kojic, Djero Koledin, Trifun Korac, Acim Kosutic, Luka Krakovic, Vlajko Krivokucin, Uros Lalic, Milos Latac, Jance Manojlovic, Zivko Maric, Milan Maric, Savo Milovic, Ivan Nedj(d)elkov, Mi-

lan Novakovic, Petar Perisin, Svetislav Petljanski, Aleksandar Petrov, Obren Pjescic, Vojin Plavsic, Milos Plavsic, Novak Plavsic, Jecko Popadic, Spasoje Popadic, Gavro Prekrajac, Omer Prekojac, Stevo Putnik, Milos Rajic, Djoko Rasulov, Milanko Smiljanic, Matej Stijacic, Spasoje Stijacic, Lazar Herceg, Novak Herceg, Stevan Cobanovic, Molos Colic, Jovo Cuckovic, and Savo Sovljanski. [20]

The address of the society was: 446, Frederich Ave, Detroit, Mich.

Soon after re-establishing, the Administration has ordered formal and workout suits, and had sent 70 $ deposit for those to SSUA. In the same letter they expressed a wish to have a Sokol flag for the society and asked what would be the price for one. [8]

Besides regular activities, they also organized chevalier parties. One of those parties and dances "[...] which was a great success" [21] took place on November 22nd 1913 in Detroit.

On a session of SSUA, December 1st 1913 in Chicago, Njegomir Bogdanov from Detroit was dismissed from the Supervisory committee of SSUA, and Pero Krstovic from Gary was placed to that position. [6]

Due to disrupt in the society's work in 1912, and the departure of members, the membership to the SSUA was also discontinued. After re-establishing on Vidovdan 1913, and electing new Administration, the initiative to reapply for membership of SSUA also began. This was achieved at the meeting of the Union on December 28th 1913. At the same meeting the Union's Administration received 15.60 $ from Serbian Sokols from Detroit: for membership, fees and journal "Soko".[9]

During February 1914, appeared some, for now, unfamiliar disagreements between the members of "Serbian Sokol" from Detroit. Petar Krstovic, member of the Supervisory committee of SSUA, traveled to Detroit to try to end the disputes, but as he said on the meeting of the Union on March 8th 1914 "[...] he had not succeeded". [4] After Petar Krstovic's report about the state at the "Serbian Sokol" in Detroit, the decision was "[...] to keep the most, but to discharge some of the members from the Union." [4]

During month of May, Serbian Sokols worked on an opening of Serbian School in Detroit. At the end of May, the School starter its work and lectures, and the teacher of Serbian children was Matej Stijacic, a secretary of Serbian Sokols from Detroit. [14]

On June 7th 1914, Serbian Sokols from Detroit blessed their flag, followed by a Sokol party of celebration. [22]

CONCLUSION

Based on the aforementioned we can conclude that Serbian Sokols from Detroit gave significant contribution to development of Serbian Sokolism in America, as also to edification of their people.

But still, in available sources, there was very little information found about the founding of Serbian Sokol society in Detroit, as well as about its activities until the beginning of October 1911, so for now, it remains unknown who were the first initiators and founders, who was in the first management of the society, who was the leader, how many members have they had, where did they work out, which activities were followed, etc. So it leaves a mission for the new researchers on the field of history of Sokolism, to research the topic further.

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SEMANTIC FEATURES OF THE SPORTS SPACE AND TIME

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Key words. *Sportsman, sport time, lifetime, cyclic time, Olympic game*

INTRODUCTION

This work focuses on the philosophical analysis of sport as significant phenomena of social life. The study focused on the formation of a new perspective on the concept "sport time". Modern competitions are held on a tight schedule. Cyclicity of the competition like a permanent change of seasons. Sportsman's lifetime is depend on natural time. Such a specific organization athlete's life has a certain effect on the senses, which lives athlete. In this case, should discover which meanings is determined athlete life. What happens to a man when he is expelled from the cyclical recurrence sports time? The used methodology allows analyzing sporting events through the structures of self-description and self-representation of society. This approach avoids any ideological connotations in the description of the Olympic Movement and sport in general.

In our previous research it is suggested that social symbolic meanings are filled with the new values in the sports competitions. There is a redistribution of symbolic capital in the space of sports [4]. In turn, the appearance of the new heroes' names leads to the structuring of social memory by means of sports discourse [5]. Sports discourse messages are language messages, and state bodies in the process of the competition. Thus, the space of competition is determined by grammatical message, and the bodily message [6].

METHODOLOGY

Research Methodology involves treating a hermeneutical approach in the analysis of human existence (Bushmakina [2009], Heidegger [1993], Ricoeur [1995, 2002]).The term "hermeneutics" Martin Heidegger used in the analysis of human existence, the meaning of which can be detected and interpreted similarly to the text. This interpretation is possible because the human being is always meaningful. Sporting events and texts became a self-detection and self-representation essence of sport. Having conducted such an analysis we can talk about their own sense of sport and not about meanings that are imposed on the Olympic Games and the Olympic Movement such discourse of politics, economy, or advertising. Philosophical analysis of the issues will be declared based on the interpretation of scientific texts devoted to the Olympic games, sports, issues related to the identity of the person's body

RESULTS

The competition and sport space at peak times (Olympics, finish time, trauma, retired) are collapsed to the point, completely filled by sport meanings. At this point discourse of sports detects the presence of social meanings. Social presents in multiple space-time versions that radically different from the strictly defined limits of sport time and space. In this case, the athlete is begun to define not need to be embedded in the space-time sports but the need to choice and structure a personal space as a space of social meanings.

DISCUSSION AND CONCLUSIONS

The popularity of sports and sports discourse and the discourse of the Olympic movement leads to a special structuring of space. Since ancient times sports competition carried out in a dedicated or a

separate location. Enkratic or power nature of sports discourse [1] allows him to have a serious impact on the structuring of social space. According to H. Eichberg [1998] “it is about time and space, more precisely, on the modeling of space and time in the sport, and - indirectly -included space and time in the conventional social representations and practices” [8, 76]. Moreover, the time is the structuring element of sports space. H. Eichberg [1998] suggested interdependence of space and time.

ATHLETIC SPACE

H. Eichberg [1998] identified possible options for the sports space organization. These conceptions deserve attention on their own. Nevertheless, the most important seems the way in which sport space generates social meanings

In the first case, we are talking about the removal or leveling of social space. “There was the “disappearance” of the space in the process of development of sports, turning it into a flat pan, worn horizon and standardized area” [8, 79] Required for filing and recording records athletic space should be the same regardless of the competitions venue. Thus, at each new competition athletes have the opportunity to be close to the limit, expressed as a fixed record time. “The ideal form of sports space as a three-dimensional object is a kind of receptacle (container), a box with right angles; monofunctional this sport “box” means that different sports need their specialized “boxes”. [8, 77] a unique sense of social space provided outside of the sports facility. To describe modern stadiums for athletes we suggest Z. Bauman’s [2008] concept “purified space.” «Record» as the semantic dominant erases other connotative social meanings. “It is closed on itself”, a “place without a place “. [2, 108].

Development of sports discourse leads to changes in the sports space. Structuring of space is not due to erase social features, but in the process of incorporating new sports in particular social space. H. Eichberg [1989] after Dietrich and Heinemann [1989] raises the question of the origin of “Der nichtsportliche Sport.” “Space and identity (as well as time and identity) here means a lot of space (or time) and a plurality of different spatial (or time) forms of organization, which differ depending on gender identity, regional culture, subcultural identity and historical change” [8, 84] . In this case, the sporting space loses its focus on the temporary record time. The space meanings no longer be structured on the basis of one of the absolute ideological position. Labyrinth as space configuration reflects the multiplicity of meanings of sports space, various interpretations of the sports action.

SPORTS TIME

Time in sports is one of the objective measurement tools. Becoming an indispensable element of modern sport, it has become to have the following characteristics.

1. Time is one-dimensional and completely; it will not multidimensional or relative.
2. Time has a direction as running directed to the target; it is irreversible.
3. Due to its imaginary scalar-directional structure can be measured by time, share, compared and classified (as well as money, as evidenced by the expression “time - money”); time sport - this time a stopwatch.
4 Quantification of time means that the time may be recorded in the form of the result, a certain number of seconds (or - increasingly - the sport can be expressed in centimeters, grams, and seconds); this makes it possible to compare the results and establish records “. [8,77]

Time determinates the results in most sports. Therefore, time serves as absolute measurements and universal means of expression result. Described characteristics show ideological connotations of time in building sport space. Stadiums, sports grounds are determined the need monotonous presentation time on them. This ensures the progressive movement and the opportunity to set the record.

Irreversibility and straightness sports time turns cyclical and reticence within the sports space and modern calendar of sporting events. Uniformity stadiums, racetracks indicate closure, cyclical and re-

peatability sports spaces and events taking place on them. In the sports space-time there is a transformation of man. Engaging in professional sports, a person begins to exist in a particular space-time dimension, which leaves a mark on his individual existence.

STRUCTURING THE LIFE OF AN ATHLETE OR A SPORTING LIFE

The specific nature of sport leads to wrinkle or to collapse of the entire sport's space-time to one point as a photo finish. Four-year cycle of preparation and prior athlete's life collapses or shrinks to a single point. The photo-finish point is the convolution in a single time and space. From this point occurs a retrospective evaluation of a 4-year cycle, and the athlete's life

The movement of a person's time is not a straight line. There is no rigidly structured periods, point of results presentation. The number of competitions (Olympic games) in which he participated can measure sports life and athlete's life. The limit of human capabilities becomes structuring element of life. This limit must be shown at a certain time in a certain place. "With the help of homogenizing rules sport athletes at the same time provide an equal and hierarchical position associated with territorial identity: as the best athlete of the provincial or national champion" [8,84].

In accordance with the landmark lines up the whole existence of the athlete. He turns out to be visible and permeable from this point, from this elevation. "Pyramid" has always been an ideal scheme of the organization and visualization of modern sport and the East and the West." [8,86]. The athlete is at the foot of the peaks. The permeability of the athlete's life (control coaches, WADA) structures of its time in the present, describing his future. Athlete loses his own personal time. His time is included in the total sport time. Thus, athlete's life is becoming a general trend of sports time.

To fix some meanings for a particular person, it is necessary to display static. Thus, the athlete stands out from the general stream of sports time. For example, the title of Olympic champion is an athlete forever. Hosting the Olympic Games structures space and time in a special way too.

Reaching the top of the sport is the presentation of the existence of an athlete at a certain point. The point is characterized by compressed and concentrated nature. Sports and social meanings fill it equally. Social meanings that fill this point are structured discourse of recognition. At this point, there is the self-recognition and the athlete gets the recognition of other people. [12]. Selfdetecting yourself at this point, as in the time of the stoppage-time sports, the athlete finds himself and a multiplicity of social meanings.

Clear structuring of meanings sports discourse influences athlete to choose sports meanings despite other social perspectives. The choice of different social meanings leads to disjunction the cyclical nature of sports time and space, and discover other social meanings. "And if a pyramid - the ideal image of modern sport - spatially oriented to the center point of the review, which is in panoptic "top", the labyrinth such panoptic view is unfamiliar." [84] An athlete lived up to improve the sporting requirements of time and space, finds itself in a situation of free choice. Social opens in all its possibilities, requiring decision-making as the selection and design of its own configuration space-time.

After the completion of his sports career person is off or excluded from sports and sports space- time. The only structuring moment, the moment of the beginning of all kinds of social discourses becomes an end sports. Structuring element of sports, which determines the continuation of the life of an athlete is absent. Time is revealed in its infinity and eternity. Sport's time cyclicity transforms into linear time. At the end of sports life, athlete returns his own body, and moves from one organized space-time to another.

Completion sports life or life in professional sport can occur under several scenarios. Limit or the essential version (invariant) is as follows. Athlete is no longer adapted to the cyclic flow of sports time, which requires a constant alternation of periods of "training" and "peak form." Exclusion from the sports space-time could be due to the inability of the body (aging, trauma), "bodily inability" or the inability of a different kind - "social inability." The metaphor of "social inability" refers to the lack of

social meanings in the sports space-time. Athlete discovers the multiplicity of social outside rectilinear space-time sports.

So, sport, time and space are organized certain idealized image. The competition and sport space at peak times (Olympics, finish time, trauma, end of career) collapsed to a point, to the limit of meaningful sports. In this limit point, the discourse of sports detects the presence of social meanings. Social presents in multiple versions unfolding of space and over time and radically differs from the strictly defined limits of the sport time and space. In this case, the athlete begins to define not need to be embedded in the space-time sports and the need for choice and free structuring of personal space as a space of social meanings.

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DEVELOPMENT OF THE UNIVERSITY DIAGNOSTIC CENTER AS A RESPONSE TO CHALLENGES POSED BY TRANSITIONAL ECONOMY

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Key words: *diagnosis and diagnostic center, physical health status, information systems, management, hypokinesis.*

INTRODUCTION

The intensity of psychophysical and social development of a individual directly depends on the impact of socio-economic and cultural development of the social environment in which his/her socialization takes place. In a society undergoing economic transition, dilemmas and problems such as: security, self-esteem, a sense of social belonging, competence, quality of life, manipulation, political-ideological scene, effects of scientific and technological revolution, changes in working and living conditions, environmental vulnerability etc, frequently occur. All this leads to impaired physical and health status of modern population as a result of the so called tripartite morgogenic factors (hypokinesia, obesity and stress). The last of these factors is certainly the most prominent in a society that is undergoing economic transition, but also the overall transition in society. For this reason, health care, regular monitoring and diagnostics aiming at preventing risk factors, should have the central place in our lives so as to build, preserve and improve the bio-psychosocial components of each individual. Many studies have confirmed that the modern business person in a society undergoing economic transition is prone to various types of modern illnesses, primarily cardio vascular and psychosomatic. Therefore, the preventive measures of stress factors such as uncertainty and insecurity should go hand in hand with the economic development.

It follows from the aforementioned that the establishment of a diagnostic center at the University, with the main task of controlling, monitoring and preventing risk factors in the population that makes up the main agent of change in the transition process, is of utmost importance.

The main objective of this work is to show the importance, need and the organizational basics of a diagnostic and prognostic University center from the point of view of transitional economy, which requires new business forms as well as new habits, in order to meet the demands of modern society. The educative function of this center is certainly the most important factor of change in the habits and ways of thinking. In this sense, it is very important for individuals to think about the health as the sum of „reserve capacities" of basic functional systems, whether their way of life reduces and lessens these health reserves, and if they are doing enough to preserve and improve their health.

Model of Information Systems and Function Diagnostic Centre University

One of the main goals of the transitional economy is to model transformative processes by way of optimal (cost-effective, efficient and meaningful) technological innovations. In addition, existing models need to be improved and adapted in accordance with the needs of a society in transition. The development of the model of an information system as part of a University diagnostic center is determined by management needs, as well as modern methods and techniques for software development. In this sense, the approach to the development of the model of Information System (IS thereafter) is based on as model that starts from the functions of the diagnostic center, its tasks and goals, which determine the required IS characteristics and information technologies necessary in the development of these systems.

IS enables us to formulate the functions of prevention, maintaining and improving physical and health status (quality way of life), through exercise and proper nutrition, as well as the proper management of other stressful factors through regular diagnostic of the body. These functions, integrated through scientific and professional creative work, are based on modeling diagnostics as the fundamental category of technological process that needs to be defined at an early stage of the Diagnostic Center development. It is through this category that we observe mutual interdependence of mentioned functions, given that the purpose of the modeling is to find a model of the desired state of activity of the Diagnostic Centre run by the University students and staff, while diagnostics is used to determine their initial, transitive and final health condition. Regarding the modeling of diagnostic in the diagnostic center, the individual differences of each individual, resulting from the diversity of life style and habits, demands finding the optimal model of individual activity i.e. actual individual models. Within these models, it is necessary to determine the model of anthropological characteristics and knowledge of the individual, as initial information for setting up screening of program activities. The parameters of these models, in the form of information content, are the elements of the diagnostic center IS. Having in mind the multidisciplinary nature of diagnostic information technology, it is necessary to identify several types of information structures i.e. information model of diagnosing University students and staff, within the anthropological space, such as morphological characteristics, functional abilities, psychological traits, sociological traits and information model of health care.

Educative function of the diagnostic center involves modeling the basic concepts of the curriculum current topic of lectures and exercises. Topics should be in the domain of physical and mental, social and health status which depend on the socio-economic and cultural impacts particularly in the state of the economy in transition. Education (lectures, tutorials, workshops, training) should include the following topics: exercise and health, fitness, health and ecology, exercise, stress, stress management, motivation-quality changes in behavior and thinking, cardiovascular disease and exercise, fitness evaluation, nutrition and weight control, exercise and health risks of smoking, alcohol and drugs, muscle strength, flexibility and endurance the influence of bioclimatic factors on the health and physical fitness, individual prevention programs and others.

Managerial and business functions of the University Diagnostic Center, as a kind of logistical support for all activities of the center, should be based on the information needs and perform the following functions: management, marketing, administrative activities, management of facilities and equipment, management of human and financial resources and other supporting activities.

Management of the University Diagnostic Center is viewed as a process of management, followed by the functions that require information in order to be performed. For this purpose, we should define information needs for the following management functions: planning, organizing, managing human resources, management and control.

Marketing in the diagnostic center of the University can be identified as the process of designing and implementing activities during the establishment of services (such as specific product of the Center), pricing, promotion and distribution of services aimed at meeting the needs and desires of users, but at the same time achieving the goals of the diagnostic center as an organization. Starting from this identification of marketing, the program of development and modeling IS aims at identifying the information structure for the following possible components of marketing in the diagnostic center: the market, products, services, image center, sponsorship, price and distribution services, the promotion of the city.

Facilities and equipment diagnostic center as the basic material resources, have their own computer term and can be systematized in a certain way. Objects can be observed and classified for the follow-up according to their elements (diagnostic cabinet, trailing spaces, extra spaces, installed building equipment, built-in exercise equipment) or attributes (types, size, shape and construction, etc.). Information about the resource (location, composition, capacity, ownership, etc.) and the information intended users (potential, prices, terms of use), can be made available to users through the site diagnostic center.

Human resources are the direct implementers (teachers and staff), staff specialists and assistants in the implementation of the goals, programs and objectives of the diagnostic center.

University sports team as a unit of the diagnostic center, conducts operative programed activities, that is, carries out individual anti-stress programs, preventions, recreation, corrective exercises in addition to conducting chosen sport activities. The club has its own specific features, objectives, activities and model IS, defined in the Club's statute, business plan and development.

Financial condition of the diagnostic center is registered under the current regulation on accounting. Basically, the information about the financial condition relate to the income and expenditure purposes.

Information technology (IT) observed as a function of application, integrate modern computer systems, communication and modern tools, methods and methodologies for the development of IS. In addition to the operational transaction systems, which relate to transaction processing and workflow automation (automation of business) these technologies are used in the processes of governance and decision-making and development management IS. These IT features enable the development of IS University Diagnostic Center in accordance with the modern needs of a transitional economy.

In the development of IS and IT in diagnostics, one should take into account the strategic role of the internet, which is manifested through the exercise of global communication and access to web applications, diagnostic centers and organizations, both domestic and international, to develop diagnostic technology, marketing, management and IS management.

The implementation of such programs or projected information systems, enables us to redesign the way of performing certain functions of the Diagnostic Center according to current needs and situation, and also from the standpoint of improving professional performance in all aspects of the IS model and Diagnostic Center functions. In this sense, the University diagnostic center includes, as part of its program, IS planning, design, and development of is, from the standpoint of the synthesis of information and technology management and marketing activities.

CONCLUSION

Functions and software diagnostic center of the University achieves the mission, objectives and strategies of the center as an organization through the application of information technology. Direct implementation of programs applies to the following areas: management of diagnostic technology, medical management, marketing and PR and sports management as a whole. This approach lays the Foundation for significantly improving the system of prevention and promotion of health in a society with an economy in transition, which is largely achieved in countries with high economic status. Completed IS model of the University Diagnostic Center should:

- Enable more effective management, development and operation of the diagnostic center
- Meet the information needs of all levels of users within the University
- Provide information support to business operations through the construction of an integrated IS diagnostic center, with modern design methodologies, software tools and technologies
- Be designed and implemented for optimal and interactive work of operational services, and to respect the principles of automatizing work procedures, i.e. that the information are entered into the database at the place of their origin or in the workplace of the Center's operative officers
- Be complete with an open distributed architecture of IS
- To provide an interactive use of data in the database in accordance with user's credentials
- To build system protection that includes protection of computer networks, operating systems, databases, etc.
- Be in accordance with the needs of the diagnostic center, ensuring exchange of documents in electronic form through computer – communication system of the internet (the exchange of unstructured data)

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TESTING AND INNOVATION IN SPORT AND PHYSICAL EDUCATION – TISPE

EXTERNAL TESTING OF INTERNET BASED TEACHING TOOL (TESS)

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Key words: *Internet based teaching tool, sport, technical English*

Web based education has been gaining much more popularity over the past two decades.

The first Web based educational systems were developed in 1990s (Brusilovsky, Schwarz & Weber, 1996; De Bra, 1996; Okazaki, Watanabe & Kondo, 1996). Classroom independence, availability to thousands of learners all over the world, as well as attractive interface are just some of the few benefits which this kind of teaching method provides. Most of the systems are developed on the base of learners' knowledge and some global goal. However, there are still few projects organized around specific group of users' needs and preferences.

The TESS tool provides yet another alternative to the traditional "just-put-it-on-the-Web" approach in the development of Web-based educational platforms (Brusilovsky & Miller, 2001). It constitutes a teaching platform built on the base of the goals, preferences, and needs of sports persons. It was made to help various sports specialists and people involved in sport in general with acquiring a good level of technical English in the field of the following sports: basketball, volleyball, and table tennis.

The research behind the project was helped by a sequence of workshops that brought together teachers and sports experts from five European countries – Bulgaria, France, Portugal, Germany, and Hungary. It incorporates some activities traditionally performed by a teacher, such as coaching learners and diagnosing their misconceptions but it is totally oriented around the independent self-study done at any place any time.

It provides the learner with the most suitable individually planned sequence of knowledge units and sequence of learning tasks to work with (e.g. video materials, role play exercises, solving grammar problems, etc.). In other words, it helps one find an optimal "path" through the learning material, being evaluated after completing every activity.

The tool incorporates the so called "remediation" as well (P. Brusilovsky, 1999) – a reactive technology which does not require active learning goals in case the learner is unable to solve a particular problem or answer a question correctly. Its purpose is to offer the sports persons a set of learning materials, which will fill the gap in their knowledge or help them to clear a certain misconception.

The aim of this report is to reveal the results obtained after testing the tool among its potential users.

During the testing period the following **tasks** were set:

- To evaluate the pedagogical advantages of the tool for the users;
- To compare the results obtained after testing the tool in five countries;
- To receive an adequate feedback which would help to improve the tool;
- To help outline a marketing strategy for further distribution of the tool.

The testing was conducted in 2013 among **137 target individuals** related to different sports, with different roles within the sport (coaches, referees, players, and sports persons), linked to different types

of organizations (clubs, federations, and universities) in five countries – Bulgaria (39 users), France (41 users), Portugal (15 users), Germany (26 users), and Hungary (16 users).

A **questionnaire** was applied post-tool-use and its questions were inferentially treated, considering several groupings – sport, role within the sport, organization type and country, to see if there was an effect of these independent variables on the variance expression of the answers.

The tool has four main sections – **Volleyball, Basketball, Table Tennis** and **Common Stations**, each of them with several stations related to different contents. Each station is constituted by three videos that set up the basis for the exercises presented to the user. In order to address the targeted issues in this external testing (technical, pedagogical and language content) each user was asked to do a whole station, which means viewing the three videos, doing each video's exercises, and exploring the vocabulary and the grammar associated with it. To make the task more appealing to the user, it was suggested they choose a station that was more related to them (e.g. a volleyball coach might choose a coach communication station).

ANALYSIS OF THE RESULTS

The questionnaire used for conducting the testing is a 10-item Likert-type scale with four possible ratings ranging from "lowest" to "highest".

In order to reveal the variance in the degree of satisfaction with the tool among the users a variation analysis of the results was used (**table 1**).

Table 1. Degree of satisfaction with the tool.

Question	N	Minimum	Maximum	Mean	Std. Deviation
Would you recommend this method to someone involved in sport?	137	1	4	3.36	.726
Do the videos help you to understand sports in English better?	135	1	4	3.24	.755
Do you enjoy learning English with TESS?	137	1	4	3.23	.760
Is the technical vocabulary rich enough?	136	1	4	3.21	.731
Do the exercises help your comprehension?	136	2	4	3.15	.643
Does the grammar contribute to improve your level of English?	135	1	4	2.95	.795
Do you think that this tool can help you to improve your use of English?	137	1	4	2.94	.715
Is the follow-up of your progress satisfactory?	137	1	4	2.93	.693
Do the exercises improve your pronunciation?	136	1	4	2.81	.812
Do the exercises improve your written skills?	136	1	4	2.75	.767

The results of the analysis show that all users claim to enjoy learning English with TESS and are willing to recommend the tool to their peers.

The technical vocabulary included would suffice the needs of a sports person and most of the users find the video materials really helpful in their better and faster acquisition of the English language.

The set of learning materials provided (including grammar explanations and a list of technical vocabulary) prove to be useful and assist learners in filling the gaps in their knowledge or help them clear certain misconceptions.

The tool aims at improving learners' skills in dealing with sports related situations, and not gaining overall English language acquisition. This explains the lower ratings given to the questions concerning pronunciation, follow-up progress, and writing skills improvement.

The results from the testing based on the answers given by the users in each of the five countries reveal that the Portuguese, Hungarian and Bulgarian users show the greatest satisfaction with the results obtained after learning in the platform, followed by the French and the German ones (table 2). However, the tool is likely to be recommended in all of the five countries which could be considered a proof for the success of the project.

Table 2. Mean values of the results based on the Country.

Question	Portugal	Hungary	France	Germany	Bulgaria
	Mean	Mean	Mean	Mean	Mean
Do you enjoy learning English with TESS?	3.47	3.63	3.12	2.46	3.62
Is the follow-up of your progress satisfactory?	3.13	3.25	2.66	2.46	3.31
Do the videos help you to understand sports in English better?	3.67	3.69	3.17	2.58	3.36
Do the exercises help your comprehension?	3.40	3.25	3.10	2.68	3.38
Do the exercises improve your pronunciation?	3.13	3.19	2.37	2.48	3.21
Do the exercises improve your written skills?	3.20	3.06	2.39	2.32	3.10
Is the technical vocabulary rich enough?	3.73	2.88	3.15	2.88	3.41
Does the grammar contribute to improve your level of English?	3.33	3.31	2.83	2.29	3.18
Do you think that this tool can help you to improve your use of English?	2.67	3.38	2.83	2.81	3.08
Would you recommend this method to someone involved in sport?	3.53	3.75	3.02	2.88	3.82

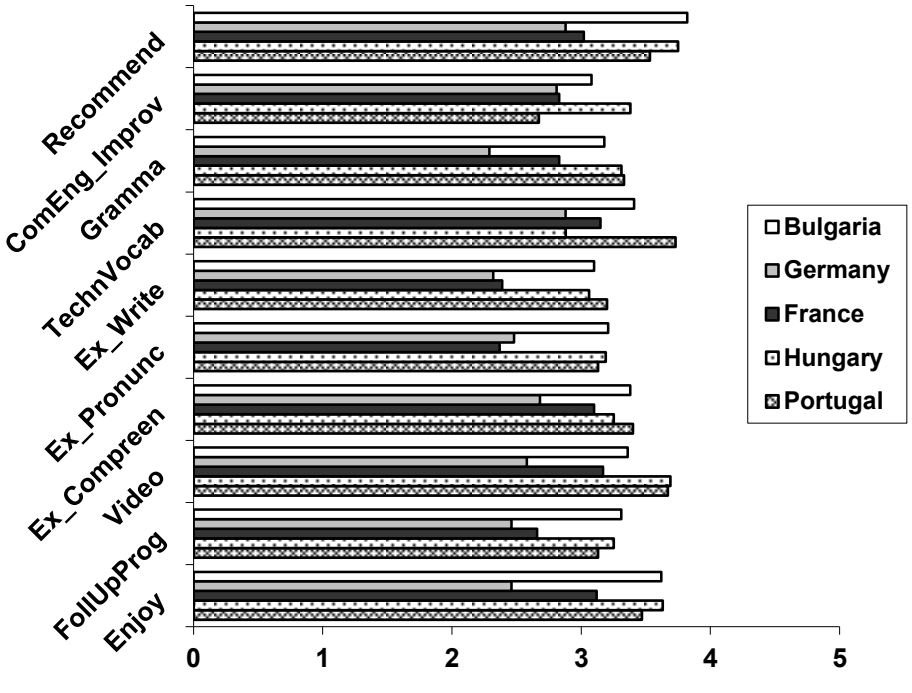

Figure 1. Evaluation of the pedagogical tool based on the Country.

The variation analysis shows that the learners find the videos included in the tool the most useful to understand sports in English better, while writing exercises are considered least effective.

The Portugal, Hungarian, and French users place the highest importance on the video materials provided for the efficiency of their English language acquisition, and the Bulgarian and German learners consider the technical vocabulary exercises the most useful (**fig. 1**).

The majority of the users gives a very high evaluation of the technical vocabulary but does not think this tool could help them to improve their overall use of English or assist them in developing their writing or pronunciation skills.

The results from the analysis of the variance based on the role within sport (37 coaches, 7 referees, 27 players, 70 sports persons) confirm the above mentioned trends (**table 3**).

The tool proves to be the most useful for coaches, players, and referees who do appreciate the benefits of video materials and technical vocabulary included. TESS is justified to meet the needs and preferences of the sports professionals with different cultural backgrounds.

Table 3. Mean values of the results based on the Role within sport.

Question	Coaches	Players	Referees	Sports people
Do you enjoy learning English with TESS?	3.65	3.70	3.29	2.86
Is the follow-up of your progress satisfactory?	3.24	3.17	3.14	2.66
Do the videos help you to understand sports in English better?	3.57	3.30	3.43	3.01
Do the exercises help your comprehension?	3.43	3.26	3.14	2.97
Do the exercises improve your pronunciation?	3.24	2.87	2.86	2.55
Do the exercises improve your written skills?	3.27	2.74	3.14	2.43
Is the technical vocabulary rich enough?	3.41	3.26	3.57	3.04
Does the grammar contribute to improve your level of English?	3.38	2.96	3.00	2.71
Do you think that this tool can help you to improve your use of English?	3.03	3.04	2.57	2.90
Would you recommend this method to someone involved in sport?	3.81	3.57	3.71	3.03

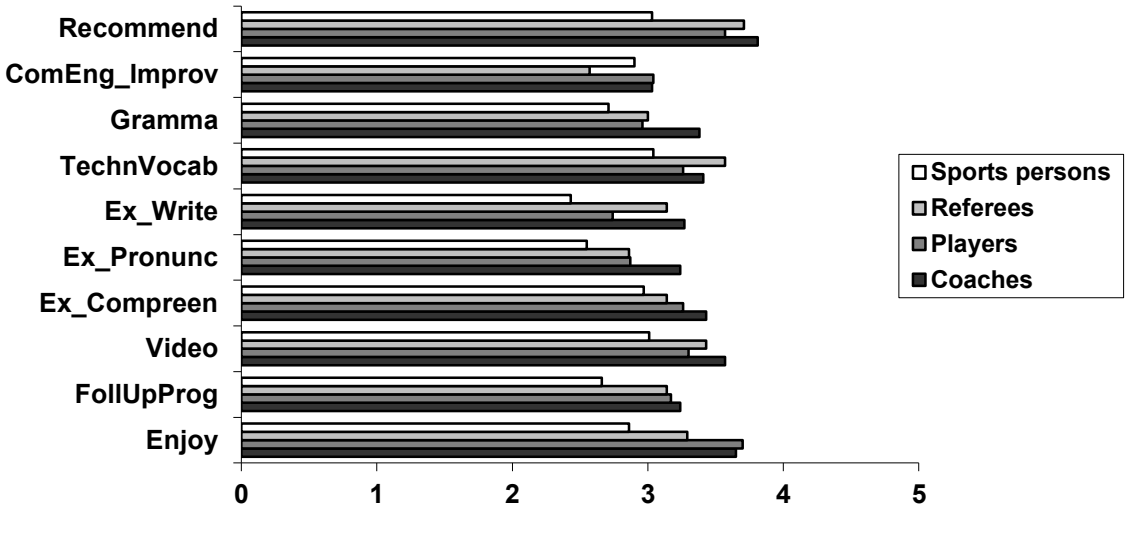

Figure 2. Evaluation of the pedagogical tool based on the Role within sport.

The coaches and the referees place the highest importance on the video materials for the efficiency of their English language acquisition (**fig. 2**). However, they do not think this tool could help them to improve their general English knowledge.

Players and sports persons, on the other hand, consider the technical vocabulary and role play exercises the most useful but do not find the writing exercises very appealing.

CONCLUSION

The results obtained from the external testing of the internet based teaching tool (TESS) suggest that the specificity of the tool contents is more appealing for people strongly related with the sports presented, especially coaches and officials.

Moreover, the average higher score coming from the question "Would you recommend this method to someone involved in sport?", with a very expressive 3.36, is indicative that even those that might not see much value in the tool to improve their use of English recognize its value to others.

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MONITORING OF ROWING PERFORMANCE USING IMU (INERTIAL MEASUREMENT UNIT)

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The combination of scientific knowledge in biomechanics and the modern measurement devices gives the experts an opportunity to determine movements in different sports skills and also to find out mechanisms of efficient movements in particular sports (1, 2, 3, 6, 9). Using expedient measurement equipment, the sport scientists today can determine movements in all important joint groups and segments of the athlete's body.

The achieved power also can be measured directly or indirectly but more important is to be calculated and to define the mechanical effectiveness of the movements (4).

In this aspect, the body movements' effectiveness has to be particularly connected with the whole biomechanical system movements and the influence of the environment in which the action is performed (5, 7, 9). Precise mechanism of movements has to be established and included in right learning programs in order better performance to be achieved.

Sport fields: It is not difficult to investigate in the track and field events (as an example) in real conditions outside, inside or, in a lab. Other sports as cycling, equestrian, all aquatic sports, etc. are not so easy for complex biomechanical investigations and that is why it is expected the new technology to exert influence on them for determination of the movements effect.

Technology: The development of micro-electromechanical systems, GPS, wireless transmitters (Bluetooth), microprocessors, batteries, standardizations of the communications records and software maintenance are the base for more possibilities of doing better and more detailed biomechanical investigations in sports movements.

GPS modules, which are now generally accessible, and are capable to exchange data with satellites of 10 Hz and it locates position with high accuracy, weigh of 9 grams and size of 22 x 22 mm pack.

The purpose of this article is to describe some new technologies for analyses of aquatic sports movements and to give good examples for its successful application.

Method: Six elite rowers were examined with one of the most up-to-date method to define movements and orientation by using inertial measurement unis – IMUs. Minimax B4 was the one we used. It is portable microprocessor device with GPS – 10 Hz, 3D accelerometer, gyroscope and magnetometer working with 100 Hz. It has also possibility to analyze heart rate. Data can be stored in 2GB memory into the device or, to be transmitted wirelessly within 200m.

Specialized software processes and visualizes information and gives opportunity for synchronization with video records. The device serves to analyze athletes' movements in time and space scanning the position with high frequency. It determines the position of the moving system in 3D with high accuracy. Its weight is 67 gram.

Fig.1. Catapult – Minimax B4

Results: Data stored in the device memory gives a possibility for complete analyze of the boat movement during training or test pieces. The most important parameters are the following: Stroke – shows its graphic and stroke rate; Vel (100Hz) – shows the boat velocity in the direction of movement at 100Hz; VHi/Stk – maximum velocity during the stroke; VLo/Stk – minimum velocity during the stroke; Vel/Stk – average velocity of the stroke; StkMark – marks graphically positions in the stroke: it marks with small peak the entry and with a big one the release and the beginning of the recovery.

Figure 2 shows results of the 4x1000m pieces performed in a different stroke rate. Graphical and table parts can be distinguished and they present all data for the different pieces and also some chosen parts of it. It shows the positon of the boat on a satellite picture with GPS coordinates.

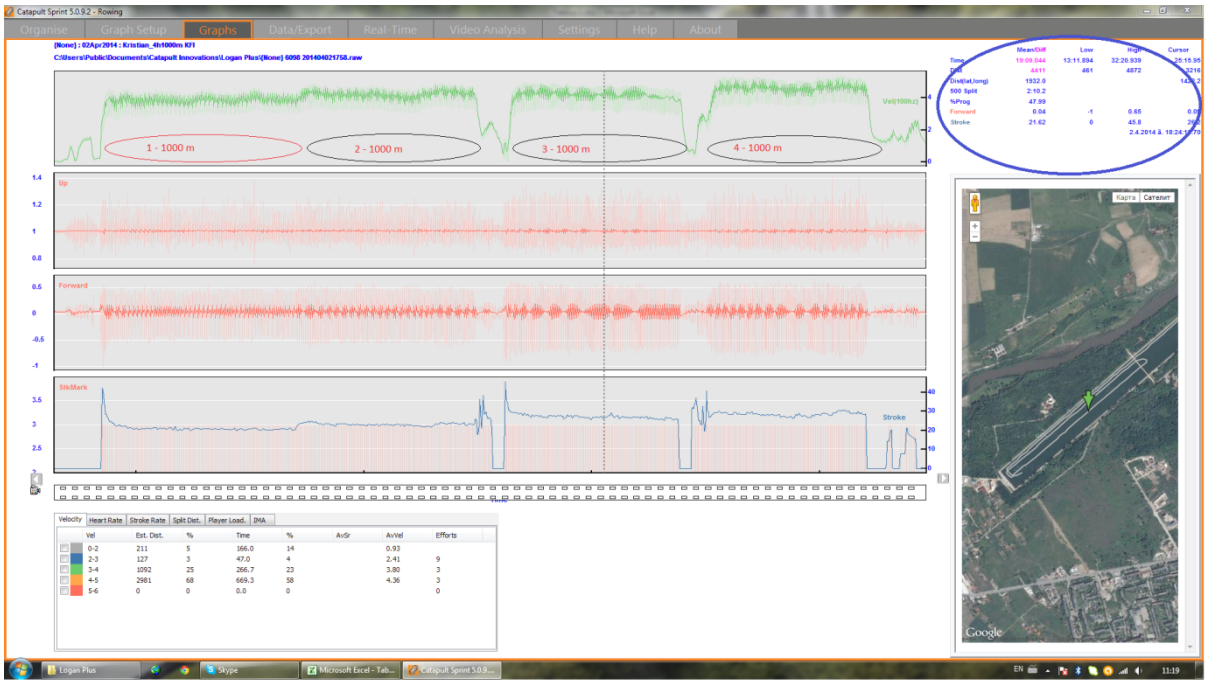

Fig. 2. Results of 4x1000m pieces performed in a different stroke rate

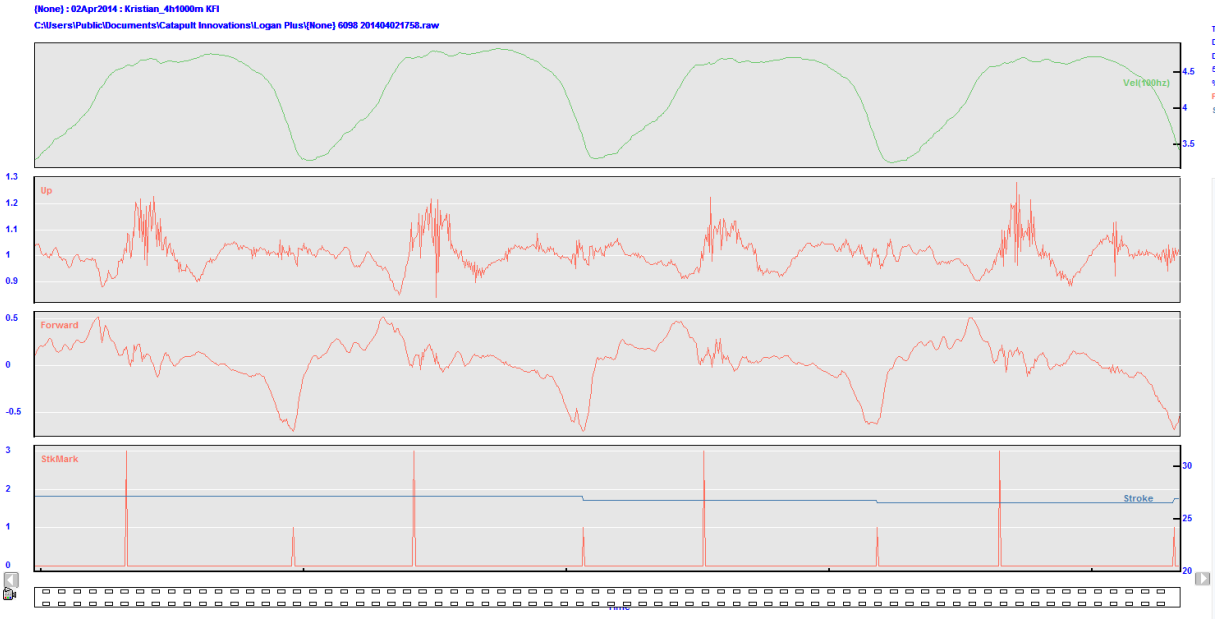

Fig. 3. Data of chosen four strokes

Figure 3 presents the graphical part and it is extended to be able to show dynamics of alterations of demonstrated exponents. It shows: in the upper part – the boat's velocity at 100Hz, under it is the dynamics of the vertical acceleration of the boat, the next part presents the boat velocity in the movement's direction, and the last one of the graphic presents the alterations in the stroke rate (in blue) and the entry and release phases of the stroke (in red).

These results presented in graphical and table form are in fact objective information regarding the boat movements but its analyze and interpretation is difficult for most of the coaches and athletes due to the character of the analyzed quantities. In order to make connection with the kinematics parameters of the athlete motor movements it is necessary to present Minimax B4 synchronized data and a video record of rowing in real time. It is demonstrated on the following figures where DartFish 6.0 product has been used for that purpose.

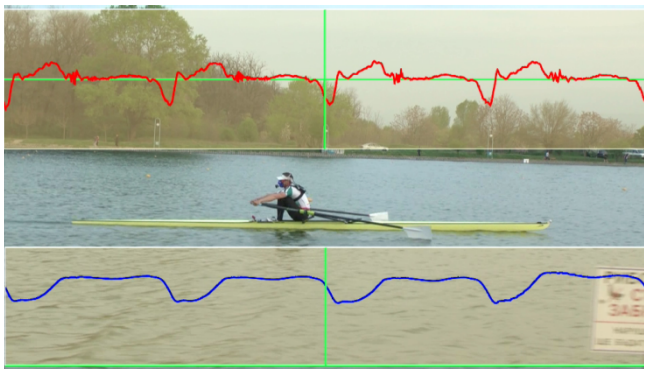

Fig. 4. Synchronized record of rowing and Minimax B4 data. Entry phase of the stroke. The lower graphic (in blue) presents the boat velocity alteration and the upper one (in red) is the boat acceleration.

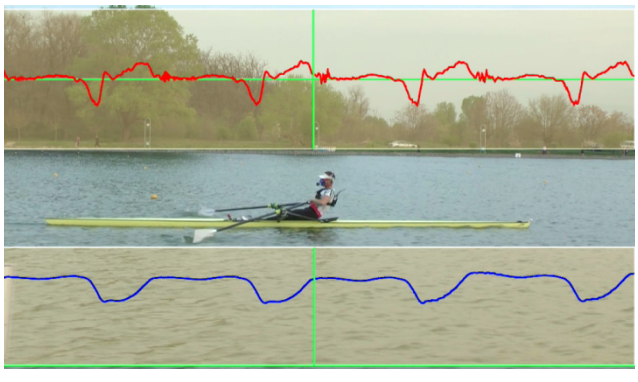

Fig. 5. Synchronized record of rowing and Minimax B4 data. End of the stroke – release.
The lower graphic presents the boat velocity alteration and the upper one is the boat acceleration.

Table 1. 4x1000m test results, different stroke rate; n=6

		1		2		3		4	
Темп	ц/мин	20,13	± 1.2	23,35	±0.93	27,52	±0.67	32,09	±1.31
Време за цикъла	s	2,98		2,57		2,18		1,87	
Време - работна фаза	s	1,05	±0.08	0,99	±0.11	0,95	±0.03	0,90	±0.05
Време - въздушна фаза	s	1,93	±0.09	1,58	±0.07	1,23	±0.06	0,97	±0.06
Ритъм		1/1,8		1/1,5		1/1,29		1/1,07	
Средна скорост за цикъл	m/s	3,94	±0.67	4,24	±.0.75	4,47	±0.69	4,78	±0.85
Средна максимална скорост цикл.	m/s	4,35		4,66		4,92		5,18	
Средна минимална скорст цикл.	m/s	3,39		3,65		3,72		3,89	
Разлика в скоростите	m/s	0,96		1,01		1,2		1,29	
Средна дистация за цикъл	m	11,27	±1.45	11,06	±1.11	9,47	±1.03	8,83	±0.97

Dynamics in the main integral parameters of the rowing technic of the examined athletes can be followed during the alteration in rowing intensity on the presented table. When examine in details mutuality of the intensity and the boat velocity alteration toward the covered distance in one stroke the crew efficiency can be defined.

CONCLUSIONS

The presented system of movement analyzes is reliable and objective base for gathering data about athletes in different sports (rowers in this case) in several aspects:

- For training loads analyzes;
- For detailed analyzes of the technical parameters;
- It gives the coaches a reliable feed-back and facilitates the technical improvement.

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ASSESSMENT OF BLENDED LEARNING COURSE IN SPECIFIC EDUCATIONAL CONTEXT

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Key words: *blended e-learning, foreign language, assessment, learning course*

The paper presents research results of experimental study on forming of knowledge, skills and competence in foreign language blended learning course offered to first, second and third year students majoring in Coaching and Physical Education faculties at the National Sports Academy. Pedagogical experiment is planned and based on the concrete design of 24 modules elaborated and applied in foreign language teaching within one academic year.

The main question which must be answered is related to whether the blended foreign language learning objectives are achieved. Tools used to assess the experiment results include didactic test specially designed for the concrete educational context. The technology used in the experimental study is the web-based platform NICENET.

The results are analyzed and discussed under two major points: statistically and pedagogically. Conclusions are made in order to improve the pedagogical design for foreign language blended learning courses.

INTRODUCTION

Foreign language teaching and learning are no longer restricted to traditional classrooms, while e-learning (electronic learning) has become one of the powerful supporting tools which have diversified the traditional context of teaching and learning in educational institutions. The rapid development of technology, the Internet as a delivery platform has motivated universities to invest their resources on developing online programs.

Advances in technology provide new opportunities for teachers to design and deliver their courses in ways that support and enhance the teachers' role, the students' individual cognitive experiences, as well as the social environment. The main question is not just using technology because it is available but finding better ways of supporting students in achieving the learning objectives and providing them with the best possible learning and teaching experiences through blended learning practices [1].

Meanwhile, the blended course, which combines online components with the conventional face-to-face teaching, has emerged as an alternative mode of teaching and learning foreign languages and a substantial supplement. With opportunities and barriers as well, however, the development and management of e-learning are still challenging, especially for the continuous improvement of students' learning effectiveness via e-learning for blended courses.

METHODOLOGY OF THE STUDY

This paper assesses the students' achievement in blended learning course conducted at the National Sports Academy "Vasil Levski" for two semesters of the academic year 2011/2012. The pedagogical experiment involved replacing the traditional face-to-face course with a blended learning approach involving conventional face-to-face teaching followed by material and activities delivered exclusively online. Our key task is to measure the impact of the blended learning model elaborated for assessment of the foreign language blended learning experience in specific educational context. The experiment was planned and based on the concrete design of 24 modules course for first and third year students at

the National Sports Academy "Vasil Levski". The comparison has been made between two groups – control and experimental which were formed respecting some criteria of equality such as level of foreign language knowledge, number and year of study.

Therefore, consideration needs to be given on how to assess the success of blended learning courses. It should not be surprising then that a large body of literature has emerged on how to assess these novel teaching blended strategies. There are two main methods of assessing the effectiveness of a blended learning course [2]. The first one involves the measurement of the students' satisfaction with this course. This is usually done through surveys or focus groups. The second method involves comparing students' performance at the beginning and at the end of the course. In this paper we pursue the second method of assessing the foreign language blended learning course for sports students.

A topic-based, learner-centered curriculum has been designed to meet learners' needs and interests. Syllabus content has been developed taking account of the target learners' profile that emerged from work carried out with focus groups on campus. This profile included information about learners' attitudes to learn foreign languages (English and French) and to use e-learning as a part of foreign language teaching, their professional needs and activities, foreign language knowledge level and information they believed a person would need to be able to communicate in the field of sports. Through modules students learn the language they need to know in order to meet sports people, talk about their sports and training activities, learn sports terminology necessary for understanding professionals, sports stars and authentic sports documents. The foreign language teaching program integrates a combination of task-based language learning approaches with content-based teaching and computer-supported collaborative learning through the web-based platform Nicenet used during the blended learning course [3,4]. Students were encouraged to develop their autonomous learning abilities and to work towards fulfilling their language learning goals. The platform used during the course is a free classroom assistant which contains all materials and tools students need for their language-learning work, such as written documents, wordbook, class schedule, discussion forum, internet resources, online assignments, among other functionalities.

The pedagogical model designed for underlying the specific educational environment takes into account the foreign language learning objectives, the criteria and the conditions for optimal language learning; methodological principles for task-based language teaching in e-learning and a range of teaching methodologies for network-based language teaching and e-learning pedagogy [3].

FOCUS GROUP EVALUATION

The results briefly reported here correspond to a focus group of 99 students distributed in experimental group of 49 students and control group of 50 students. The experimental group students were enrolled in the foreign language blended learning course and the control group students were taught a traditional face-to-face foreign language. A special written test has been elaborated for measuring the impact of the course on the students' linguistic competence in five didactical tasks including the most important language skills, such as reading, writing, speaking, listening and grammatical use of the language.

IMPACT ON STUDENTS' LINGUISTIC COMPETENCE

The results obtained by students in the diagnostic and final assessments were statistically processed with SPSS using Student's' t Test and are presented in the table 1. The comparison of the experimental group mean scores on the diagnostic and final assessment shows a remarkable improvement in students' performance, going of 4.16 to 5.08. This achievement has been reached by students of the National Sports Academy in over 25-week period.

The comparative analysis of the means for the diagnostic and final assessment for the experimental and control groups shows a difference of 0.92. Perhaps this difference gives reason to believe that the positive impact of new components in the foreign language blended learning design, among which may be mentioned as the most important the diverse interactive content, focused on topics of professional and academic lives of students and construction of a new learning environment of mutual coopera-

tion and collaboration, which involves the use of various information sources and resources. Improved students' performance at the end of the pedagogical experiment is probably due also to the additional learning materials and activities (additional learning time) in the web-based platform where have been achieved individualization and differentiation of learning, but also building skills for independent and active learning. The comparative analysis of academic achievement of students in the control group between initial and final study showed little improvement, going of 3.82 to 4.02. The progress, however, is made in acquiring knowledge and building skills through the application of traditional teaching methods in foreign language classes.

Table 1. Comparison between experimental and control groups for the diagnostic and final assessment

GROUPS	n	DIAGNOSTIC		FINAL		GROWTH		Statistical significance	
		$\bar{X}_1$	S_1	$\bar{X}_2$	S_2	d	d%	t_{emp}	P (t)
EXPERIMENTAL	49	4.16	1.14	5.08	1.08	**0.92**	22.06	9.15	100.00
CONTROL	50	3.82	0.98	4.02	0.98	**0.20**	5.24	2.65	98.91
DIFFERENCE		0.34		1.06		**0.72**			
Statistical significance	**t**	1.60		5.13		5.73			
	P(t)	88.78		100.00		100.00			

Other comparisons have been made between experimental and control groups through didactical tasks given in the pedagogical test which show different skills built by students during their foreign language blended learning course (table 2). If we compare the mean values showed that for both groups, they are the highest in terms of task "Use of the language" (experimental group students -14.00 and 10.68 for control group students), and the lower levels are the mean values for the task "listening "(experimental group-8.35 and 6.46 for the control group).

Table 2. Comparison between experimental and control groups for didactical tasks of the test in initial and final study

Didactical tasks	Experimental group		Control group		Growth	
	Beginning	End	Beginning	End	Experimental group	Control group
Use of language	9.18	14.00	8.94	10.68	4.82	1.74
Reading	6.96	13.82	6.54	8.72	6.86	2.18
Speaking	7.08	13.31	6.76	9.02	6.22	2.26
Writing	5.69	10.49	5.42	9.14	4.80	3.72
Listening	4.49	8.35	4.94	6.46	3.86	1.52

Therefore, the highest achievements of the students in the experimental group have been made for tasks „Use of the language" then have been ranked the tasks „Reading", „Speaking", „Writing" and the worst task achievement is showed for the task „Listening".

We assume that the remarkable improvement in four of the five tasks set out in the language test is due to the large number and variety of learning activities, including grammar and vocabulary exercises, the use of sports terms and term phrases, writing reports, summaries and short texts, discussions and oral comments, which are used in the learning process, both during the traditional classwork and other supplementary activities delivered through the web-based platform Nicenet.

In the control group the highest levels of achievement are reported on a task „Use of the language" then have been ranked the tasks „Writing", „Speaking", „Reading" and the weaker, as already men-

tioned achievements are reported on the task „Listening „. This is understandable given that traditional methods of teaching foreign languages present many problems and exercises are mainly related to the use of language and to the writing. All classroom activities are aimed at building skills that are associated more with the written language.

CONCLUSIONS

The comparative analysis results show substantial improvement in the students' language skills and lead us to draw the following conclusions:

1. A significant increase in the academic achievement of the experimental group is made on four of the five tasks in the language test.
2. The increase in performance of the control group students is less than the growth in achievement of students in the experimental group.
3. The experimental group students' achievement is associated with the basic knowledge and skills in tasks "Use of the language", "Reading", "Speaking", "Writing" which is a good indicator of the effectiveness of innovative pedagogical model of foreign language blended learning.
4. Weak performances in terms of task "Listening" may be due to insufficient learning experience in the process of training or poor quality of audio / video material that is provided in the didactic language test.

Our experimental group results support the success of foreign language blended learning model implemented whose main purpose is to build skills in a foreign language oral and written communication. These improvements in students' linguistic competence give us new hope to believe that teachers and students can succeed in their goal of teaching and learning foreign language more effectively.

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PE AND SPORT IN THE EDUCATIONAL SYSTEM – PE1

EFFECTS OF DIFFERENT APPROACHES TO TEACHING BASKETBALL ON GAME PERFORMANCE, SKILLS AND KNOWLEDGE OF PRIMARY SCHOOL PUPILS

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Key words: *Teaching Games for Understanding (TGfU), technical approach, game performance, game skills, procedural and declarative knowledge*

INTRODUCTION

How the best teach physical activities incuding ball games to children has always been a crucial question in the field of Physical Education (PE). Many authors (e.g. Bunker – Thorpe, 1982; Turner – Martinek, 1992; Griffin – Mitchell – Oslin, 1997) suggest that a greater emphasis in teaching games should be placed on teaching tactical aspects earlier to increase competence, interest and enjoyment in playing the game. Therefore a model still not very well-known and used in Slovakia, called Teaching Games for Understanding (TGfU), was introduced by Bunker – Thorpe (1982). Its main intention is to enable students to enjoy participation and to play the game reasonably well so that they will be more motivated to play and to gain the benefits of engagement (Blomqvist, 2001). Slovak schools have mainly been technique oriented so far. But with the latest school curriculum there is a need for inovative methods of teaching physical activities.

The aim of the study was to compare effects of the TGfU approach and the technical approach to teaching basketball on game skills, game performance and procedural and declarative knowledge of primary school pupils.

METHODOLOGY

The experiment was conducted during Physical Education (PE) classes at 2 primary schools for 8 weeks in duration of 45 minutes twice a week. Two male groups in the age of 11 – 12 years participated in the study.

One group was taught by the technical approach (n=21) (**Table 1**) where a content of school lessons was built on the thematic plans inspired by Argaj - Rehák (2007). This control program focused on basketball skills like passing and catching the ball, asking for the ball, shooting, dribbling, rebound and defending players with and without a ball. Another group was taught by the TGfU approach (n=13) (**Table 2**) where the content was built on Mitchell's et al. (2006; 2003) thematic and lesson plans. This experimental program focused on tactical problems like keeping possesion of the ball, penetrating the defence and attacking the goal, transitioning from defence to offence and vice versa, defending players with and without the ball, winning the ball and restarting play.

Chosen game skills were measured before and after the intervention. Shooting skills were measured by Under basket shot test (Brace, 1966) where the goal was to score as many times as possible within

30 seconds. Passing skills were evaluated by Push pass for accuracy test (Brace, 1966) with the goal to hit the target as many times as possible out of 20 attempts and dribbling skills werw measured by Dribbling test (Argaj - Rehák, 2007) where the player should dribble the ball as fast as possible around the marked track shown in **Figure 1.**

Table 1. Technical group's elemental profile

	Age [years]	Hight [cm]	Weight [kg]
Average	11.62	152.24	42.81
Standard deviation	0.50	7.52	9.30

Table 2. TGfU group's elemental profile

	Age [years]	Hight [cm]	Weight [kg]
Average	11.69	153.77	42.15
Standard deviation	0.48	4.95	11.04

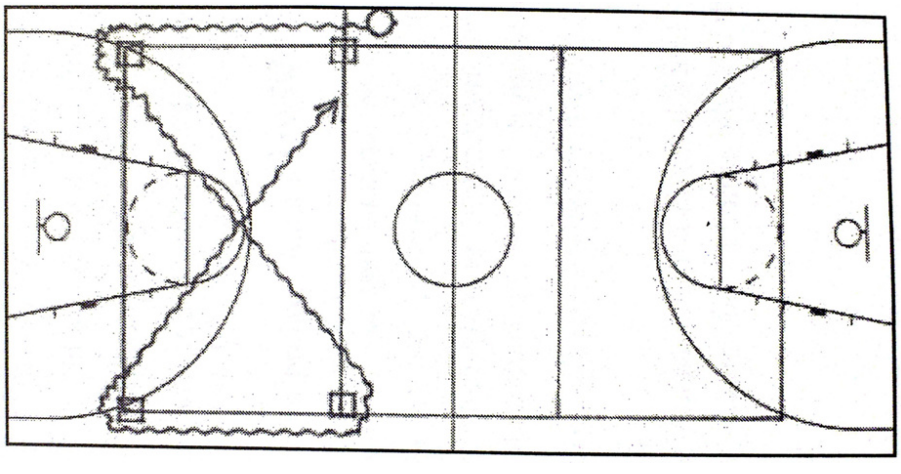

Figure 1. Dribbling test (Argaj - Rehák, 2007)

What kind of pass should the player with a ball make in order to pass the ball to his teammate?

a) An overhead lobbed pass

b) A bounce pass

Figure 2. An example of a tactical question to assess procedural knowledge

Procedural and declarative knowledge was assessed by a written test after the intervention. The test was constructed on the basis of questions for physical education activities (McGee – Farrow, 1986).

Seven out of 12 questions were concerned to rules (declarative knowledge) and five questions to tactics (procedural knowledge) of basketball. Both closed and open questions were applied. An example of the tactical question is shown below in **Figure 2.**

Game performance was evaluated by coding players' behaviour through a videorecord after the intervention. Specifically "1-5 scoring system of Game Performance Assessment Instrument" (Mitchell – Oslin, 1999) was applied to measure pupils' game performance during the 3-3 game on one basket. Each player's performance was assessed like very good (5), good (4), average (3), week (2) or very week (1) according to some exact definitions.

Wilcoxon's t-test and Man-Whitney's U-test were used to evaluate the data. Procedural and declarative knowledge was evaluated separately and also together as general knowledge of basketball. A level of significance was set on 5%.

RESULTS

Both groups achieved a remarkable improvement in passing and dribbling skills ($p<0.05$) however not in shooting ($p<0.05$) what can be seen in **Figures 3 and 4.**

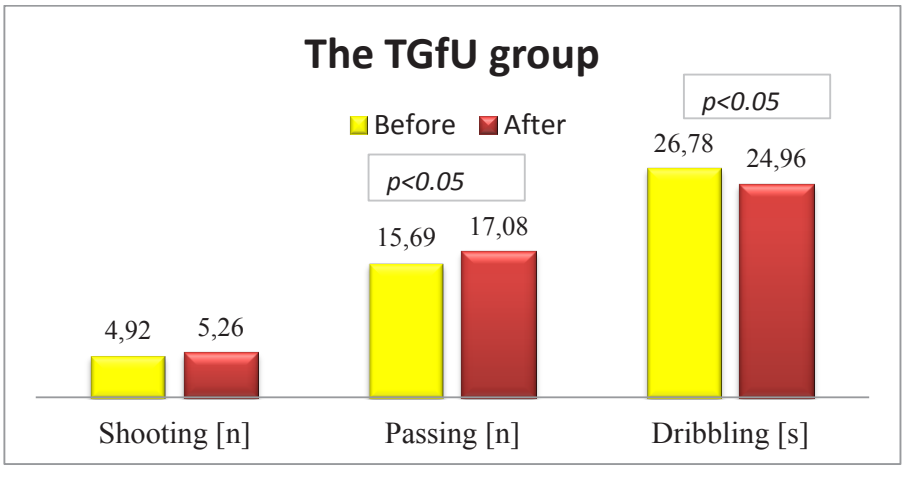

Figure 3. TGfU group's differences in game skills before and after the intervention

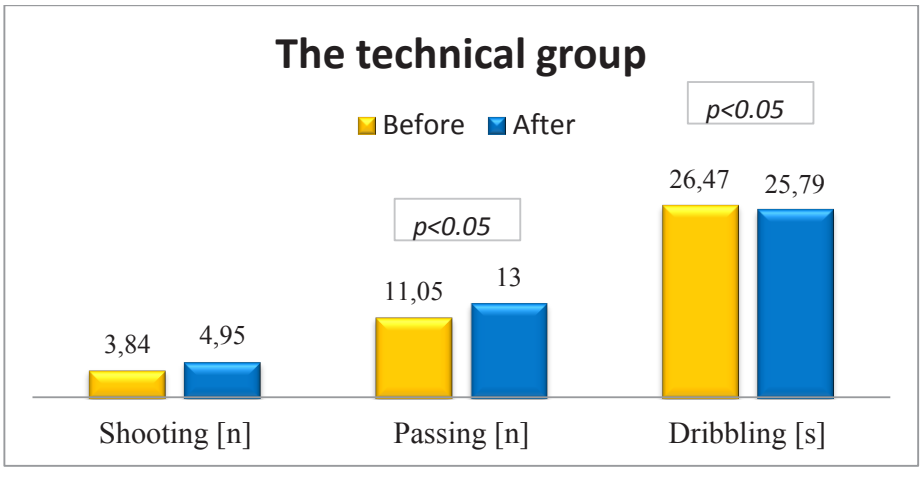

Figure 4. Technical group's differences in game skills before and after the intervention

Changes in game skills between the groups caused by the experimental programs were as follows (**Figure 5)**. Although the group taught by the technical approach achieved slightly better improvement in shooting and passing than the group taught by the TGfU these changes were not statistically significant. However on the contrary the TGfU pupils improved more their dribbling skills in comparison to pupils taught by the technical approach ($p<0.05$).

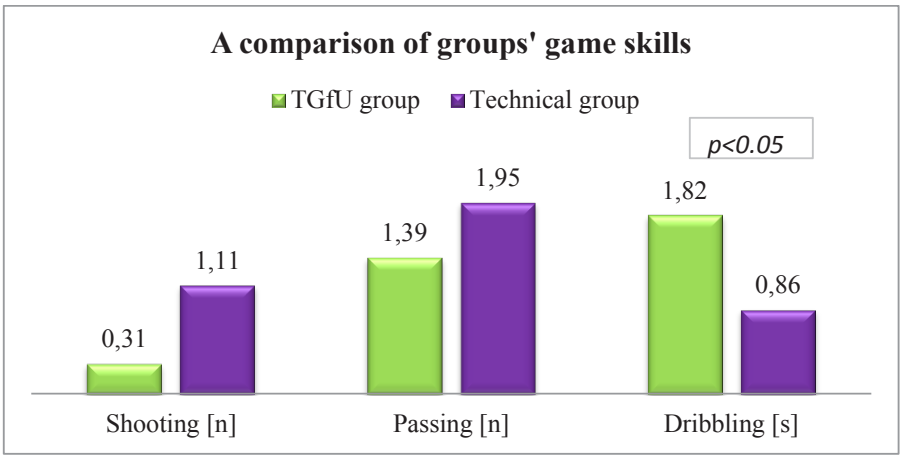

Figure 5. A comparison of changes in groups' game skills

Although the TGfU group achieved better % - score in questions of both procedural and declarative knowledge than the technical group, the differences were not statistically significant (Table 3).

Similarly to game knowledge this experiment didn't show any significant differences in game performance of the groups (Figure 6). Due to such results we could conclude that in this particular case both approaches have very similar effects on game knowledge and game performance.

Table 3. Comparison of groups' basketball knowledge after the intervention

TGfU group				Technical group		
procedural knowledge (out of 5 questions)	declarative knowledge (out of 7 questions)	general knowledge (out of 12 questions)		general knowledge (out of 12 questions)	declarative knowledge (out of 7 questions)	procedural knowledge (out of 5 questions)
4,23	5,08	9,31	average	8,2	4,4	3,8
84,62	72,53	77,56	%	68,33	62,86	76
4	4	10	mode	7	4	4
4	5	9	median	8	4	4
5	7	12	max	11	6	5
3	4	7	min	5	1	2

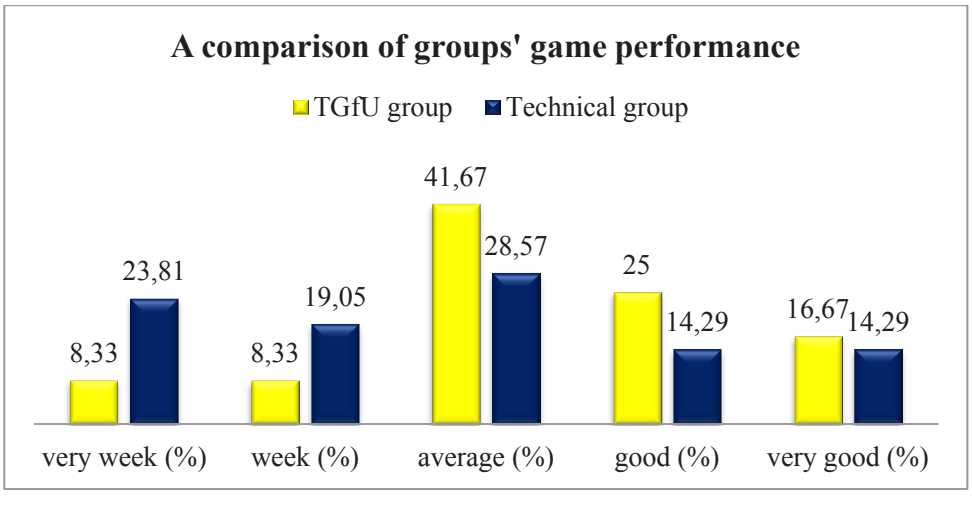

Figure 6. Comparison of groups' game performance after the intervention

DISCUSSION AND CONCLUSIONS

Results of our study can be summarized very briefly in two sentences. The TGfU just as the technical approach caused similar improvement of pupils' passing and dribbling skills ($p<0.05$) but the TGfU showed better effects on changes in dribbling skills in comparison to the technical approach ($p<0.05$). Moreover there were no significant differences found between the effects of mentioned approaches on game knowledge and game performance.

This study supports Blomqvist's (2001) results which indicate that both groups improved their game skills but the TGfU group more. Similarly to our study Turner (1996), Turner - Martinek (1999) and Griffin et al. (1995) didn't find any significant differences in game skills level between groups. These authors, however, found better effects of TGfU on procedural knowledge in comparison to the technical approach what is not in accordance with our outcomes. Our study also supports results of Turner – Martinek (1992) who didn't confirm any significant differences between the groups in neither procedural nor declarative knowledge of field hockey of 6th and 7th graders. Quite the opposite, Blomqvist (2001) proved significant differences in both types of knowledge of badminton between the groups. Different outcomes relating to game performance were shown in the experimental study of Olosová – Zapletalová (2012) who found that better game performance was achieved by TGfU group than by the technical group.

It is obvious that obtained results are nonuniform what indicates that there is still need for a further investigation in this area.

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The study is part of supporting grant of Comenius University UK/314/2014 "Effects of different approaches to teaching basketball of primary school pupils" and grant VEGA 10386/13 "Learning effects of different teaching approaches to sports games in relation to gender, age and game experience."

STUDY INTO COMPETENCY DEVELOPMENT OF NOVICE TEACHERS IN PE CLASSES

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Key words: *PE Teachers, Novice, Cognition, Reflection*

INTRODUCTION

PE classes are generally taught while the students are moving about in wide, open spaces. As a result, PE teachers require the cognitive ability to observe students that are not all in one place, unlike they are in a normal classroom. Further, students are required to learn a skill by interpreting slight bodily sensations while they perform whatever action they are instructed to therefore the timing and content of interjections by the instructor can have a significant impact on the learning process. For example, whether or not an instructor has the ability and insight to tell a student who is only steps away from being able to successfully vault over a vaulting horse to focus on a particular action or aspect of the exercise and give them the encouragement they need can have a significant impact on that student's skill acquirement. The ability of an instructor to pick up on what a particular student might be struggling with and give them the assistance they need in a large, open space does come under question. In the field of cognitive science, the job of a PE instructor is figured into the domain of creative skill – requiring the ability to act on the spot in situations where there is no definite solution, and the skill to act at exactly the right time to achieve the desired result [Oura, 2000]. In addition to the previous example of the vaulting horse, there is no set time for a baseball coach to change pitchers, the decision, for example, by a coach to change pitchers is dependent on creativity, in other words, the coach's experience and gut feeling, while at the same time, requires the skill to pick the correct timing, which if is lost, can have a significant impact on the outcome of the game. This can also be said for the question of how to instruct the children in front of you. Focusing on this question will help give insight into how to increase the competency of teachers in their ability to determine what students are struggling with and what feedback to give them in order to achieve the desired result in research into teacher training in HPE education, a field that requires creativity and skill.

Oura has noted three personality types for how teachers seek to increase their own competency levels. The first is those who learn as a result of a comparison based on their own internal standards. The second is those who learn as a result of a comparison between their peers. The third personality type is those who learn as a result of a comparison based on highly objective external standards. The first personality type (those who learn as a result of a comparison based on their own internal standards) recognizes changes in the way they teach by comparing classes from the past to the classes they teach now. This can be achieved through reflection by reviewing their own classes recorded on video etc. Reproduced cognition [Nishihara, 2007] can be effective, particularly in the case of novice teachers. This study looks at the change in the competency levels of novice teachers by using reproduced cognition in health and PE classes

METHODS

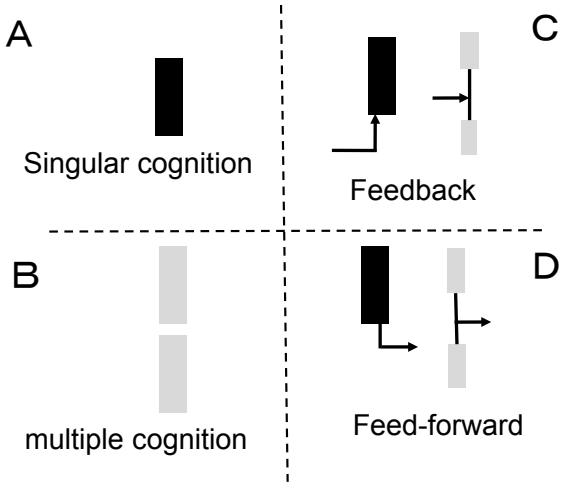
Subjects used in the study included six novice health and PE teachers with less than five years teaching experience. Reproduced cognition was used in seven hours of health and PE classes. Classes used in the study were badminton classes at a junior high school. The study was conducted from October to November in 2013. Three of the teachers were asked to use reproduced cognition after each hour of teaching. The other three teachers taught their classes as normal, without the use of reproduced cognition.

✓Reproduced cognition

In order to film what the teachers were seeing during class, a CCD camera was fitted to their heads, while at the same time, another cameraman was used to follow behind each of the teachers. The video footage taken by the cameraman was used as a backup to the CCD camera footage. Two days after the classes, teachers were encouraged to reflect on what they were seeing while viewing the VTR footage. During this process, teachers used the word [STOP] to stop the footage (look at a still shot) when they were looking at something in particular, and discuss what they were seeing. Once they were finished talking, the footage was restarted and they continued watching the video.

✓On-going method (**Fig. 1**)

Teachers were fitted with an IC recorder and were asked to discuss what they were seeing at a particular point in the class and record their reflections. These reflections were divided into;



A: Singular cognition (cognition of 1 area or incident)

B: Multiple cognition (cognition of multiple areas or incidents)

C: Feedback (cognition from the recollection of past events)

D: Feedforward (cognition to predict future events)

Fig.1: On-going observation in the class

RESULTS

The number of reflections increased through repeated sessions of reproduced cognition in the case of the three teachers that were asked to use reproduced cognition as part of the study (**Table 1**). This is due to the fact that the teachers was growing accustomed to the process of reproduced cognition as the sessions progressed and the way they were seeing their own classes was changing. Dividing the content of the reflections from each class into “abstract reflections” and “specific reflections”, the number of “specific reflections” increased as the classes progressed. “Abstract reflections” included, for example, content such as, “subject is moving away from the objective of the class”, “the class is not progressing the way I had planned” and “the students are showing no enthusiasm” etc. On the other hand, “specific reflections” included content like, “here it would have been better to speak in a slightly louder voice”, “it would be better to reinforce this explanation again later”, “this particular student continues to do the same thing and is showing no improvement” and “it would be better to use a slightly larger panel for this explanation” etc.

Table1: The numbers of refrections

Period		1	2	3	4	5	6	7
Abstract recognitions		9	8	8	5	3	2	0
Specific recognitions	Teaching technique	7	9	10	5	6	4	5
	Teaching material	3	2	2	5	4	3	4
	Gauging student learning levels	2	4	5	11	14	18	21
Total recognition		21	23	25	26	27	27	30

※The mean value of 3 teachers, Unit:times

Further, it was also possible to divide “specific reflections” into the following; “reflections concerning teaching technique”, “reflections concerning teaching material” and “reflections concerning gauging student learning levels”. “Reflections concerning teaching technique” increased up until the three-hour mark, following which there was no change. We believe this is due to the fact that initially the teachers tend to reflect on their own teaching technique; however as the classes progress, their technique improves. “Reflections concerning teaching material” varied from class to class and were inconsistent. We believe this is due to the fact that some classes place heavy emphasis on teaching material whereas other classes do not. “Reflections concerning gauging student learning levels” gradually increased over the course of the seven hours. We believe that this is due to the fact that as the classes progressed, it was possible to gauge specifically what students displayed what kind of behavior, or in other words, in what areas they improved.

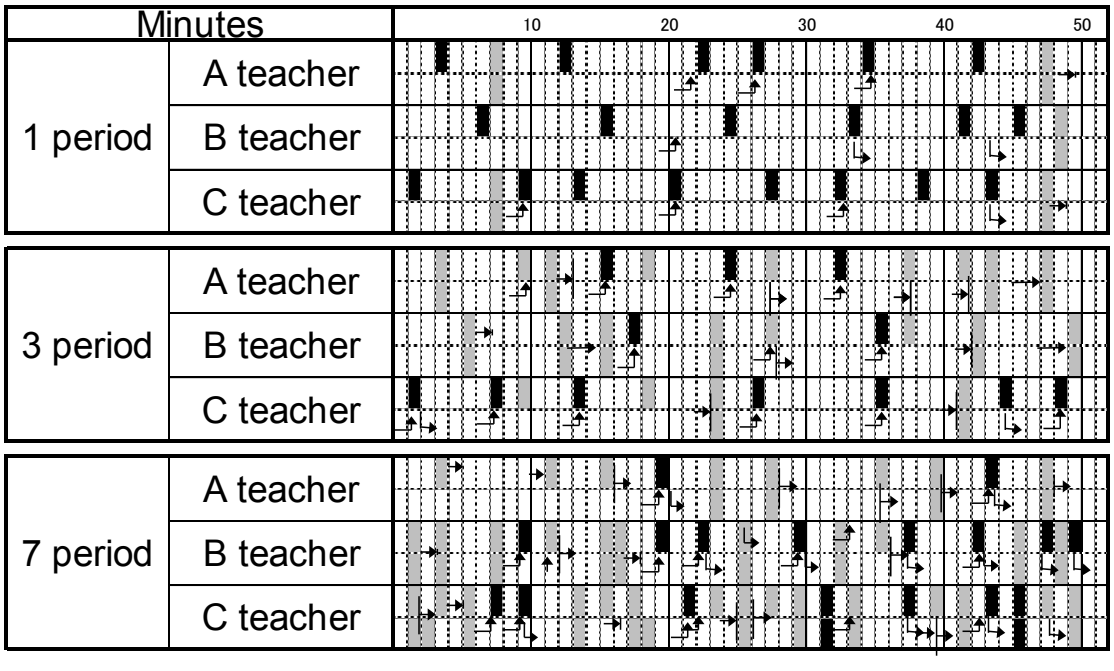


Fig.2: The three teachers that were asked to use reproduced cognition

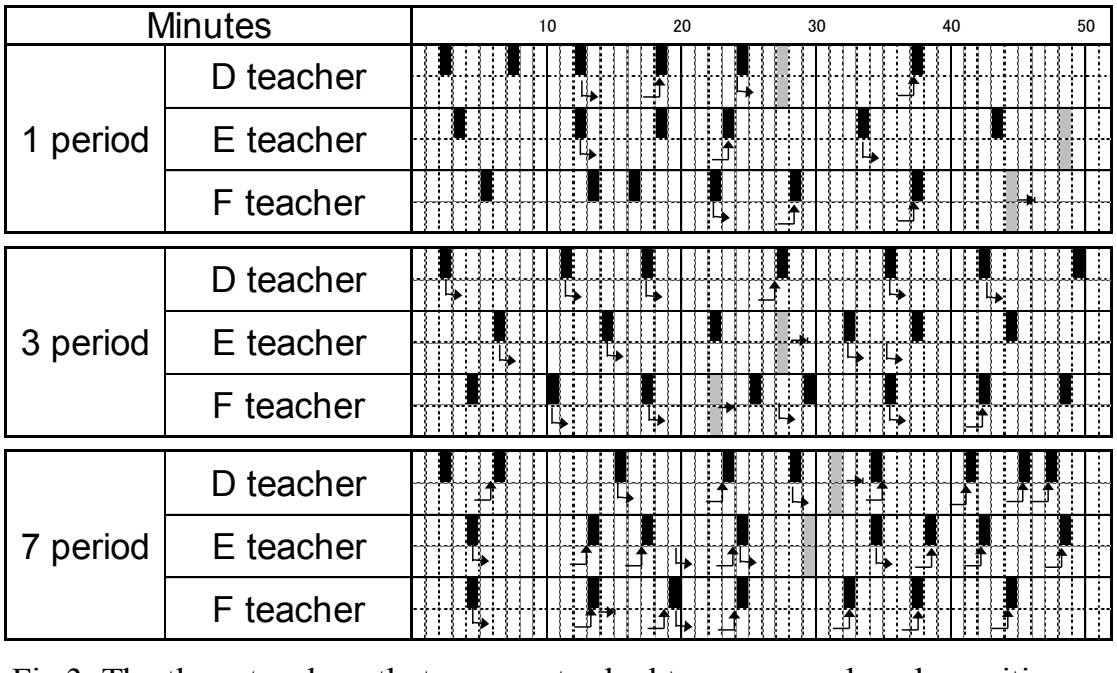


Fig.3: The three teachers that were not asked to use reproduced cognition

Next, I would like to discuss the results of on-going observation of the teacher's cognition during the classes. As the classes progressed, there was an increase in multiple event cognition, feedback and feedforward in the three teachers that were asked to use reproduced cognition (**Fig 2**). As shown in the results above, we believe this is due to a better understanding of relationships between the students, their past ability levels and how much they have improved since as a result of the teachers being better equipped to acknowledge specific phenomenon and effectively gauge student learning levels. On the other hand, while there was a slight increase in feedback from the three teachers that were not using reproduced cognition, we believe this is simply a result of cognition they had grasped as the classes progressed (**Fig. 3**).

DISCUSSIONS AND CONCLUSIONS

From the increase in the number of reflections over the course of repeated reproduced cognition we can presume that repeated reproduced cognition results in an increase in classroom awareness. From the increase in "specific reflections", it is also possible to formulate specific measures to improve on future classes. Further, due to the increase in "reflections concerning gauging student learning levels", we can also assume that it is possible to better understand specific changes in behavior and ability of individual students and therefore provide more appropriate tuition.

This study has showed that the introduction of reproduced cognition into health and PE classes is effective in assisting novice teachers formulate specific improvements for future classes and in understanding student learning levels.

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DECLINE OF PHYSICAL ACTIVITY LEVEL FROM CHILDHOOD TO ADOLESCENCE

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Key words: *Physical activity; School; Children; Education.*

INTRODUCTION

Various studies have confirmed that physical activity during childhood and adolescence is associated with benefits to the health of children and adolescents, including decreased adiposity, improved cardiovascular fitness, prevention of the metabolic syndrome [2,20].

The levels of physical activity are indicators of health for children and young people.

Studies in different countries warn that a consequence of reduced levels of physical activity among children and adolescents is the decline in motor performance [14,42] which helps to reduce the protective effects of physical activity.

Physical education and sport in schools has a fundamental role: is an essential component of the educational process of the student, promotes the development of perceived competence and enjoyment that are mediating factors to increase levels of physical activity and promote the development of relations between the areas of motor, cognitive, emotional-affective and social of the person [1,28,37].

The definition of the physical activity levels of physical activity needed for growth and development of children and young people, has been studied mainly in the last decade. The studies contributed to the drafting of recommendations and guidelines for physical activity daily also for children and adolescents. International organizations, governmental and non-governmental, have developed recommendations on physical activity, aimed at guiding the programs and interventions of prevention and health promotion [15,48,41,46] .

According to WHO [48] children and young people aged between 5 and 17 years old should play at least 60 minutes of daily physical activity, of variable intensity between moderate and vigorous and most of daily exercise should be aerobic. The Intensive activities, aimed at the development of motor abilities, should be carried out at least three days a week, at different levels of intensity, adapted to the physical characteristics of the children and take place under conditions of security. The daily physical activity should be organized in periods of variable duration and intensity, up to score the recommended amount.

The Council of the European Union [41] warns that physical education in school is essential opportunity to provide educational opportunities designed to increase awareness of the importance of HEPA (*health-enhancing physical activity*) and to implement programs prevention and health promotion through physical activity and sport.

The recently published study by Hallal [18] warns that in different countries of the world physical inactivity increases with age, is higher in women than in men, and is higher in high-income countries. The percentage of adolescents 13-15 years old who plays less than 60 minutes a day of physical activity, moderate to vigorous intensity, is 80.3% and the boys are more active than girls.

The data from the *Childhood Obesity Surveillance Initiative* of the European Region of WHO, showed values of overweight and obesity in children aged 6-9 years ranging from 11% to 37% among males and from 15% to 35% among females. This phenomenon, in addition to genetic factors, is dependent on the changes in lifestyle [21]. In Italy, the available data (2012) concern both the percentages of overweight

and obese children in both the levels of physical activity measured by self-report completed by parents. The data confirm worrying levels of overweight: 22.2% of children are overweight and 10.6% in terms of obesity, with higher rates in the regions of central and southern.

Regarding the values of the levels of physical activity and sedentary habits there was an improvement, compared to the year 2010, but the values are high: the 17% has not practiced physical activity the day before the survey, the 18% practice sport for no more than one hour per week, the 44% have the TV in his room, the 36% watch TV and / or playing with video games more than 2 hours a day and only one in four children walk to school or goes by bicycle [22,23].

The study international HBSC (Health Behaviour in School- aged Children), with the support of WHO, has analyzed the physical activity levels of adolescents and behaviors related to health in the population among boys aged 11, 13 and 15. According to HSBC study, in Italy, the percentage of adolescents who reach the recommended value of at least one hour of physical activity a day, for 7 days a week is respectively 8.2% at 11 years, 6.9% at age 13 and 7.6% at 15 years.

Age increases and there is a decrease in the practice of daily physical activity.

In addition, the percentage of females who practice physical activity for an hour a day, seven days a week, is about half that of males: 11 years 10% in males vs 6% in females, 13 years, 9% in males vs. 5% in females, and 15 years 10% of males vs 5% in females.

The percentage of young Italians who engaged in physical activity for "an hour a day, seven days a week," is almost half compared to the international. In particular, the percentages for males are to 11 years old: 10% vs 28%, to 13 years: 9% vs 24%, and 15 years: 10% vs 19%; while for females: to 11 years old 6% vs 19%, to 13 years: 5% vs 13%, and 15 years: 5% vs 10% [5] .

The interventions for promoting physical activities require an integrated planning between the different institutions, to adapt the guidelines to the needs of the community, in relation to the particular socio-cultural and environmental factors and to experiment specific organizational and operational [33]. Among the factors that influence the systematic practice of physical activity of children and adolescents are fundamental differences in gender, age, ethnicity or social class, level of parental education.

The principals determinants of physical activity are [36,45] :

demographics (the social class, level of education and income, the greater likelihood of physical activity among young people, particularly males);

*psychological*s (motivation, enjoyment and perceived competence);

social factors (social inclusion, support from parents, siblings and peers, teachers);

environmentals (the disponibility of facilities and equipment for physical activities, organization to specific programs).

The interdisciplinary programs to prevent and combat the sedentary habits allow you to implement integrated interventions to promote health through investments in different contexts: the urban built environment , the active travel, the programs of physical activities promoted by local governments, school, family, the introduction to the sport, public health [43].

The educational process of children through the motor experiences, the learning of motor skills and motor abilities development, are in relation to the opportunities offered by the socio-cultural context [30]. It's a process that exceeds the previous settings on child development, especially related to the succession of evolutionary stages defined.

The ecological approach to proposed by Bronfenbrenner [3] studies the interactions of different contextual levels that affect human development and considers the complex interrelationships between the human organism and environmental change, in different contexts and during the various stages of life.

A variant of the model of Bronfenbrenner has been proposed by McLeroy [29], which provides a greater focus on variables that are crucial to the programs, processes and actions.

The human behavior that emerges would be regulated and influenced by the following factors:

Intrapersonal: individual characteristics, age, sex, knowledge, behaviors and attitudes, self-concept and perception of competence, mastery of motor skills, etc.

Interpersonal: peer groups, formal and informal network of interpersonal relationships, family, teachers;

Institutional: neighborhood, organization of sports and recreational associations, norms and regulations; access to equipment and participation in the programs;

Community: programs of associations and institutions, partnerships; organizational models adapted to the individual and groups;

Public Policy: local, state, and national laws and policies, programs regionals of the prevention and for promoting of the health.

The five levels of analysis reflect the stratification of the interventions and the variety of strategies for planning.

In general, the reduction of daily exercise, as measured through the integration of objective and self-report methods, is progressive in both sexes with increasing age but is higher in females although the trends are different between the different countries [16].

The habits to practice daily physical activity change with age and various longitudinal studies have shown that the time devoted to physical activity declines gradually: the decline begins during adolescence [26] and according to some authors, the interruption occurs towards the 12-14 years [35].

In addition, we highlight gender differences: the girls appear to be less active than boys, and this remains constant in all age groups [26,40], although this factor is variable in relation to the geographical area.

Long-term studies have confirmed that low of physical activity levels and sport among children are associated with low levels during adulthood and sedentary habits [24,38]; practice sport at least one day a week in children and adolescent (for females) and two days a week (for males) is associated with high levels of physical activity in adulthood [39] .

The transition from childhood to adolescence marks the beginning of a period of great vulnerability and the children who have a low perception of competence will continue to have it even during the later ages with low of physical activity levels [37].

The school is the privileged context to promote physically active lifestyles and learn motor competences. Physical education has a significant influence to increase the physical activity levels in young people, although the number of available studies, methodologically sound, it is still small and, therefore, very different results emerge [27].

Wallhead & Buckworth [47], in fact, have studied the correlations in physical activity for young people and the factors are consistently associated with: the *enjoyment* for physical activity, *motivation*, *physical self-efficacy*, parental involvement and the opportunities to be physically active.

The engagement in physical activity helps to create the child's perception of competence that influence its persistence in a motor performance or physical activity [19]. The perception of competence is the most important mediator for interventions to promote physical activity among children and young people in a circular relation of antecedent and consequent, motor experiences positive allow the mastery of motor skills and the increase of perceived physical self-efficacy that promotes the continuation of activities and new learning [28].

The study aims to verify the following hypotheses: a. the group of children and young people of normal weight (Nw) showed higher of physical activity levels compared to the group in terms of overweight-obesity (Ow-Ob), regardless of the gender differences; b. during the transition from primary school to middle school, there is a decline in physical activity levels.

The aim of this study is to compare the differences in physical activity levels, of a sample divided by gender, age and into two groups, according to BMI (Nw *vs* Ow-Ob) and the age (8-10 vs. 11-13).

METHODS

The self-report PAQ_C - *Physical activity questionnaire for children* – [9], has been proposed to a sample of 212 primary school children (age: F 9.52±0.59; M 9.79±0.52) and to a sample 298 boys and girls of middle school (age: F 11.9±0.9; M 12±0,99) of the Apulia Region.

The sample (**Table 1,2**) was divided according to gender differences and group, normal weight (Nw) and overweight-obese (Ob-Ow), according with cutt off of Cole [7].

The self-report PAQ_C consists of ten questions with a Likert scale score ranging from 1 (low) to 5 (high level), which asks the student to reconstruct the type, frequency, duration and intensity of physical activities carried out in the last seven days.

Table 1

Sex	Group	N	Age	Height (cm)	Weight (kg)	BMI (kg/m^2)
Female	Nw	81	9.49±0.53	135.5±0.07	32.07±5.18	17.35±1.85
	Ow-Ob	70	9.57±0.64	140.0±0.07	44.78±7.80	22.72±2.49
Male	Nw	32	9.84±0.51	139.0±0.06	34.0± 4.91	17.0±1.50
	Ow-Ob	29	9.72±0.52	142.8±0.06	49.37±8.65	24.09±3.32
Total 212						

Table 2

Sex	Group	N	Age	Height (cm)	Weight (kg)	BMI (kg/m^2)
Female	Nw	86	11.85±0,833	152.3 ± 0.09	44.76 ± 7.72	18.44 ± 1.87
	Ow-Ob	46	11.96±0,976	154.0 ± 0.08	60.55 ± 11.72	24.85 ± 2.96
Male	Nw	104	12.11±1,023	156.0 ± 0.10	46.46 ± 9.04	18.44 ± 1.70
	Ow-Ob	62	11.82±0,915	156.1 ± 0.11	58.71 ± 11.08	23.43 ± 2.50
Total 298						

RESULTS

Apart from the descriptive statistics (M±DS), Student's T Test was carried out, in order to highlight the significant differences within the group and age.

The significativity index was set to p less than .05. ANOVA 2 (group *Nw* vs *Ow-Ob*) x 2 (age, *8-10* vs *11-13*) showed for *group* differences in the PAQ_C for females 8-10, p =.02; 11-13, p =.03; for males 8-10, p =.000; 11-13, p =.007. Also are highlighted *age-related* differences in score, for females, in the two groups, Nw, p=.001; Ow-Ob, p=.02 and for males in the group Nw, 8-10 p=.003 (Table 3).

Table 3. (*Physical Activity Level)

Measures				
Sex	Age	Group	PAL*	P (<0.05)
M	8-10	Nw	2.67±0,39	0.000
		Ow-Ob	2.25±0.42	
	11-13	Nw	2.29±0.33	0.007
		Ow-Ob	2.05±0.44	
F	8-10	Nw	2.57±0.65	0.02
		Ow-Ob	2.29±0.33	
	11-13	Nw	2.26±0.50	0.03
		Ow-Ob	2.06±0.47	

DISCUSSIONS AND CONCLUSIONS

The results confirm previous evidence on changes in physical activity levels during the transition from primary school to middle school and that BMI is a factor that increases these differences.

The studies on the monitoring of physical activity levels of children and young people seek interdisciplinary approaches to imple-

ment interventions at national and local level, according to the inferred directions organizational context, for interbreed the results with other information about motor development, psychological, social.

The review of Craggs [8] accomplished by selecting 46 studies (of which 31 are using self-report), confirming the decline in physical activity from childhood to adolescence and points out that, by the age of 4-9 years, females showed a greater reduction than males.

Among the children of 10-13 years and 14-18 years, there has been a decline in physical activity, correlated with demographics variables and biologicals.

The quality of physical education and the promotion of free time's motor activities are opportunities to counter the decline in physical activity levels.

The school is the educational setting most appropriate to propose structured physical activities adapted to each student, to promote the learning of motor skills and the development of the motor abilities, increase of daily physical activity levels and acquire physically active lifestyles [44,31] .

The contents and the organization of activities in the physical education lessons, plans can be modified to increase of physical activity levels, the percentage of time in which the group is involved in a moderate-to-vigorous physical activity (MVPA) [17].

A recent study has shown, using accelerometers, which in the days when there is the lesson of physical education, increases MVPA and reduce sedentary habits of the students, although there are differences of gender and BMI [6].

The lessons of physical education allow you to increase the percentage of time in which students are physically active in order to respect the guidelines, particularly in primary schools, teachers have a crucial role to sustain the motivation and social development of children [13].

The following guidelines are a useful organizational reference [34]:

a. the school should ensure that all students physical education programs related to health which respect international recommendations;
b. the school should encourage students to walk or use the bicycle to go to school;
c. the 50% of the time for a lesson in physical education should be devoted to MVPA and physical education programs should allow students to learn the motor competences needed to practice physical activity during the later ages;
d. every student should have the opportunity to practice every day in school and in extra school, at least 60 minutes of MVPA.

An analysis of European projects to promote physical activity among young people, shows that [10]:

interventions in schools lead, in the short term, improvements in physical activity levels;

improving levels of activity levels at school often does not contribute to increase physical activity in leisure time;

parental involvement improves interventions in schools;

the support of peers and the influence of environmental changes contribute to increased of physical activity levels.

The longitudinal study of De Meester [11] using methods of integrated assessment, objective and self-report, shows that changes in levels of physical activity from childhood to adolescence and in both sexes, are influenced by various socio-cultural factors (the distance of home from school, active transport and the level of autonomy of children, the availability of school facilities and equipment, the organization of the school timetable to carry out physical education during the intervals).

Emerging in different orientations on the organization of physical and sporting activities.

The primary school promotes, mainly, physical activity in extracurricular time, the middle school encourages physical activity and sport curriculum, organizing intervals and varied opportunities for practice, regardless of the gender differences.

Dessing [12] in a study with a sample of 76 primary school children (6-11 years of 6 schools in five Dutch cities), analyzed the contribution of the school to meet the guidelines for physical activity.

It was evaluated through accelerometers, time and intensity in which children are physically active in the school yard during different periods of the day (pre-school, school, school recess, lunch break and post-school). The results show that, on average, the children were 40.1 minutes / day in the schoolyard; the time spent in MVPA activity was 27.3% for males and 16.7% for females.

The males were more active than females during the interval (M 39,5%; F 23,4% the time used in MVPA).

It is confirmed that the levels of physical activity are higher during the interval and that this data can be useful for the planning of further work by changing the organizational methods of physical activities in school.

From a methodological perspective, in the school curriculum and physical education classes, the quantitative and qualitative parameters are interdependent: increase the physical activity levels of children and young people in school requires the proposed exercises and different activities, geared on motor learning and a wide repertoire of activities for the development of physical fitness; this refers to the qualification of teachers of physical education to enrich the contents and update didactics competences [4].

The proposed of activities through different teaching styles help you learn motor competences and to gain awareness of the importance of physical activity daily [32].

The education for active lifestyles proposal by qualified teachers, the suggestion to walk to school or by bicycle, go often to parks or other facilities easily accessible for spending free time, the participation to promotional programs with information activities on the territory, are strategies to increase physical activity, learn and socialize [25].

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Acknowledgements

This study was done in collaboration with the Regional Committee CONI – Regional School of Sport.

SELF-PERCEIVED FITNESS OF PUPILS AND ITS IMPACT ON ATTITUDE TOWARD PHYSICAL EDUCATION LESSONS

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Key words: *questionnaire, school, self-perception*

INTRODUCTION

Negative trends of decline of physical activity in school youth are very well documented [2, 5, 19]. Although schoolwork is typical by its sedentary nature, school as an institution has an undoubted potential to influence the total physical activity in students, particularly through regular Physical Education (PE). As many authors [1, 7, 12] stated, the level of daily and weekly physical activity in youth is significantly influenced by school PE. School PE lessons are also essential from the perspective of the educational regime, motivation for active leisure time after school or the creation of positive attitudes to be physically active on a lifelong basis [5, 6]. Increasing school-based physical activity is considered to be a promising approach that can improve total daily physical activity levels of youth [12].

In the Czech secondary and high schools, school PE as an obligatory course is realized by means of two 45-minute-long lessons a week with an option of one extra lesson. Although PE remains among the most popular school subjects, the number of students totally exempt from school PE rises [18]. To improve the efficiency of school PE, it is necessary to overcome the contradictions between the needs, wishes, preferences, interests or inclinations and physical activity during schoolwork/school PE [9] and to analyze students' attitudes toward school PE lessons from various perspectives as well.

Miscellaneous theories and concepts of "self" (e.g. self-efficacy, self-esteem, self-perception, self-concept, self-competence etc.) have perspective to explain substantial part of behavior generally associated with physical activity in youth [4, 8, 14, 20]. Thus, it is possible to expect associations (either positive or negative) between self-perceived fitness and various forms of physical activity, including organized school PE.

The objective of the pilot study was to find out whether pupils' self-perceived physical fitness (as self-evaluated in utilized questionnaire) had impact on the attitude toward school PE lessons and additionally, on the number of steps taken during realized PE lessons.

METHODS

The sample consisted of *n* = 1714 participants (53.85% boys and 46.15% girls) attending secondary and high schools in the Czech Republic. The participants were 11 to 19 years of age (secondary schools: 11 to 15-year-old pupils, n = 804; high schools: 15 to 19-year-old pupils, n = 910), (see Table 1). Data were gathered in 2012–2013. All participants and their legal representatives were informed that the research was approved by the Ethical Committee of the Faculty of Physical Culture, Palacky University in Olomouc.

To collect relevant data on the pupils' attitudes towards PE lessons, a standardized "Diagnostics of PE Lesson for Students" questionnaire [10, 11] was applied. The questionnaire was distributed by students of the PE teacher education (PETE) who attended two regular practices at selected secondary and high schools as part of their study program. At the end of one randomly chosen PE lesson, they distributed the questionnaire forms among participants who were actively involved in respective PE lesson. Completing the questionnaire inquiry should not exceed 5 minutes.

Utilized questionnaire consists of 24 dichotomous questions divided into six dimensions (cognitive, emotional, health, social, attitudinal, and creative) and one additional dimension "pupil's role" con-

taining 8 selected questions. As a part of the questionnaire, respondents also evaluate their self-perceived physical fitness (SPF). For the analyses, pupils were divided according to their SPF marked in the questionnaire as high or low [11].

To measure step counts as an indicator of physical load in analyzed PE lessons, 10 students randomly selected from each class involved wore the Yamax (type Digi-Walker 700) pedometers during the whole lesson. These pedometers are considered most accurate for research purposes [13]. To follow the recommendations specified by Scruggs and colleagues [15, 16, 17], all data gathered during PE lessons were adjusted to units of steps per minute to make the results comparable with other studies. For this reason the exact duration of pedometer measurement within PE lessons was recorded.

Basic descriptive and comparative statistics was performed using the IBM SPSS 19.0 statistical program. To process the inter-group data comparisons, the non-parametrical Mann-Whitney U-test was used to obtain statistical differences, and the effect size *d* coefficient was used for the purposes of confirmation [3]. This effect size *d* was calculated from the Z score: $d = 2|Z| / \sqrt{N}$. Statistical significance (p-value) was set to $p = .05$.

RESULTS

To summarize analyzed PE lessons according to their content, majority of the lessons (82.0%) were oriented on sports games (including 34.0% basketball, 14.6% volleyball, 10.9% football and 22.6% other sports games). The main content of remaining lessons was created by athletics (7.9%), fitness exercise (6.1%), gymnastics (1.8%), dance & aerobic exercise (1.1%), and other activities (1.2%).

Considering the questionnaire data, almost two thirds of pupils participating in analyzed PE lessons have high self-perception of their fitness. In particular, SPF was denoted as high in 64.68% of boys (secondary schools: 62.31%; high schools: 66.95%) and low in 35.32% of their counterparts (secondary schools: 37.69%; high schools: 33.05%). In girls, 61.95% of them have high SPF (secondary schools: 62.04%; high schools: 61.87%) and 38.05% indicated their SPF as low (secondary schools: 37.96%; high schools: 38.13%). (See Table 1 for further distribution into subgroups.)

Table 1. Sample sizes (number and percent) in the subgroups

Subgroups		All	Boys	Girls
Total		1714 (100%)	923 (53.85%)	791 (46.15%)
Type of school	Secondary School	804 (46.91%)	451 (56.09%)	353 (43.91%)
	High School	910 (53.09%)	472 (51.87%)	438 (48.13%)
Self-perception of physical fitness	High	1087 (63.42%)	597 (54.92%)	490 (45.78%)
	Low	627 (36.58%)	326 (51.99%)	301 (48.01%)

Boys from secondary schools with high SPF manifested positive relation in pupil's role when compared to their peers ($Z = 2.05$; $p = .04$; $d = .19$). Statistical significance in other dimensions was not proven, although some borderline values were found in cognitive ($Z = 1.90$; $p = .06$; $d = .18$), emotional ($Z = 1.88$; $p = .06$; $d = .18$), and creative ($Z = 1.83$; $p = .07$; $d = .17$) dimension and also in total positive points ($Z = 1.91$; $p = .06$; $d = .18$). However, effect size coefficients did not confirm any notable effect on the evaluation in respective dimensions and total evaluation in these subgroups (Fig. 1).

In girls attending secondary schools (Fig. 2), the only statistically significant difference between girls with high and low SPF was found in cognitive dimension ($Z = 2.06$; $p = .04$; $d = .22$) with only small effect size.

Boys from high schools with high SPF showed positive relation in additional dimension of pupil's role ($Z = 2.42$; $p = .02$; $d = .22$) and emotional dimension ($Z = 2.45$; $p = .01$; $d = .23$) in comparison with their low SPF counterparts (Fig. 3). Effect size was small in both cases.

Girls from high schools with high SPF rated more positively cognitive ($Z = 3.61$; $p = .01$; $d = .34$), emotional ($Z = 2.00$; $p = .05$; $d = .19$), and overall ($Z = 2.33$; $p = .02$; $d = .22$) dimension of realized PE lessons

than high school girls with low SPF (Fig. 4). Again, Cohen's *d* coefficient values refer to small size effect.

Considering the number of steps during the analyzed PE lessons, pupils with higher SPF were more physically active within each analyzed subgroup referred to gender or type of school (Table 2). However, statistically significant results were observed only in boys.

Table 2. Physical load (steps·min^{-1}) in PE lessons according to gender, type of school, and self-perceived physical fitness (SPF)

Type of school	Gender	SPF	*M* ± *SD*	U test
Secondary school	Boys	High SPF (n=281)	57.46 ± 18.96	*Z* = 1.93; *p* = .05; *d* = .18
		Low SPF (n=170)	54.05 ± 18.99	
	Girls	High SPF (n=219)	47.94 ± 16.27	*Z* = 0.92; *p* = .36; *d* = .10
		Low SPF (n=134)	46.38 ± 16.83	
High school	Boys	High SPF (n=316)	61.31 ± 17.08	*Z* = 2.79; *p* = .01; *d* = .26
		Low SPF (n=156)	55.68 ± 18.47	
	Girls	High SPF (n=271)	43.69 ± 15.85	*Z* = 1.41; *p* = .16; *d* = .13
		Low SPF (n=167)	41.64 ± 16.70	

Legend: M – mean; SD – standard deviation; Z – Mann-Whitney U test; p – p-value; d – Cohen's coefficient of effect size

DISCUSSION

Self-perception of physical fitness is a concept which requires particular clarifying of both, input and output variables. This study was oriented on relationship between self-perceived (self-evaluated) physical fitness and attitudes toward PE lessons as an output variable.

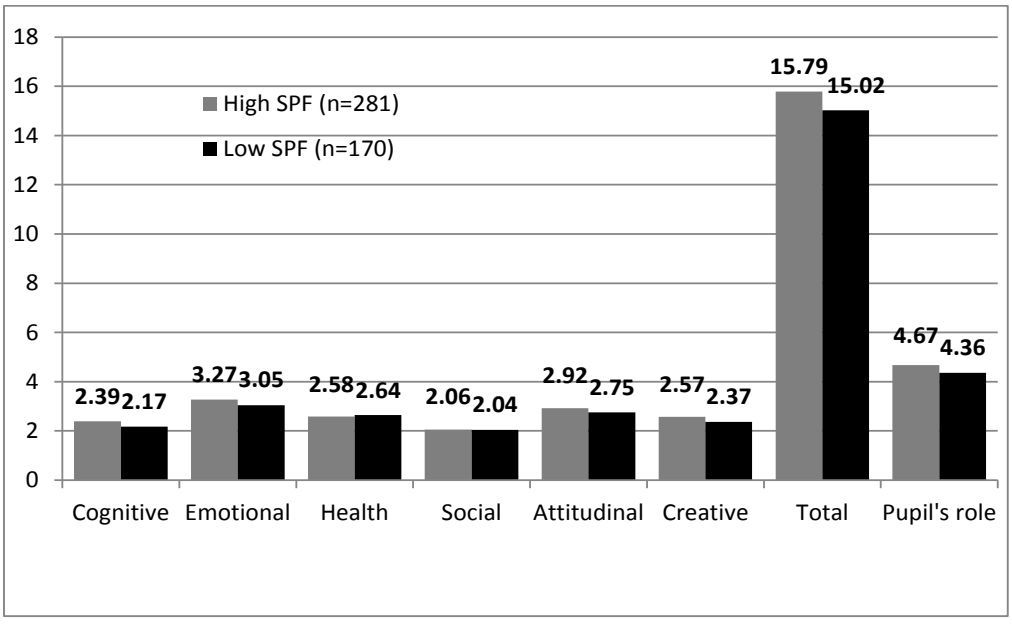

Fig 1. Attitude toward PE lessons according to self-perceived physical fitness in boys from secondary schools

Presented questionnaire data indicate that pupils with higher SPF had slightly more positive attitude toward realized PE lessons when compared to pupils with lower SPF. From the aspect of overall positive points, the strongest association between SPF and positive attitudes toward PE lessons was found in the subgroup of high school girls. On contrary, our previous results published elsewhere [21] showed SPF to be significant factor when considering overall evaluation of PE lessons only in boys. However, both studies brought only a weak statistical evidence for such association. Stronger associations be-

tween SPF and evaluation of PE lessons were found in international study of Frömel and colleagues [11] where Czech and Polish pupils with high SPF rated PE lessons higher in almost all dimensions and overall compared with low SPF pupils (p = .000). On the other hand, authors conclude that assessments of the PE lessons have declined over the past decade.

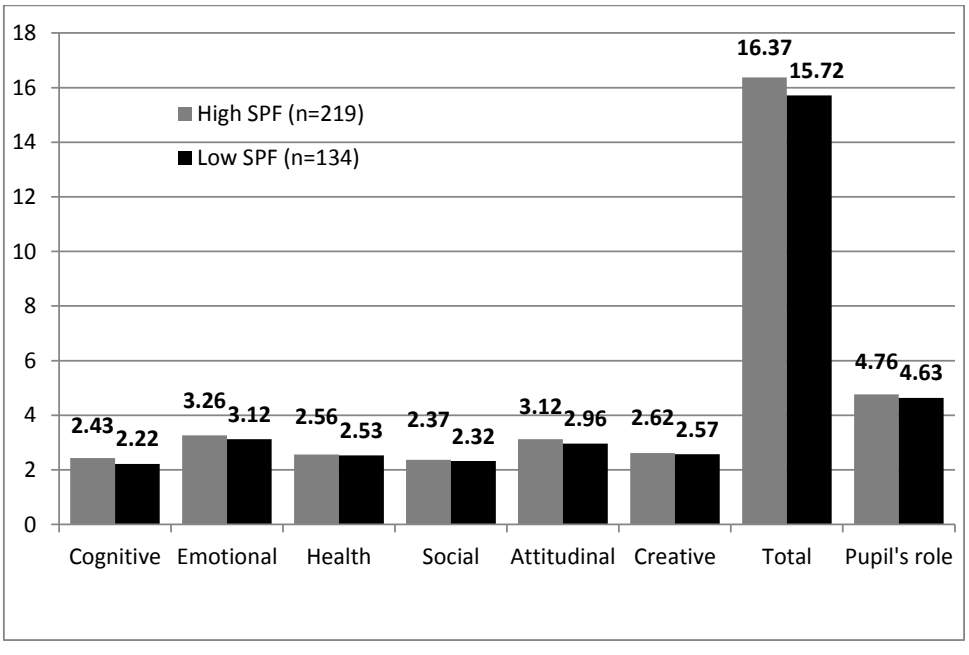

Fig 2. Attitude toward PE lessons according to self-perceived physical fitness in girls from secondary schools

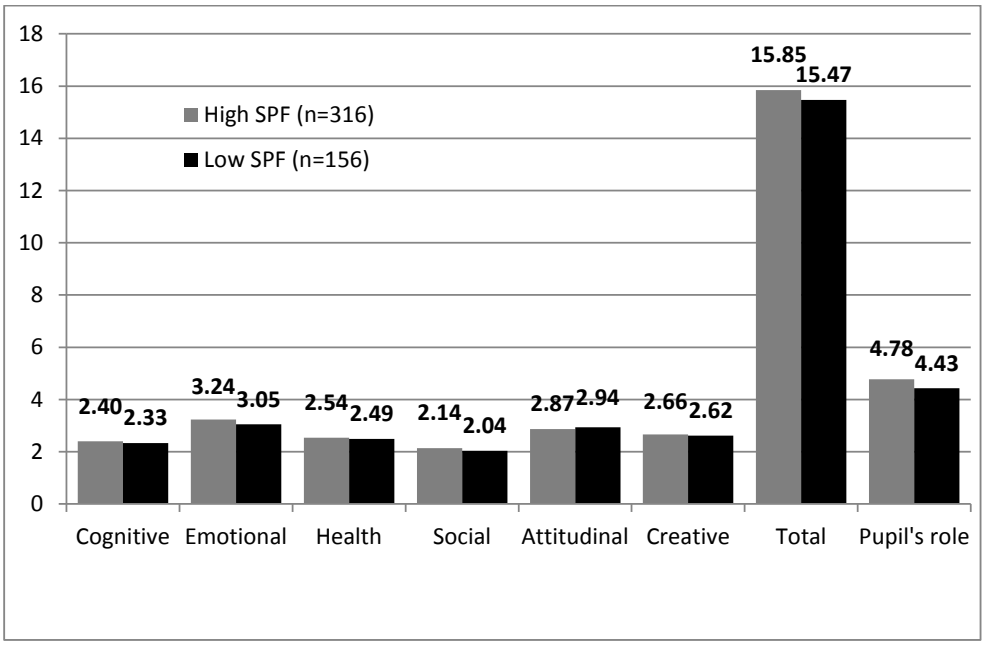

Fig 3. Attitude toward PE lessons according to self-perceived physical fitness in boys from high schools

According to Frömel, Novosad, and Svozil [10], girls have generally better attitude toward PE lessons when compared to boys. When expressed by total positive points, better overall evaluation of analyzed PE lessons in girls can be assumed also in our study (Fig. 1–4).

Pupils' with higher SPF can be denoted as somewhat more active during analyzed PE lessons as their counterparts indicating lower SPF. Stronger statistical dependence was found in the subgroups of boys (especially high school boys) while differences in the subgroups of girls were not significant. We can

presume in compliance with general standards (at least 60 to 62 steps·min^{-1}) formed by Scruggs and colleagues [15, 16, 17] that physical load of pupils analyzed PE lessons was rather lower.

Subjectivity of involved pupils when grouping themselves according to SPF, content heterogeneity of realized PE lessons, and variety of PE student teachers leading the classes can be mentioned among limiting factors to this study.

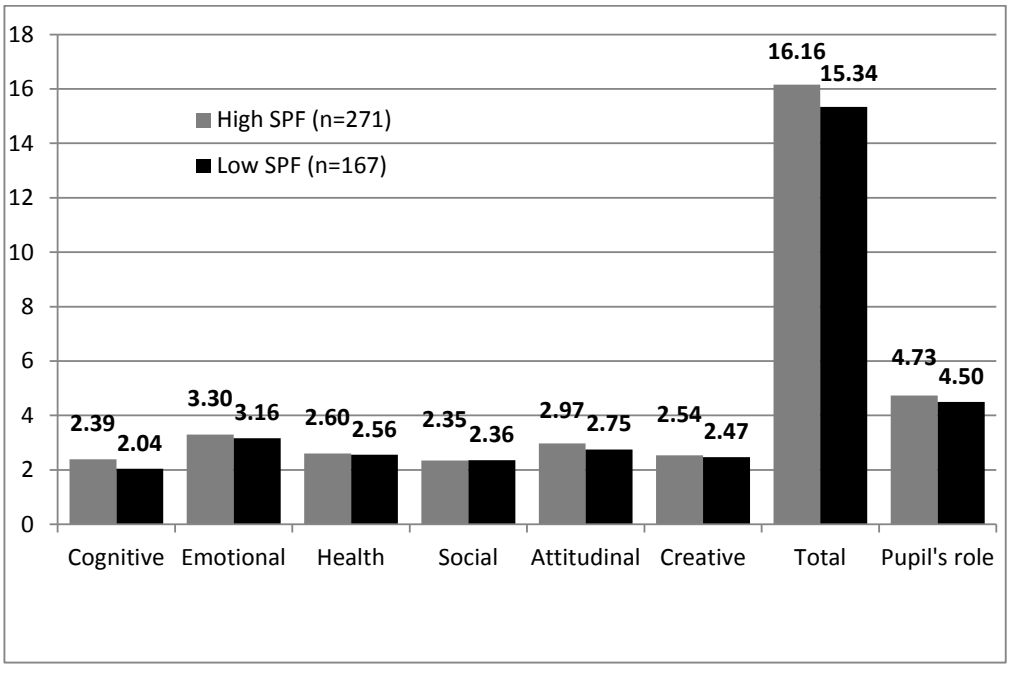

Fig 4. Attitude toward PE lessons according to self-perceived physical fitness in girls from high schools

CONCLUSION

To conclude, pupils' higher SPF was associated with positive overall attitude toward PE lessons only in high school girls. Other results lack stronger statistical evidence to support the concept of self-perception of physical fitness as an attitude-influencing factor in the field of school PE. Nevertheless, some tendencies are apparent and require more detailed explorative approach including analyses of SPF as a behavioral variable with an impact on physical load of pupils during PE lessons. Our further studies should be oriented on mutual links between various factors potentially influencing pupils' attitudes toward school physical education.

ACKNOWLEDGEMENT

This article was supported by the IGA project "Association between self-perceived physical fitness of pupils and their attitude to Physical Education lessons: Use of pedometers" (FTK:2013:010), funded by Faculty of Physical Culture, Palacky University in Olomouc.

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THE PRINCIPLE OF EDUCATION BY VISUAL METHODS AND THE MODERN FORMS OF APPLICATION IN THE SPORTS EDUCATION

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Key words: *demonstrativeness, sport education, pedagogy*

It is known that the issue of didactic principles is one of the central in the theory and practice of education. It has been attracting the attention of the representatives' pedagogical thought since most distant time. Their scientific identification is related mainly to the name of the great Check pedagogue Yan Amos Komenski having lived and worked during the 17th century, author of Didactica Magna (1). That is the first fundamental work in the pedagogical field which presents the "universal art how to educate everybody on everything". According to Komenski, everything should as far as possible be learned visually and be accepted by as many senses as possible: "the visible - by the eyes, what is heard – by the ear, what is smelled – by the sense of smell, what is to be tasted – by the taste, what is palpable – by the sense of touch, and if possible to be accepted by several senses at once" (2) which is a prerequisite about achieving success "at all cost" in the education, including the sports education.

Nevertheless the distance of time, there exist sufficient reasons to claim that Komenski's idea about educational process in conformity with the laws of nature has till today preserved its universal nature of didactic principle. Word goes about a basic principle as invariable part of the didactic technology. It is through it that the understanding about the need of visualization is confirmed, i.e., the need of visual acceptance of the processes and events but without neglecting the role and the importance of the rest of the didactic principles.

-The concepts treating the application of the didactic principles are varied but the thesis about their didactic use in the theory and practice of the physical education and sport is persistently promoted. Word goes about the b a s i c r e q u i r e m e n t s claimed to the organization of the education as aim, tasks, contents, methods, forms, means, etc. The aim is to optimize the education.

The powerful development of the electronic audio – visual and computer technique in the modern conditions and realities confirm the fundamental and intransitive nature of the visual principle. That is a prerequisite for the appearance of new and perfection of the traditional forms for its application in the field of the sports education too.

It is a fact that one of the modern forms for the application of the visual principle in the process of education is the use of educational films. Indisputably, they offer richer opportunities for the visualization of the educational material and application to nearly all school and sports disciplines. For instance when new material is taught, during specially organized discussions, as element of the lectures, specially organized seminars and other modern forms of teaching. Important are also the possibilities of the educational film for combining the visual means with other didactic elements depending on the plan of the sports pedagogue; for instance using photos, schemes, video materials, animation and others depending on the aims and the tasks of the lesson. In this respect our attention in the present paper shall be directed to the educational film and more concretely to its possibilities for increasing the effectiveness of the education.

The a d v a n t a g e of the educational film as a form of visualization can be looked for, according to us, mainly in the simultaneous impact on the visual and auditory analyzer upon perceiving the information. It has been proved that the combination of the narration and the music provides the possibility of maximal degree of concentration of the attention of those taught; thus the audio impact upon the students through the educational film is realized basically by t h r e e c h a n n e l s, i.e.:

The f i r s t audio channel for impact is related to the meaning and contents of the narration. It is through it that the students' (athletes') mental activity is impacted. For the purpose the text contains – certain structure of the problem, emphasis on the basic moments of the theme – subject of the film, systematic nature and consistency of the explanation, logical connection between the various parts of the issue, outlining the limits and the approach to the matter.

The s e c o n d audio impact channel is also related to the narration but its effect is directed to the non verbal communication sphere, i.e. "the language of the body" – gestures, facial expression, pantomime, expressive vocalizations, through which emotional states are most often expressed. The appropriate timbre of the narrator's voice, intonation, the rhythm by which the contents of the text is presented, the pauses, the accent upon certain and important parts of the text aim at sharpening the attention of those taught on particular parts on the text. At the same time they serve to differentiate the separate problems within the theme – purpose of the film, emotional predisposition of the "spectator" on the issue, "interweaving" elements of the problem and "mystery", provoking curiosity to the problem, etc.

The t h i r d audio channel is related to the use of the musical background to the narration. The aim is to provide the needed emotional state of the subject while simultaneously a comfortable emotional situation is created for him/her and at the same time his/her interest towards certain moments of the film is increased.

Visualization in an educational film is practically unlimited. Its basic components are concentrated in the following basic directions:

F i r s t, the history of the problem which is the subject of the education. It is necessary in this relation to point out that the educational film provides a possibility to present this history in laconic and sufficiently synthesized form. The aim is to introduce those taught to the essence of the problem. The short introduction to the rise, development and the possibilities for solving the matter indisputably increases the interest in it.

S e c o n d, it is possible the subject of the visualization to be presented in the educational film in more details too – according to the aims and tasks of the concrete lesson or training session. Effects like "fragmentation stop", "slow cadence", bio-mechanical and photometric layering of the fragmentations, related to the finest elements formatting the motive act, provide fuller concentration of the attention on certain details which sometimes remain difficult to grasp or even hidden.

T h i r d, the educational film provides the possibility to present visually both sense- perceived objects and abstract ones as well – notions, assertions, even scientific theories. That can be achieved by transforming theoretical positions into logical schemes, drawings, graphics, tables, diagrams, photos. Relations and dependences are demonstrated by them which are of primary importance about forming the needed notions, motive skills, habits, relationships.

The limitations of the c o n d i t i o n a l-p i c t o r i a l visuality about which we have talked hereinabove are linked mainly to the difficulties in creating basic characteristics of relatively static kind, related to individual, group and collective actions and movements. For instance, in the sports games it is rather difficult from tactical point of view to create concrete notions for the students through one or a range of schemes. Here we have rich variety of possibilities for the implementation of the various forms of tactical system related to the universalization, specialization and improvisation of the actions.

Richer possibilities for visualization can be provided by the means of a n i m a t i o n. Here, except for the purely psychological effect related to the real fact – dynamics attracts to higher degree man's attention, a range of other meaningful effects can be sought as well. For instance, possibility for comparing various theoretical constructions in real time, reflecting the dynamics of the development of a given process, simultaneous effect both on the rational and the sensory knowledge. In that way closer relation between both degrees of human knowledge can really be provided. That considerably increases the possibility for the knowledge received to be related directly to the long lasting memory and respectively, durability of the knowledge, motive skills and habits.

F o r t h, exceptional importance from pedagogical point of view acquires the fact that the educational film allows to overcome one of the greatest shortcomings of lecture method related to setting those

taught in a state of passive listeners. It has been proved that the educational film hides great possibilities for using various forms of active participation of the subjects in the educational process. One of these forms is related to setting a range of questions at the beginning and repeating them at the end of the film. Here the final answer does not exist as a ready made decision but sufficient information is presented for its creative synthesis and formulation. Another variant is related to the presentation of the needed information by the narrator or the teacher; then stopping the film followed by a discussion or a trail of the students to answer the questions; then the film is continued and at the end the students should formulate a complete and clear answer to the set question or case.

F i f t h, the educational film as a didactic means can be treated as connecting unit between all didactic principles and more precisely those of visuality, consciousness and activity, accessibility, system and consistency, durability of knowledge, skills and habits, individual approach and at the same time practically combines this unity in it.

As a conclusion we consider it necessary to underline that the large accessibility to computer technique and software products easy to work with release to a great extend the teacher, lecturer, coach from the dependence of the available ready made educational films or their absence. It is a fact that the make and use of such a product more and more is transformed into a challenge for the sports pedagogue where he/she can input his/her creative ideas and imagination. And something more, according to us, nevertheless the serious "power" of the educational film as didactic means, the need comes to the front of sufficient convincing studies both about its exact place within the "didactic means" system and its separate components, their correlation, the degree of impact separately and in their completeness upon the education. We think it is namely in this way that the sports pedagogical parameters of the educational film as modern didactic means can be presented or "measured" in details.

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ANALYSIS OF THE OFFENCIVE GAME OF THE STUDENT´S HANDBALL GAMES FOR YOUTHS (11- 12 CLASS)

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Key words: *Handball, Student Games, Game Scores*

The handball takes an honorable place in the system of the School Physical Education.

In its natue, the handball game is based on common human body movements like walking, running, jumping, throwing... (1-2). Combined with fast rules changing the game ¨allows¨ an easy asumption and practicing making it appropriate for all ages and sexes. First, kids and teens all over the world play handball, because it brings them a great portion of joy and satisfaction. On the other hand, the most gifted and prominent children with inherent for the contemporary handball capabilities and talant are being attracted to a specialized long term preparation (3-4).

The goal of this research is to make an analysis of the game activity in offence of the finals of the students´games for youths (11- 12 class) regarding to an optimisation of the educational process in the Physical Educaton Subject.

METHODICS

The present research was made between 09.05- 11.05.2013 in the town of Dobrich.

Subject of the research are the techno- tactical skills of the handball players, participating in the school games.

Object of the research is the gameplay activity of the handball players, participating in the finals of the school championship.

Contingent of the research are the six teams finalists of the scool games for youths (11-12 class) in the town of Dobrich.

For the needs of the research is applied a test batery of 17 indicators, including the fases of the game in offence, the different types of shooting, shooting from a distance and shooting by zones as well (**table 2**).

For achieving the determined goal and objectives are applied the following methods of research:

- Overview study of specialized literature.
- Pedagogical observation and recording of the game activity (table 1).

Table 1. Methodology for recording of the game activity during a Handball Game

№	Attack type	№ of the player/ shooting zone	Throwing type (distance)	Score	Mistakes	Halftime part
1.	G. A.	5/3 – 4/2	h (8 – 9) +	1 : 1	-	-
2.	F. B.	6/4 – 5/3	h (8 – 9) +	2: 1	-	1-st 10 min

Mathematical- Statistic Methods:

According to the research tasks was used a frequency analysis for determining average values ($\bar{X}$) and percentage of utilization and effectivness.

ANALYSIS OF THE SCORES

The data about all the values from the average values are shown in table manner in table 2.

Summary of the average values of the utilization and the effectivness of the game indicators for all teams

Table 2

№ INDICATORS	UTILIZATION	SUCCESS	E %
1 Fast Break	6.7	3.7	55.2%
2 Extended Couter Attack	2.4	0.9	37.5%
3 Gradual Attack	19.6	9.5	48.7%
4 Throwing one arm over the shoulder of support	0.6	0.1	16.6%
5 Throwing with standing on one leg	0.5	0.3	60.0%
6 Throwing a rebound in length	13.5	8.9	65.9%
7 Throwing a rebound in height	8.4	4.0	47.6%
8 Hip Throwing	0.9	0.6	66.7%
9 Throwing slope to free hand	0.25	0.08	32.0%
10 Short Range Shooting	13.1	8.9	67.7%
11 Medium Range Shooting	8.2	3.7	44.7%
12 Long Range Shooting	2.1	1.1	51.6%
13 Shooting from 1-st Zone	1.7	0.7	41.2%
14 Shooting from 2-nd Zone	5.6	2.9	52.1%
15 Shooting from 3-d Zone	8.2	4.9	60.5%
16 Shooting from 4-th Zone	7.0	4.8	68.4%
17 Shooting from 5-t Zone	1.5	0.7	46.7%

The represntative teams of VTH ¨G.S.Rakovski¨, SMH ¨P. Hilendarski¨ Sofia, NPHMME- Bourgas, EH ¨Emilian Stanev ¨- Turnovo, PHTP ¨P. Yavorov¨ and ZPH ¨Timiryazev¨ Sandanski, use more often the gradual attack ($\overline{X}$=19,6), goals scored $\overline{X}$ =9,5, with effectivness 48.7%. Second by utilization comes the fast break ($\overline{X}$ =6,7), goals scored ($\overline{X}$=3,7) with effectivness 55,2%.

With the least utilization is the extended counter attack ($\overline{X}$ = 2,4), goals scored ($\overline{X}$=0,9) with effectivness 37,5%.

For more clarity the data is presented and on **fig.1** the probability frequent utilization of the gradual attack is based on the teachers view (the coaches of the teams) for more sure game, the level of the speed strength training, and the specialized work for fast game in the Physical Education classes and the 3-d extra class (module- Handball) as well.

Of course it obligates the teachers during the classes and the extra classes to establish a purposeful work on 1-st and 2-nd pase of the offence- fast break and extended counter attack.

From the data, presented on table2 and fig.2 is clear that the researched school teams utilize more frequently in the played games the throwing a rebound in lenght ($\overline{X}$=13,5), scored by goal $\overline{X}$=8,9 with effectivness 65,9%.

The second most utilized shooting type is throwing a rebound in height ($\overline{X}$=8,4), scored by goal $\overline{X}$=4,0 with effectivness 47,6%.

The bigger utilization and effectivness of shooting a rebound in lenght is due to the fact it allows during the rebound to be hold a little longer in the flying fase and the closer shooting distance to the door on the other hand. It, of course, difficults the action of the goalkeeper who has to react in a very short distance from the attacker.

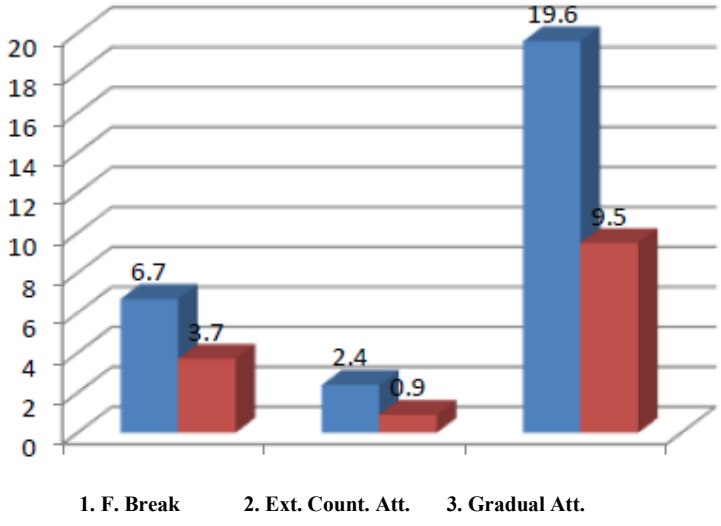

Fig.1. Average Values of the Utilization and the Effectivness of the Different Types of the Attack

The less effectivness of the throwing rebound in height is connected basicly with the longer distance to the door (usually it is used between 8-th and 10-th meter), and overcoming the deffencive block by the goalie field on the other hand.

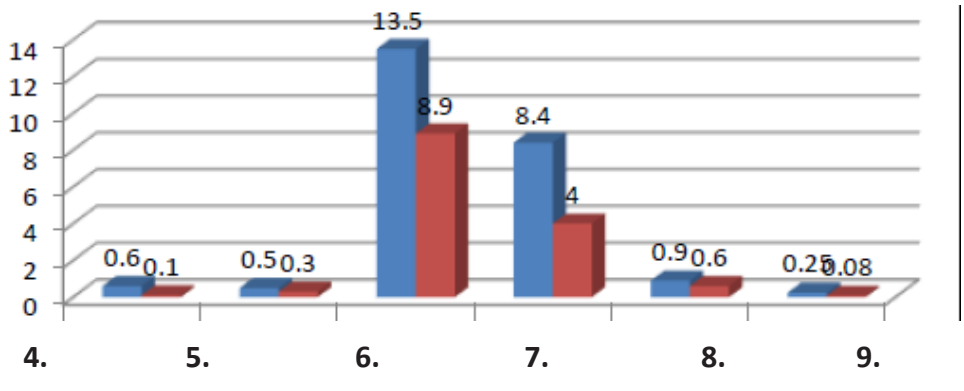

Fig.2. Average Values of the Utilization and the Effectivness of the Different Types of Throwing

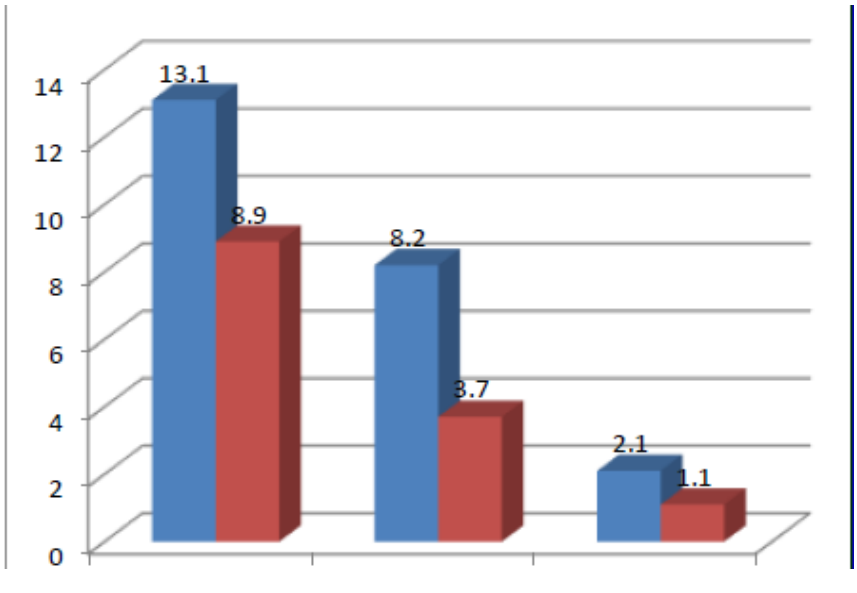

Fig.3. Average Values of the Utilization and the Effectivnes of the Shooting from Different Distances

It gives an impression that the other ways of throwing against the door, by their utilization and effectivness are moving in much lower levels.

The low utilization and effectivness of the shooting by support is a result of the more complicated coordinational structure of some of them and of the non- purposeful work of the teachers and the coaches in the methodical percistance in their asumption in the elementary grade on the other hand.

The shooting with landing was not included in the analysis, because of the fact it was not used by the players in the games at all.

From **fig.3** is seen that the school teams use most frequently for shooting to the door 6-7 meter or the so called close range $\bar{X}$= 13,1%, goals scored $\bar{X}$= 8%, with effectivness 67,6%.

The second indicator by utilization is medium range shooting (7-9 meter) $\bar{X}$ = 8,2% success $\bar{X}$= 3,7% with effectivness 44,7%.

The long range throwing (behind 9-th meter) is the least utilized $\bar{X}$= 2,1% with success $\bar{X}$= 1,1% with effectivness 51,6%.

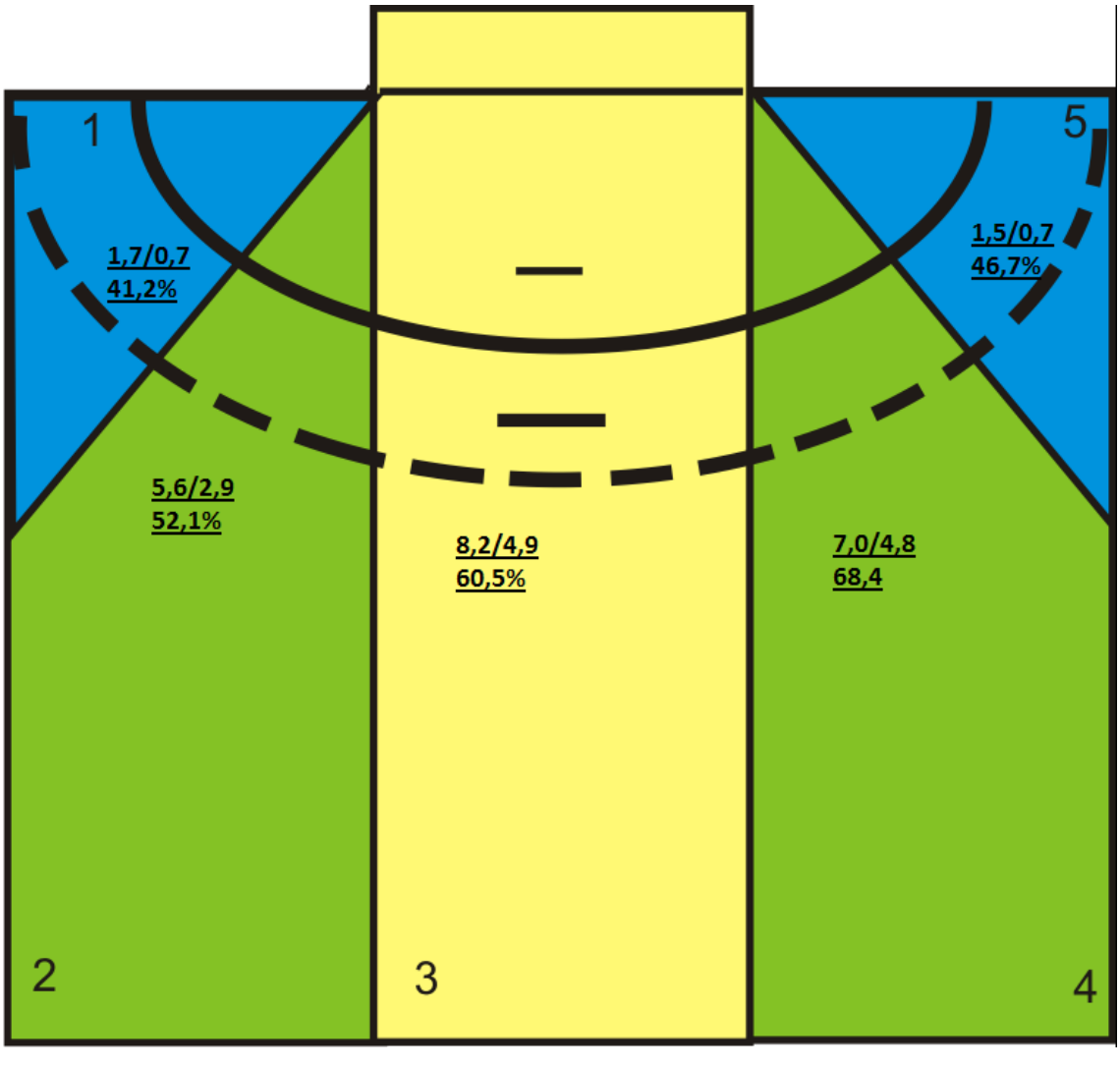

Fig.4. Average Values of the Utilization and the Effectivness of the Shooting of the Researched Teams by Zones

In my oppinion, the reason for the wider utilization of the short range shooting is the greater probability for scoring a goal. The utilization of the middle range throwing shows that the players finish their attacks more often from 7-th-9-th meter than from longer range. The less utilization of the shooting behind the 9-th meter I give to the circumstamce that the shooting from this distance requires high development of the physical sthrenght, speed and power, tall players and of course the right concepo of the coaches (teachers) for offencive game.

From table 2 and fig.4 is seen that the most used for shooting in the door is 3-d zone ($\overline{X}$ = 8,2), success $\overline{X}$ = 4.9, with effectivness $\overline{X}$ = 60,5%. It is explained by the fact that from this zone the handballists have an opportunity of shooting at the door from the widest angle and because of the circumstance that the central zone is comfortable to perform a throwing both for left and right handed players. Surely, we must add here the visions and the preparation of the teams, which zones basicly to be finished their individual, group and team actions through.

Next by utilization is 4-th zone ($\overline{X}$ =7,0), success $\overline{X}$ = 4,8, with effectivness $\overline{X}$ = 68,4%.

The second zone they shoot more often from has a little lower utilization ($\overline{X}$= 5,6), success ($\overline{X}$= 2,9), with effectivness 52,1%. In these 2 offencive possitions it makes an impression that the teams finish their attacks more through the right zone of attack (zone4). It can be given to the learned interactions in attack and also to the situation of the actively handball training athlets in the club teams.

The least tries for shooting are made from the end zones (1 and 5) coresponding to the flangs. Through the 1-st zone the utilization is ($\overline{X}$=1,7), success $\overline{X}$ = 0,7 and effectivness 46,7%. It can be explained with the lack of techno- tactical preparation of the players, responsible for the corresponding positions and the fact that on these positions are usually put the weakest players.

CONCLUSIONS

- The researched teams, participants in the finals of the school games for youths (11-12 class) utilize mostly the graduate attack for finishing attack method ($\overline{X}$= 19.6), followed by the fast break ($\overline{X}$= 6,7) and the extended counter attack ($\overline{X}$= 0,9). It is probably due to the vision of the teachers for more secure game and the physical state of the players as well.
- The most used ways of shooting are shooting rebound in lenght ($\overline{X}$= 13,5) and rebound in height ($\overline{X}$= 8,4). The throwings by support (Over the shoulder, on one leg, hip throwing, and slope to free hand) are very low in utilization.
- The champions from Varna show a very good utilization and success in the shooting from the various distances to the door though the 2-nd in the chart- from Sofia- best effectivness.
- The most widely used shooting zone is the central (zone 3)- ($\overline{X}$= 8,2) , regarding to the wider attack angle. After zone 3 are coming zone 4 ($\overline{X}$ = 7,0) and zone 2 ($\overline{X}$= 5,6) . The lowest in effectivness are the end zones 1 & 5 respectively ($\overline{X}$= 1,7) & ($\overline{X}$=1,5), because of the less attack angle and the lack of techno- tactical abilities of the players.

RECOMENDATIONS

- During the development of the concept of the offencive game to be put an accent on the fast attack. It will lead to aprovement of the physical state of the students on this age.
- I recomend in the annual scool planning to be used training means for aproving the long range shooting and to be included exercises for throwing by support in the individual and colective actions in attack.
- To be offered to the teachers non- specialists in handball a methodical research for the 3-d extra class (module), corresponding to techno- tactical preparation and development of the students, playing Handball.

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IMPACT METHODOLOGIES FOR PHYSICAL EDUCATION AND SPORT ON THE PHYSICAL CAPABILITY OF CHILDREN WITH VISUAL IMPAIRMENTS

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Key words: *pupils, visual imapairment, physical capability*

The locomotor activity included into the physical education lessons has extremely multifunctional impact on children's organism. It causes positive changes in the activity of the neuromuscular, cardiovascular, respiratory, musculoskeletal system and psychophysical development of the pupils. The real impact of the physical exercises and sports on the proper development, socialisation and health status of children has been pointed by many autors. [1,4,5,6,11,12] At the same time many of them stress that the physical exercises and sport activities, conducted during the lesson, cannot meet the propulsion needs of the younger generation [1,7,8,9,10]. This provoked the specialists to find new means, methods and forms of stimulating the locomotor activity and respectively, improving the health status and socialization of children. [4,5,6,12]

In this regard, greater actuality acquires the problems associated with the development and implementation of various programs and methodologies adapted to the lesson and extracurricular education of pupils with special educational needs. Today no one really doubts that through a proper methodology, even though children with certain special needs can master the general education courses in school curriculum. [4,5,6]

Examination of the problem allows us to formulate the following ***working hypothesis: the applied complex methodology, adapted exercises and games in lessons in physical education and sport will significantly affect (H_1) physical fitness, socialization and health status of children with visual impairments.***

The aim of our study is to determine the impact of the methodology for adapted physical education on indicators of physical fitness, physical and functional development in children with visual disabilities.

The subjects of the study are indications which characterize motor skill qualities of blind children.

Under study are 12 students aged 8-10 years of school for the blind „Helios" in Athens - Greece R., 6 boys and 6 girls. The contingent is selected at the beginning of the school year 2012/2013, when it registered a snapshot of the physical activity of these children. All are partially sighted with visual acuity of 0.01 to 0.04 of the better seeing eye. Children can distinguish colors, contours and silhouettes, to move freely in a familiar environment, to recognize objects at close range to read large advertisements and names of newspapers.

Research methods: literature review, pedagogical experiment, teacher observation, diagnosis and testing.

Mathematical - statistical methods: variation analysis and comparative t-criterion of Student. [2,3]

RESULTS AND ANALYSIS:

Table 1 presents the mean and variance of the results of the tests applied by us in the experimental group at the beginning and end of the experiment. To better their perception they are presented graphically in **Figure 1, 2, 3 and 4.** As is apparent from the table and figures in five of the indicators we observe increase in the values of average levels (height, body weight, vital capacity and explosive

power of the upper and lower limbs) and in three of test no change occurs in the values of the average levels (respiratory samples of Gench and Shtage and running 50 meters).

Table 1.

№	Indicators / Parameters	X_1	X_2	V_1	V_2	t
1.	Height (cm)	108,75	109,5	7,8	7,5	0,03
2.	Body weight(kg)	22,16	22,9	12,03	10,3	-0,4
3.	Vital capacity (cm3)	1625	1800	22,1	18,5	0,95
4.	Respiratory sample Gench (s)	24,6	24,6	23	17,2	0,75
5.	Respiratory sample Shtage (s)	12,4	12,4	18,9	18	0,22
6.	Running 50m/s	11,06	11,6	4,9	5,1	-0,06
7.	Standing long jump (cm)	97,6	106	9,8	8,8	-0,06
8.	Throwing a ball (cm)	120,16	122,5	11,2	11,3	-0,08

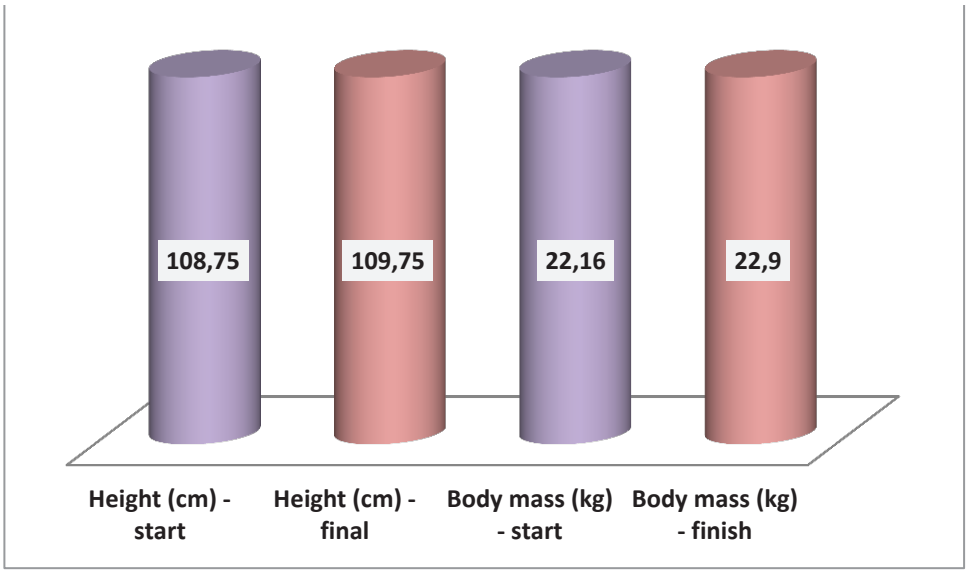

Fig.1. Dynamics of average height/cm and weight/kg at the beginning and end of the experiment

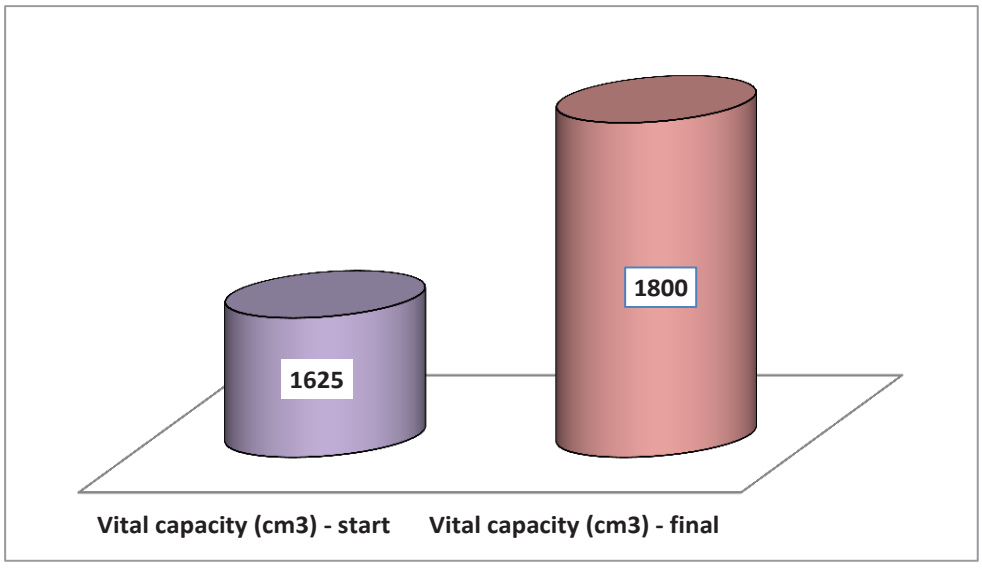

Fig.2. Dynamics of average vital capacity

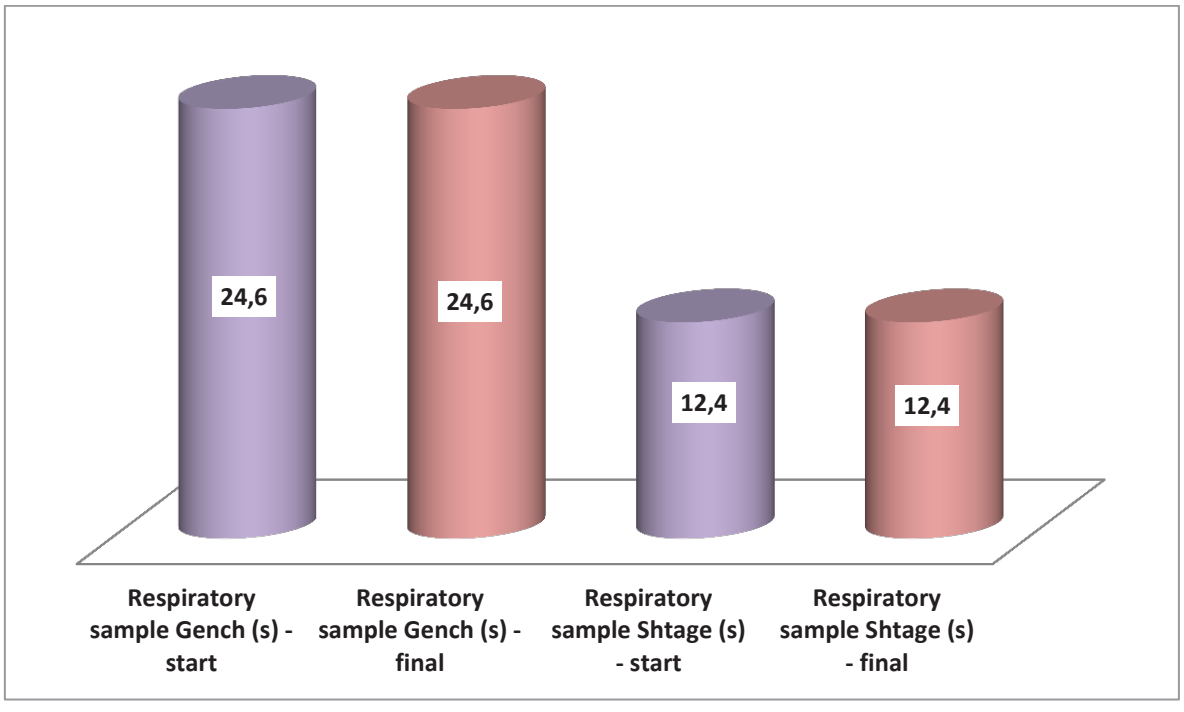

Fig.3. Dynamics of average breath samples Gench and Shtage

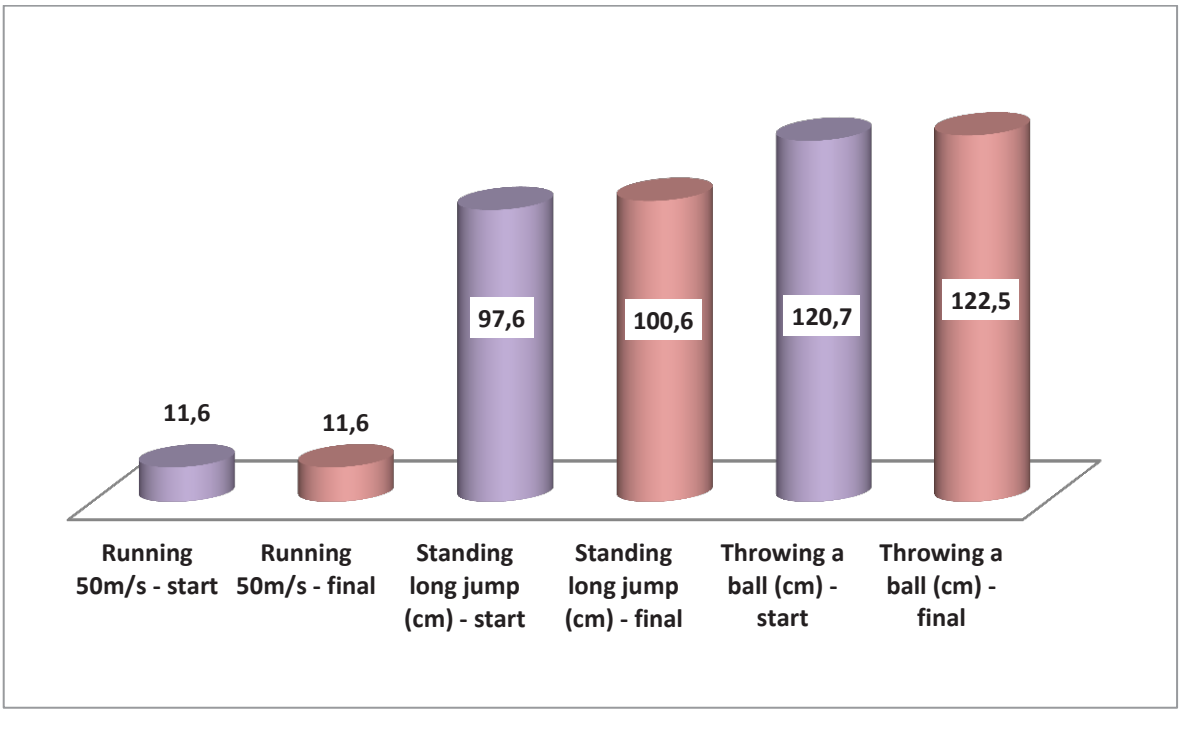

Fig. 4. Dynamics of average speed and explosive power of the lower and upper limbs.

Regarding the coefficient of variation, we can say that in 6 of the studied indicators dissipation is less i.e. below 10-12% and the sample is homogeneous in terms of height, weight, dynamic power of the lower limbs, explosive power of the lower and upper limbs. For the other three signs bearing information about the functionalities incorporated by tests vital capacity breath samples of Gench and Shtage V% is below 30%, i.e. sample is approximately uniform. (Figure 5)

To check the effectiveness of the applied methodology and established the reliability of the differences in the averages, t-criterion of Student was attached at a level of statistical confidence Pt ≥ 95%. Comparative values of t-criterion were between -0.4 and 0.95, which proves the truth of the null hypoth-

esis (H_o), which states that there are no statistically significant differences in the effect of the applied our methodology and the differences can be explained by accidental causes. (Fig.6) According to us this comes due to the relatively short period of the experiment, and also the potentiality any needed adjustments in this period, to be applied to the methodology. Nevertheless, our direct observations give us reason to believe that the accompanying impact positively affect psycho-emotional state of the children, which supports their socialization, integration and self-esteem. The above facts do not allow us to make definite conclusions. Therefore, we believe it is necessary to extend the experiment and to analyze the results.

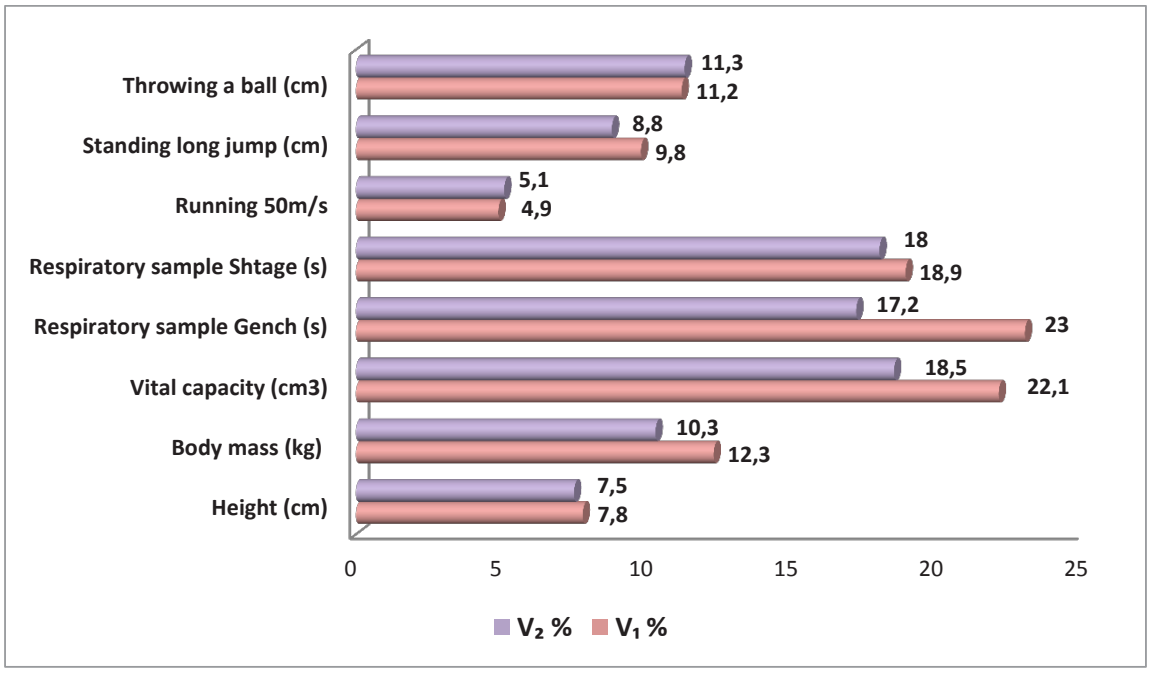

Fig. 5. Coefficient of variation V % at the beginning and end of the experiment

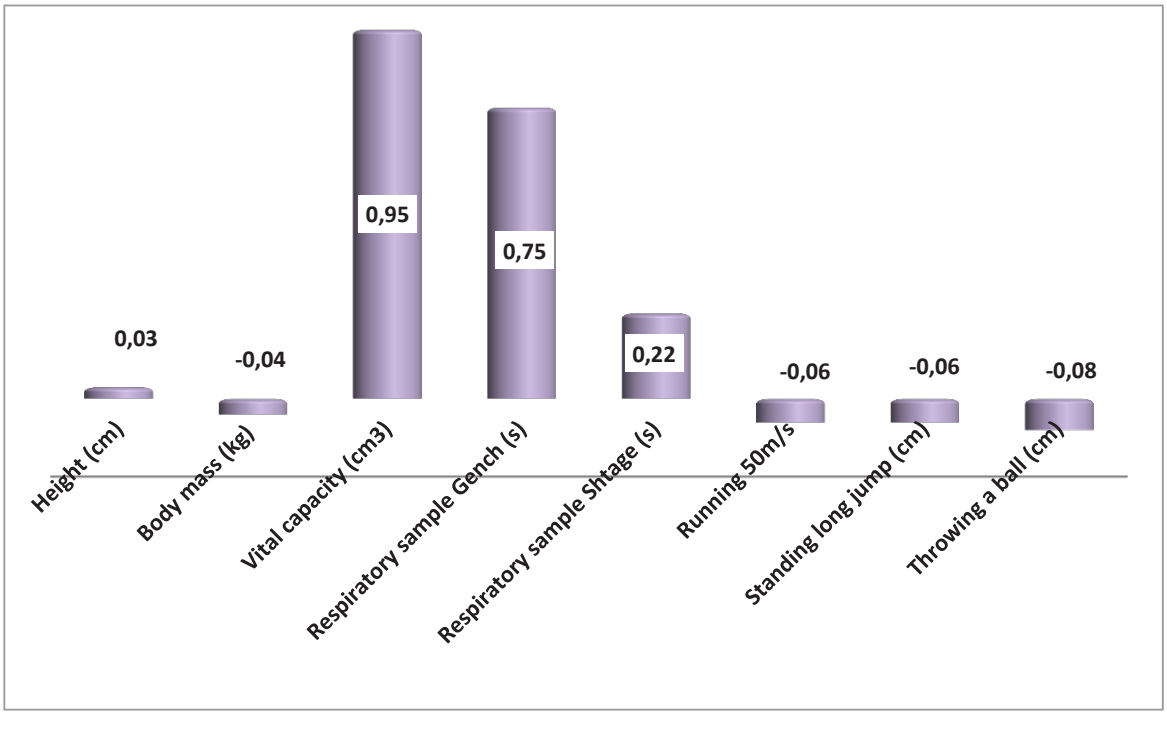

Fig. 6. Significance of differences - t-criterion of Student

CONCLUSIONS AND RECOMMENDATIONS:

The analysis of the survey results on signs of physical fitness in children with visual disabilities have private nature and allow us to formulate the following conclusions and recommendations:

1. As a result of the methodology applied we observe a general tendency of improvement over the tested indications on studied indications of physical ability. Unfortunately, the differences between the beginning and end of the experiment were not statistically significant, which we explain with the short period of experiment and the likely need for adjusting the methodology.
2. As at the beginning and at the end of experiment the coefficient of variation (V%) in the study population is stable and relatively stable, suggesting homogeneity and relatively homogeneity of the population surveyed as regards to the surveyed signs.
3. Our pedagogical observation gives us reason to believe that the applied method of education has generally a favorable impact on physical activity, psycho-emotional status and socialization of children.
4. The limited contingent of respondents and the relatively short period of the experiment do not warrant firm conclusions about the effectiveness of the applied methodology.
5. We recommend this experiment to be extended, methodology improved and the results analyzed and promoted.

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SCIENTIFIC TRAINING OF SPECIALISTS IN THE SPHERE OF PHYSICAL TRAINING AND SPORTS

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***Key words**: scientific schooling of students, physical education, diagnostics*

INTRODUCTION

In recent years there has been appeared a number of trends that promote scientific and methodological support of all directions in the field of physical culture and sports. They also affect the changes in the professional education. One of the most important trends is connected with the increase of scientific activity of students. Underestimation of physical culture as a field of scientific knowledge does not allow carrying out research at the proper level, and thereby significantly lowering the level of training of future specialists in this field [1].

However, at the current stage there has been revealed an urgent need for a rethinking of the functional purpose of physical culture in the formation of personality, his/her worldview and in the study of adaptive abilities. In modern conditions the approach to the selection of the general principles and methods of research has considerably changed. The prior issues consider being particular ones. And this is connected, on the one hand, with the change of the paradigms in science and education, and on the other hand – with the specifics of scientific thinking of the early twenty-first century. The analysis of the results of studies done in the recent years has shown that there has been formed the conceptual basis for the creation of a holistic view of physical culture as an independent object of scientific research, possessing its own specifics.

RESULTS AND THEIR DISCUSSION

The science of physical culture was traditionally more focused on the provision of applied issues in sports training. Allocation of physical culture as a special area of research is the result of understanding the functional possibilities of the physical culture, the change of research space at the end of the twentieth century, as well as the need to meet new educational challenges. At first glance it may seem that in this area there is not, and can not be independent scientific research areas. This is also evidenced by the fact that research in the field of physical culture and sports is classified as pedagogical, psychological, biological, etc. Nevertheless, the end of the twentieth and the beginning of the twenty-first century showed that physical education and sports consider being not only the practical sphere, but also independent field of science in which it is necessary to carry out fundamental and applied research [2].

Traditionally, there's recognized an area of fundamental research, which essentially determines the specificity of physical culture and sports in scientific meaning. Fundamental research should be classified as a research, which is dedicated to:

- the formation of physical culture and healthy lifestyle of a person;
- motor human activities in extreme conditions (including the provision of sports activities);
- the problems of mass physical culture and sports in modern conditions;
- organizational, resource and information support of the sphere of physical culture and sports;
- study and analysis of the system of training and skills development.

Recently, however, there has been identified new knowledge that reflects the conceptual essence of physical culture in the changed conditions of its functioning. Reasons taken at the present stage of the

reform changes in the content knowledge of physical training are not only within the sphere of physical culture, but also out of its borders. Thus, a radical change in social life has led to the expansion of the sphere of competence of the natural (addressed to the animate and inanimate nature) and humanitarian (addressed to the human personality, to the rights and interests of the individual) sciences and found integrative tendencies in the sphere of these sciences, which led to the emergence of new objects of scientific description and the formation of new fields of knowledge.

Research in the field of physical culture and sports is treated now as one of the prior tasks in the education system. The expansion of research in the professional field of physical education seems to be a very promising and effective way in both applied and fundamental research; and this should ensure the effective development of the latter. The research of this kind reflects:

- scientific substantiation and development of new areas of training of specialists of physical culture in connection with the entry of Russia into the European educational space;
- development of new and improvement of existing technologies, forms and methods of training specialists in the field of physical culture and sports;
- scientific substantiation of the content of education in the main areas of training in contemporary social and cultural conditions.

The present stage of development of education in Russia is characterized by the search for a new model, which would correspond to an emerging type of culture and society. This promotes the priority of educational tasks over the narrowly professional tasks, and *the focus on research activities as a mandatory component of training.* For example, the Master's program involves substantial scientific component in the main areas of sports activity.

The development of the physical culture science influences the formation and implementation of a uniform system of continuing education in the field of physical culture. The very idea of continuous sports education appears to be fruitful. However, until now there's still recognized the lack of many issues. The development of continuous sports education should be considered as a motion in the direction of its integrity and unity of all its stages and steps. Investigation of the system of continuous sports education can be based on the interaction of the science of physical culture, from the one hand and education, from the other. This is especially important because the goal of education has already changed, as well as its dominant component. One should agree that it is currently happening a laying of methodological and valuable fundamentals of science about physical culture and sports education [2].

It should be noted that physical culture, being both scientific and educational discipline, can not respond to such a trend in the development of physical culture, as the emergence of new directions in the field of physical culture (e.g. wateraerobics, aerobics, callanetics, stretching, thaw-bo, yoga, skateboard, power lifting, arm wrestling, paintball, squash, softball, skittles, golf, etc.).

That's why the most actively discussed and developed programs and issues are the research ones which are related to sports education and upbringing, as well as the formation of the foundations of a healthy lifestyle for people of different ages and social status. This, above all, a question of fundamental and applied research on various aspects of physical education of children, youth and adults. Especially intensively there assumed to be developed issues of improvement of the training of highly qualified and young athletes.

Traditionally there has been allocated the area of fundamental research, which essentially determines the specificity of physical culture from the scientific point of view. The fundamental research includes the types of research, dedicated to medical-valeological problems of physical culture and sports; problems of mass physical culture and sports in modern conditions; problems of training of highly qualified athletes; the study and analysis of the system of training and skills development.

Rather perspective seems to be the research devoted to *the use of modern information technologies in the field of physical culture and sports*. For example:

- development of scientific and methodical bases of system of selection and complex control of level of readiness of athletes in different types of sports;
- analysis of separate characteristics of highly skilled athletes;

- principles of creation of psychological training of athletes;
- improvement of system of planning, programming of training process.

Today the most attention is focused on the study of different types: educational research (e.g., development of methods for the formation of athletes' movements with the given parameters, etc.); biochemical studies (e.g., the scientific rationale for the selection of drugs, the effect of antioxidant agents on the performance of athletes, a modern system of a healthy diet of athletes, etc.); biomedical research (e.g., preservation of the musculoskeletal system and the maintenance of the immune system to adapt to physical stress and recovering from them, etc.); biomechanical studies (e.g., biomechanical analysis of techniques of performing a variety of exercises, and other elements; the development of hardware techniques registering biomechanical characteristics, etc.).

In the past decade in the limelight as a research motive is supposed to be spirituality. Spirituality as a principle of social life to provide benefits to others is inherently active. That is why the issue of spirituality, which was discussed in theological literature, is currently being discussed in the practice of scientific conferences. Sporting activities are usually carried out at the limit of human physical abilities. According to the researchers, high spirituality facilitates the mobilization of human motor abilities to the limit of his/her power (and in this aspect we do not mean a religious form). Sports activities form the activity votives, endurance and stamina, as well as improving the physical, mental and spiritual qualities of a person.

Particular importance recently has been acquired by the research of an applied character. To the applied research should be attributed primarily psychological problems in the field of physical culture and sports. It is an interesting fact that until recently the concept of a sports career was not perceived as a scientific problem.

Meanwhile, turning to the study of psychological training of athletes has identified such a problem as a crisis of the sports career. It is known that athletes, who did not overcome the crisis, but keeping high motivation, either remain in the mass sports, or choose a profession related to sports. A significant number of sportsmen usually leave the sport. There has been distinguished several types of crises in the career of a sportsman: the crisis of the early sports specialization; transition to in-depth training in the chosen sport; transition from mass sports to the sports of the highest achievements; from youth sports to the adult ones; from the amateur sports of the highest achievements to professional sports; transition from climax in sports career to the finishing line; the end of sport career and transition to another career. The analysis of the crises in the sports career allows not only to prepare a sportsman to future crises, but also to effectively ensure psychological help.

Analysis of the current state of research in the field of physical education and sports shows that in it there has been used approved methods that have been known over the years. In modern conditions they shifted to a higher level of technology (orthostatic, the hardware-software complex recording the electrical activity of muscles, clinesthetical and proximal tests, Asher sample), ensuring the effectiveness of training activities, fixed by electromyography, videotaping, followed by biomechanical analysis. Introduction of these methods into the process of sports activity allows receiving instant, more objective information about the effectiveness of sports activity.

One of the important directions of extension of research in the field of physical education is a directory based on the cooperation of sports science and education. For effective solution of the scientific problems one should reflect on the previously accumulated positive experience, as well as the correlation of achievements in the field of physical culture as a science with the tasks of higher school development, with the realities of the process of its transformation, as well as its significance in the field of pedagogy.

CONCLUSIONS

Rather perspective and effective direction of training specialists in the field of physical culture and sports is the synthesis of a direct implementation of «fresh» scientific developments into the learning process and the direct involvement of students into research activities. The use of research results in the educational process causes bridging of science and practice in the preparation of a qualitatively

new specialist – a specialist-teacher or a specialist- researcher.

Full experimental testing of new ideas will lead to an increase in scientific and methodological support in all directions in the field of physical culture and sports. As a result, increased research work on many issues will affect the practice of training both sportsmen and specialists in the field of physical culture and sports.

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IMPACT OF SPECIALIZED TRAINING ON THE STRUCTURE OF SURVIVAL READINESS OF 11-12-YEAR-OLD PUPILS

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Key words: specialized training, readiness, survival, pupils

INTRODUCTION

The changes in the political-economic relations round the world are realy dynamic and the conflicts arising from them in a global aspect do not decrease. Unfortunately, when they occur the most unprepared and vulnerable are children and pupils. That's why we are very interested in this topic and we consider it is necessary that programs for prevention and protection of pupils' life and health in such situations should be developed and implemented.

One of the major problems in such situations is the survival but unfortunately the surveys done in this direction are few. Therefore we think doing surveys in this area would be useful and duly.

Survival is viewed as a particular human activity, performed in conditions which endanger human's life and health (2,3). In this conditions it depends to the greatest extent on the person's readines for action.

Pupils' survival readiness in the social environment includes a number of sub-structures, the most significant being the following ones: physical, psychic, technical, tactical, etc. which are interrelated (1,4,6,7). Their formation supposes a purposeful training through application of specialized means and methods which contribute to the survival readiness in different extreme situations /natural disasters, war conflicts, etc./ (5,8).

The aim of the present study is to reveal the impact of specialized training on the development of the structure of survival readiness with 11-12-year-old pupils.

In order to fulfill the aim, the following **objectives** were set:

Theoretical base of the problem.

Implementation of specialized survival training in kung fu training process.

Recording the changes in the pupuls' structure of survival readiness.

Subjects of the study: 37 pupils - 15 boys and 22 girls, training kung fu at the Bulgarian Kung Fu Federation To'A.

METHODS

The present study was conducted in the period 05.01 – 15.03.2014 at the sports hall of the Bulgarian Kung Fu Federation.

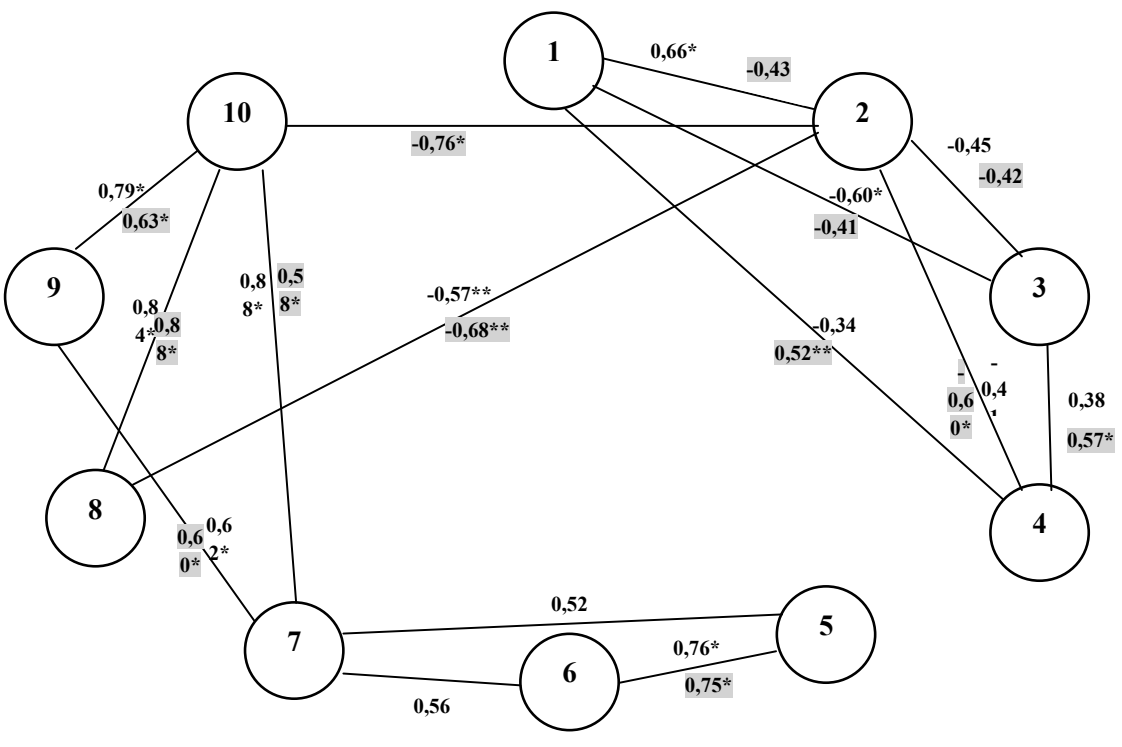
The specialized training was conducted within 30 training sessions with duration of 60 to 90 minutes. Specialized methods for psychic influence, for development of specialized speed-power qualities (10), as well as for mastering applied self-protection techniques were implemented.

The different indexes of readiness were established through application of *psychological tests* – Self-confidence, activity, mood Test; *motor tests* – 20m running, long jump, sit-ups, hand-grip dynamometry, and *expert evaluations* – done by three experts along 6-grading system. The evaluation criteria are: 1-The body position toward the opponent; 2-Action for evading the blow with and without a weapon; 3-Activity for grip release; 4-Activity for laying on a hit/hold; 5-Action after neutralizing the opponent (9). The final expert evaluation is the mean value of the three expert evaluations with accuracy of 0.5. The total expert evaluation is the mean value of all mean evaluations of the different criteria.

The obtained results were subjected to correlation analysis.

ANALYSIS AND DISCUSSION

The different interrelations btween the components of survival readiness with 11-12-year-old pupils at the beginning and at the end of the experiment are presented in **Fig. 1**.



Legend: 1 – Expert evaluation; **2** – 20 m running.; **3** – Long jump; **4** – Sit-ups; **5** – Hand-grip dynamometry /right hand/; **6** – Hand-grip dynamometry /left hand/; **7** – Self-confidence; **8** – Activity; **9** – Mood; **10** – general psychic working capacity;

** – level of significance α = 0.01; * – level of significance α = 0.05;

r = 0.00 – beginning; **r = 0.00** – end;

One of the major indexes revealing the level of action readiness in the extreme conditions of social environment is the expert evaluation of the technical skills and habits. Here, the reverse correlation connections between the expert evaluation and the manifestation of the different motor qualities of the girls at the beginning of the survey are the most impressive ones. The poor technical self-defence readiness in extreme conditions influences negatively their physical readiness. The lack of special technical skills was found to negatively influence the speed manifestation (r = 0.66 with α = 0.05), the explosive power of the lower limbs (r = -0.60 with α = 0.05), the speed-power endurance of the abdomen muscles (r = -0.34).

A number of changes occur as a result of the spacialized training and mostly of the purposeful work for forming special knowledge, skills, and habits for actions in non-specific conditions of self-defence. There is a significant correlation dependence between the expert evaluation of the technical activities and the strength of the abdominal muscles (r = 0.52 with α = 0.01). There is a logical change in the correlation between the technical skills and speed (r = -0.41). The reverse dependence between the expert evaluation and the explosive power of the lower limbs is retained (r = -0.41) which supposes the necessity of searching for approaches for mastering and perfecting the technical and physical preparation /for the muscle strength of the lower limbs/, which would determine the efficiency of the actions in different situations.

There are correlations of different strength between the indexes of physical and psychic readiness. After the experiment there are little changes in these indexes.

After the initial survey, it was established that in the structure of the physical readiness there is a very small correlation dependence between the dynamic strength of the lower limbs and the power

endurance of the abdominal muscles (r = 0.38). As a result of the applied methods and means in the kung fu training program, there is a significant correlation of r = 0.57 with α = 0.05 at the end of the experiment. This signifies that the chosen means for physical preparation favour the girls' structure of physical readiness, which determines the efficiency of actions in training, competitive, and extreme (self-defence) conditions.

The interdependence between the speed and the strength of the abdominal muscles is changed. At the beginning of the experiment the determination between the two indexes is 36%, and at the end of the experiment this determination decreases - 17%. This fact could be due to the purposeful work for mastering and perfecting applied techniques for self-defence and the little time for improving the speed and power – a problem which should be overcome in the future training process.

Another problem in the structure of physical readiness occurs out of the very weak relations between the grip power of both hands and the technical skills on the one hand, and the technical qualities, on the other hand, both at the beginning and at the end of the experiment. The major techniques in the martial art kung fu and the techniques for self-protection suppose an active work with hands. Their movements should be fast, accurate and powerful enough in order to be effective. This is the second direction which should be considered in the girls' preparation.

There are little changes in the different indexes in the structure of the psychic readiness. The detrmination between self-confidence, activity, mood, and general psychic working capacity is retained. These established regularities show that the martial art kung fu has a favourable influence on the formation of psychic readiness for action in different situations. On the other hand, probably the shorter time for influence of the applied methods was not enough for revealing a stronger determination between the surveyed indexes.

The only significant correlation between the indexes of psychic and physical readiness after the initial testing was established with speed and activity (r = -0.57 with α = 0.01). Very weak relations were established between the other components. This is an indication for a low level of psycho-physical readiness for action, especially in the extreme conditions of the social environment.

As a result of the specialized training there is a strong relation of r = -0.76 with α = 0.01 between the general psychic preparation and speed, as well as strong determination of 58%. The existence of this new dependence and the increase of determination between activity and speed (from 32% in the beginning to 46% in the end) signify the favourable influence of the experimental methods on the structure of psycho-physical survival readiness.

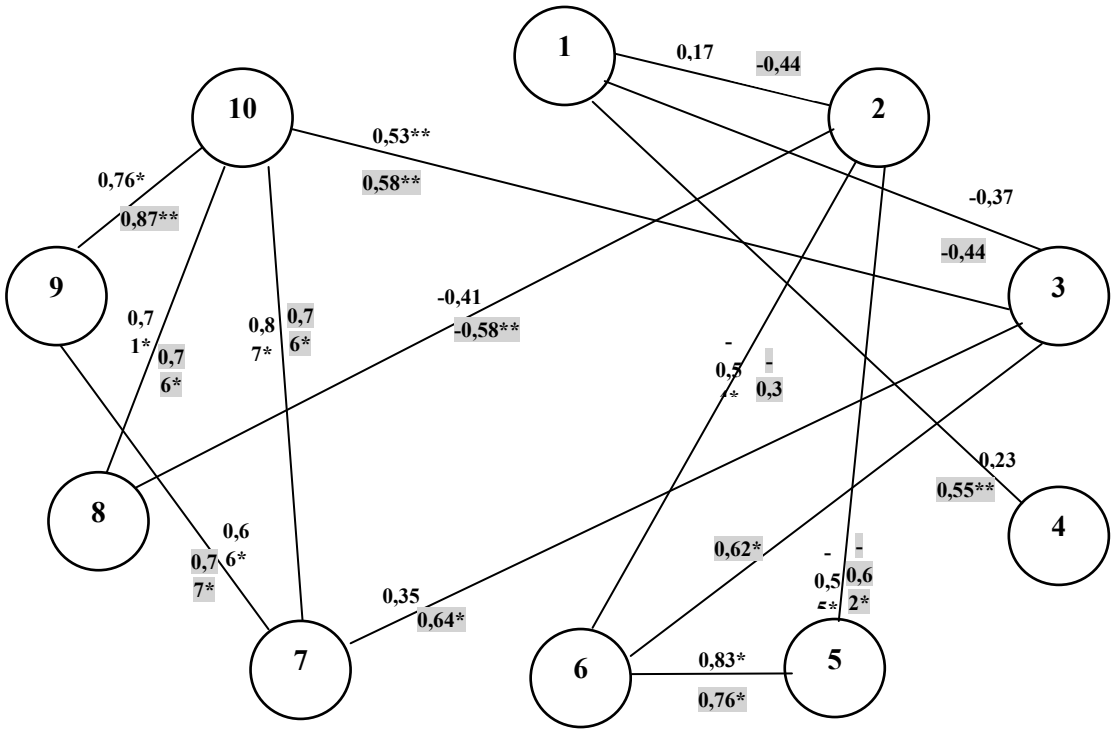
The results from the correlation analysis for the boys is presented in **Fig. 2**.

What initially makes a strong impression is the existance of significant relations between different indexes of the psychic and physical readiness.

With the expert evaluation, which is an index for the boys' technical readiness at the beginning of the experiment, there is a very small positive dependence with speed (r = 0.17), something which after the experiment changes and the relation becomes a negative and stronger one (r = -0.44). Significant correlation between the expert evaluation and the strength of the abdominal muscles also appears, which is an objective index for the formed survival readiness in case of self-defence (r from 0.23 in the beginning reaches r = 0,55 with α = 0.01). Like with the girls, here there is also a negative dependence between the strength of the legs and the expert evaluation at the beginning and at the end of the survey. This is one of the problems which should be paid special attention to in the future preparation through increasing the work for the muscle strength of the lower limbs and priority perfection of the muscle strength of the lower limbs through specific power exercises of martial arts.

In the structure of the girls' physical readiness the most significant changes could be observed between speed and grip strength. At the beginning of the survey the correlation between the strength of the right hand and speed is r = -0.54 with α = 0,05, and between speed and the left hand - r = -0.55 with α = 0.05. After the training and implementation of means and methods from kung fu the determination between speed and the strength of the right hand is increased from 30% to 38%. Between the strength of the left hand and speed the determination decreases from 27% to 11%. Also there is a slight decrease

in the relation between the strength of the right and left hand, from r = 0.83 with α = 0.05 to r = 0.76 with α = 0.05.



Legend: 1 – Expert evaluation; **2** – 20 m running.; **3** – Long jump; **4** – Sit-ups; **5** – Hand-grip dynamometry /right hand/; **6** – Hand-grip dynamometry /left hand/; **7** – Self-confidence; **8** – Activity; **9** – Mood; **10** – general psychic working capacity;

** – level of significance α = 0.01; * – level of significance α = 0.05;

r = 0.00 – beginning; **r = 0.00** – end;

Fig. 2. Correlation matrix of survival readiness – boy

As a result of the specialized training in kung fu a significant correlation appeared between the strength of the lower limbs and the strength of the grip of the left hand. After the first survey the relation between the two indexes is very small, and at the end of the survey it is r =0.62 with α = 0.05.

In the structure of the psychic readiness, as a result of the experimental methods applied, alike with the girls there are not many changes. This signifies once again that the kung fu training process influences favourably the psychic readiness for action. This refers both to action during training sessions and competitions and to action in self-defence.

An interesting fact with the girls, in the structure of their readiness for action in the extreme conditions of the social environment, is the existence of several dependences between components of the psychic and physical readiness. Increasing these relations leads to perfection of the structure of psychophysical readiness which guarantees the efficiency and adequacy of the actions in extreme situations.

At the beginning of the survey there is a significant correlation between the general psychic working capacity and the explosive power of the muscles of the legs r = 0.53 with α = 0.01. This very correlation, but slightly increased, could be observed at the end of the survey as well – r reaches 0.58 with α = 0.01.

The relation between the self-confidence and the manifestation of the muscle power of the legs increased almost twice. The self-confidence to a great extent determines human's behaviour and actions in a situation requiring defence. At the beginning of the survey the relation is small – r = 0.35. After the specialized training the coefficient of correlation reaches r = 0.64 with α = 0.05, and the determination between the two indexes reaches up to 41%.

The situation revealing the changes in the activity and speed is identical (in the beginning r = -0.41). The purposeful influence through implementation of psycho-motor training sessions, on the one hand, and perfection of speed, on the other hand, contribute to revealing a significant correlation of r = 0.58 with α = 0.01 and corresponding determination of 34%.

The analysis of the established changes in the structure of survival readiness with the boys and girls enables making the following **conclusions**:

At the beginning of the survey both the boys and the girls have a relatively low level of survival readiness. Very weak and opposite dependences between the technical skills and habits and the necessary for their manifestation motor qualities are revealed. The determination between the psychic and physical readiness is small.

The specialized training has a positive influence on the determination between some indexes of the technical and psychic readiness.

High determinations bewteen the major components in the structure of the psychic readiness are revealed at the beginning and at the end of the experiment.

The specialized training contributes to an increase in some relations between the different components of the technical, physical, and psychic preparation. It influences the appearance of new, significant correlations in its overall structure which leads to its perfection.

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PRELIMINARY STUDY ON SOME CHARACTERISTICS OF TRAINING IN FOOTBALL AT AN EARLY SCHOOL AGE

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Keywords: *school, football, training, children*

The football game is one of the most popular sports games in the world. Football in the Bulgarian school program is taught by planned learning content for each class. In the system of physical education lessons, situations are created for learning the game and its practice since the first year of primary education. Football training at school is done in a traditional method for learning the technical skills of the football game. The traditional method is theoretically sound and methodologically described in the literature, but the priority is for the formation of high-class racers. School as an educational institution has different sports' goals and objectives which in order to improve the quality of education suggests modifying the traditional football methodology for the needs of physical education in school. This is required by some peculiarities of the organisation of the academic work, and of the patterns of the learning process in the context of a football game. For example:

the smaller duration of the main lesson form compared to the educational training exercise;

limited number of classes in the academic curriculum from where the possible limited number of lessons for various sports and sports disciplines;

difficulties arising from the inclusion of already acquired technical skills in real game action;

the positive fact that after year 2000 the provided educational football content from year one to year four is taught to both boys and girls.

The aim of the study is the output of some methodological guidelines for the establishment of an adapted methodology for training football at school.

1. To achieve the objective the following **tasks** were placed:
2. A study of the problem through literature and documentary sources.
3. Conducting a questionnaire survey on teachers in physical education and sport.
4. Pedagogical analysis of physical education lessons with educational content in football.
5. Creating and approbating of exercises as part of the overall methodology for training in football.

Methodology of the study: To achieve the objective, research was conducted in three directions:

- literary and documentary sources relating to the methodological part of training in football were studied;
- executed was a questionnaire survey of 39 teachers in physical education and sport;
- game situations were created the that we approbated with 50 pupils, boys and girls in third grade of 22nd High School "G.S. Rakovski", Sofia;
- a pedagogical observation of thirty-five lesson activities in the last seven lessons of the planned fifteen hours football in five classes was established in two schools; observed was the content of the teaching process during the analysed lessons with provided educational content in football.

On the one hand, the conducting of a focused and correct training in the technical and tactical techniques of the game lays in the basis of the correct development of the students, and the creation of future competitors on the other. Issues dealing with the problems of football teaching are seen and described by several authors. We can divide them into two big groups. Some of them are exploring the interest in the game of football as we will mention only some of them, S. Abusetta [7] Sh. Amin, N. Lyubenova, M. Panayotova [8] Dimitrov, L., V. Tonchev., St. Conev [11], http://www.fifa.com/world-

football/bigcount/index.html [3]. Others, like S. Bazelkov [9], V. I. Kozlowski [13], G. Papapanayotu [16], S. Stoyanov [17], V. Tsvetkov [18] and others conduct researches on football education in children of different ages.

ANALYSIS OF RESULTS

The training in the initial stage of the basic educational level has a general educational character in order to achieve the initial sports literacy and physical abilities of the students. Integral and indispensable part of the training is the learning content of the sports games and, in particular football. Unlike previous curriculum, learning the game of football is provided to both boys and girls. Interviewed, however, did not confirm this. **Figure 1** shows that 45% of teachers implement training football with the boys, which was contrary to the requirements of state educational standards for educational content.

These results are worrying with regards to the obligation of teachers of knowing the documents gov-

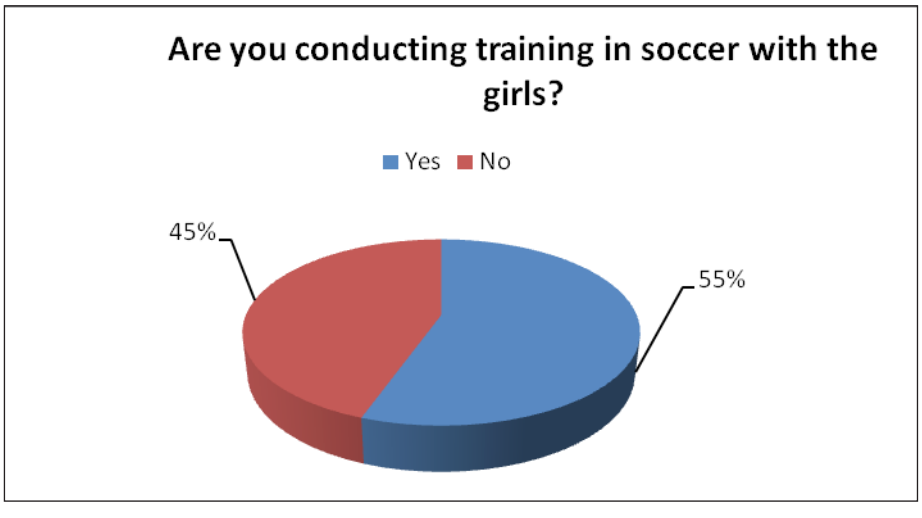

Figure 1

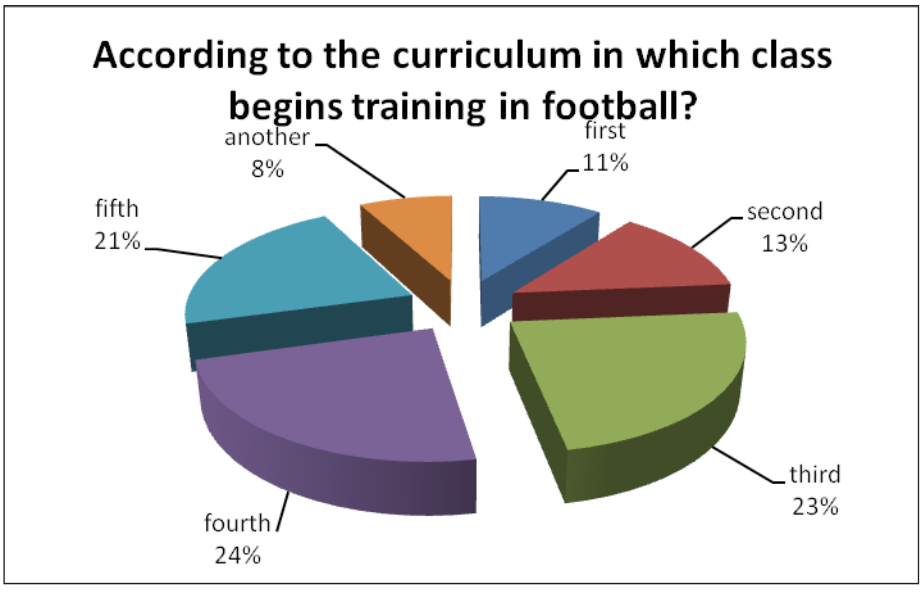

Figure 2

erning the teaching of physical education and sport. This is confirmed by the differing responses to the following question: „According to the curriculum, in which school year training in football begins?“. The answers are presented in **Figure 2**.

Only 23% of the surveyed teachers know the curriculum. The study of football as part of the physical education training and sport in the current programs begins in third grade and continues until the end of school. According to the state educational requirements, students from third grade at the end of the training period control, pass and stop the ball with foot on the ground, foot shoot from a stationary spot kick, implement keeping the ball, choose a place in attack and defense. The requirements for pupils in fourth grade are: master passing, stopping and taking over the ball with the inner side of the

top of the foot, keeping the ball with the upper outer part of the foot, hit the net with a stationary and rolling ball, detecting, passing and stealing the ball.

The presence of almost all elements in the art of football gives a broad basis for planning of a selection of the sequence in which training should pass. To determine this sequence, a study of the existing training methods has been carried out that have targeted both sports training and football learning at school.

The literary study that has been made gives a reason to bring out two guidelines that help for the establishment of a methodology for football training for students. Firstly, it is appropriate to put the choice of a learning approach. Then, the choice of a technique with which to start the beginning of training:

- ✓ Two approaches of teaching football are outlined in the theoretical and methodological aspects. Initial training until the 70s of the last century was carried on the basis of a standard motor habit that is formed in strict compliance with established methods of training. This methodology follows a consistent training, which is the execution of imitation exercises, a static ball exercises, exercises in place and only then exercises in movements. Since the 70s and 80s of the last century a number of authors [2, 6, 10, 17] probed and validated methods to study learning on the move using the variational and gaming methods. This approach is endorsed by leading football academies in the world like the German, English and Dutch.

This approach, combined with a simultaneous utilisation of specialised knowledge of tactics and rules of the game serves as a basis for the creation, by authors, of a number of methodologies for teaching children. Such methodologies are „Training in games through understanding“ [4] „Feeling game“ [5], „Long-term development of the athlete“ [1] Grassroots [6].

Given the content of the football game, as a specific type of physical activity, the trends in the last century characterise the stage of a basic football training, which covers children aged 6-11 years, age characteristics in child development and the specifics of the lesson work in physical education is appropriate in the use of an approach based on learning on the move through using games and game equipment. This would lead to the formation of motor habit that has variability.

On the other hand this approach allows the formation of the necessary knowledge in the students related to tactics and the rules of the game from the very first lesson formation. Trinity technique, tactics and rules knowledge will create conditions for achieving basic football skills in pupils from the initial stage of the basic educational level.

- ✓ For the selection of a technique with which to begin the training we will examine and compare the views of different authors. Some of them recommend the training to begin with training with hits [13,16,17]. Others offer training to begin with techniques that are directly related to the control of the ball in leading the game [6,7,9,18]. As such methods they cite keeping and controlling the ball. A priority of the techniques related to the control over the ball give authors who considered the problem in terms of the training of adolescents between the ages 6-11 years. According to them, it lays the foundation for a lasting interest in the game in adolescents.

On the other hand taking into account the specifics of the development of mental processes in this age period and in particular the characteristics of thought and attention, the constant contact with the ball, which require the above technical elements, will allow the teacher to provide a natural activity for the students in the learning process.

In support of the results obtained from the analysis of the literary sources and the results of the next two questions included in the questionnaire survey, which answers of the teachers we will analyse.

In the answers, of the surveyed teachers, of the question: „With which part of the football game you start the basic training?“ presented in Figure 3 observed is the presence of multiple responses. This variety of possibilities in a large degree could explain the diverse choices of the technical element that is referred to in various literature sources.

From the responses received can be seen that teachers give priority to keeping the ball - 46% of them indicate that element, with which, according to them, should begin the initial training. It is important to note that not a small number of teachers-respondents (26%) believe that primary education in football

needs to begin with the passing of the ball. According to the surveyed teachers, elements of the technique of the football game which is most easily absorbed by the students, is keeping the ball. These are the answers to the question: „Which element of the technique in the football game students acquire the easiest?“ which are presented in **Figure 4.**

The answers to this question largely confirm the results obtained from the previous question. We could

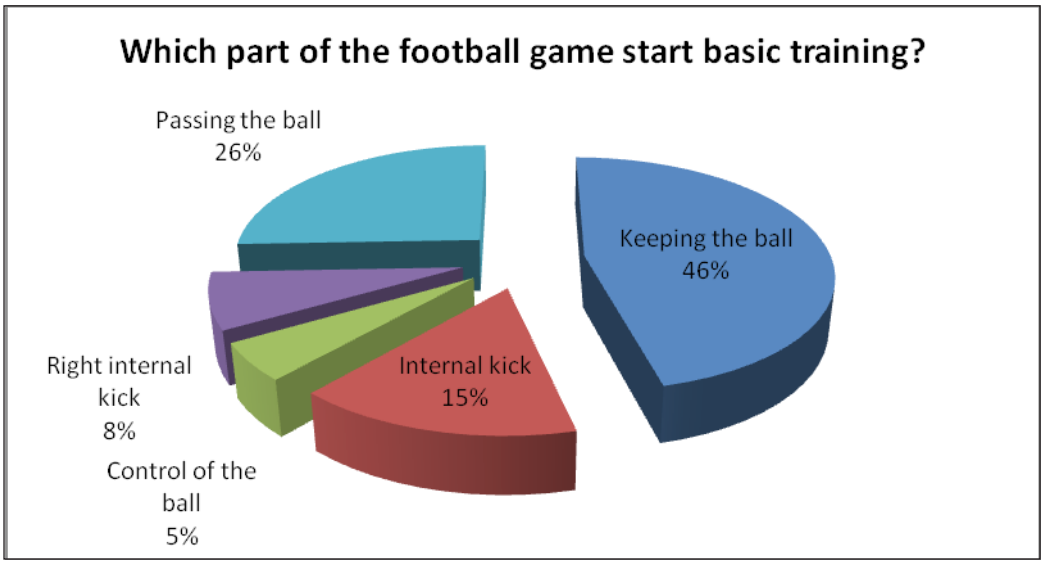

Figure 3

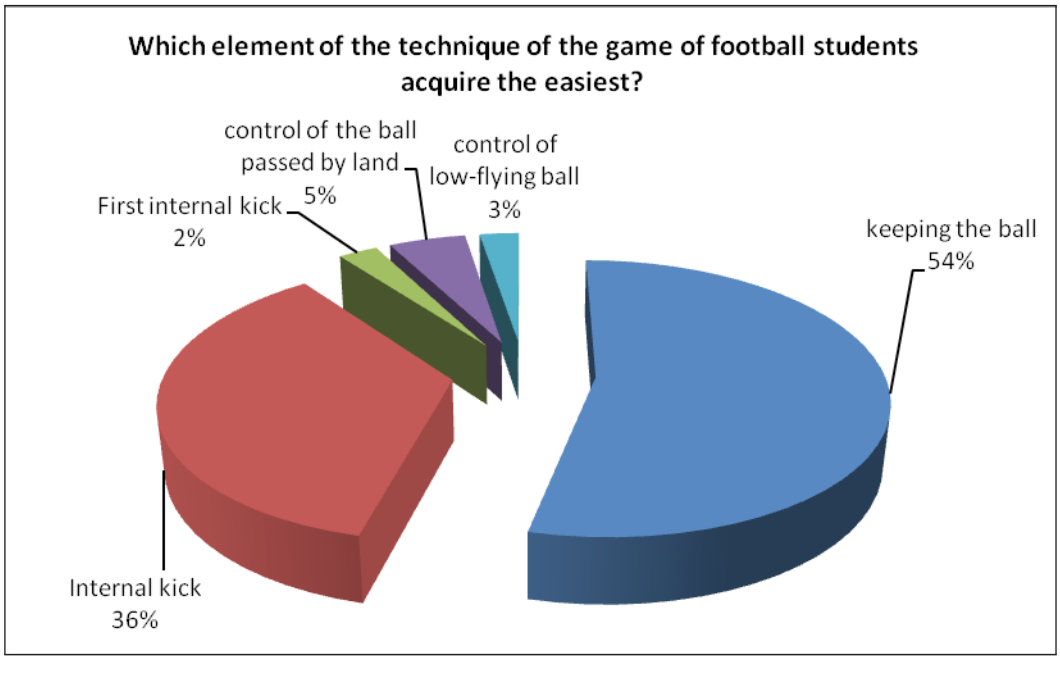

Figure4

summarise that the choice of the element with which to start learning football depends largely on the success of students in mastering the element, depending on their past motor action experience.

The results of the executed pedagogical observation we will present only in its part that that is associated with the technical skill keeping the ball. In the different stages of the learning process keeping the ball as technical skill in the football game takes place in almost all lessons through multiple repetitions without the adjustment of the allowed mistakes. It is noteworthy that no concrete tasks arising from the stage of the learning process are put. The most significant deficiency, which can be derived as a result of the pedagogical observation, is that keeping the ball is carried for its own sake. It should be emphasised that the creation of conditions and activities related to the football game was not observed. Responses that were received from the survey, the survey of the literature sources, and the results of the pedagogical observations of the specific learning activity directed our attention to creating and subsequently of approbating game situations related to the context and activities for mastering the

technical skill of keeping the ball to the upper part of the foot. We present as an example a created and probated game situation to master the technical skill of keeping the ball with the top of the foot.

Keeping the ball in a rectangle 25 x 20 meters.

Content: 12 students in two rows, one behind the other are in the square. Students from the first row lead a free ball to the opposite line of the square, where they overlap with the ball. After the students in the first row overlap with the ball, students from the second row carry out the same.

Dosage: Perform 8 repetitions of each row.

Organisational and methodological guidelines: The execution of the exercise begins with a walk and in any subsequent repetition the speed of execution changes. The exercise is performed once with the comfortable foot, once with the uncomfortable foot.

Correction of errors: Upon completion of each length the teacher corrects the setting of the legs and feet of the leading foot, as well as the distance to which is the ball from the leading foot.

Knowledge: In the course of implementation, students are gradually given information about the side and end lines of the field, as well as specific terms related to keeping the ball (keeping the ball, the top of the foot, keeping the ball in pace).

Variations of Execution:

1. Students are divided into two teams, located in rows facing each other on the two opposite lines on the field. They perform keeping the ball with the top of the foot in a straight line. Both lines operate at the same time while simultaneously keep into account the movement of both their team players and the players from the opposing team. The performance ends with the oncoming of the ball to the opposite end of the field line.
2. The organisation is as in the previous exercise, but extracts a winner. The team which players first step over the led from them balls on the opposite end line wins.
3. Students from both teams are ordered over the two end lines of the field. Each player leads of the ball to the upper part of the foot, but in a direction that he chooses. At a signal from the teacher each student should step over the ball that leads to the nearest line. The winner is the team which players' first step over the led from them balls.
4. Keeping the ball runs in the same organisation as the previous, but the advancing of the ball should be in an area of the final line of the pitch length 3m. marked by cones at both ends.
5. Students from both teams perform keeping the ball in their chosen direction on the field as they seek to keep their ball and to tip the ball off the feet of the players from the opposing team. Every player has the right to tip the ball from only one opponent. When the pitch is left with two students only, the first one that has stepped over the ball of any of the final lines carries their team's victory.
6. Keeping the ball runs in the same organisation as the previous, but there is no limit to the number of kicks of the ball out of the players of the opposing team, and at the beginning, each team is located in a row at one of the end lines. The team left with more balls on the field wins after each player involved in it steps over the led by them ball at the end line of the opposing team.

CONCLUSIONS:

1. Football Training in the conditions of a Bulgarian school is appropriate to begin in grade three – as taking place with both boys and girls.
2. The existing methods for football training that have been developed for the needs of the physical education approach broadly to the methods that solve the problems of the educational and training process in football.
3. For students from grade 3 – a study and a subsequent improvement of the technical elements to be implemented in terms of gaming activity.
4. The creation and the use of game situations in football training at a classroom level will allow the

gradual absorption of both the rules and some tactical requirements of keeping the ball and will lead to formation of a motor habit in fluctuating conditions (higher skill).

5. The sequence in which the student training in the early stages of the basic educational level in football is appropriate to be carried out in the following sequence: keeping the ball, hit, pass and tackle.
6. In view of the differences that we found during the approbation of the game situations between the sexes regarding the technical and tactical output abilities of boys and girls training should be differentiated by gender.

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STUDENTS' PHYSIOLOGICAL LOAD DURING THE TESTING OF FUNCTIONAL ABILITIES USING F6 TEST IN PE CLASSES

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Key words: functional abillities, intensity of work, heart rate, heart monitor

INTRODUCTION

Endurance training (which contains aerobic and anaerobic endurance) has many benefits aimed at the health status of an individual. Active participants in endurance training have a strong heart, lower blood pressure, and during the activities use more fat as fuel, which is very important for the prevention of cardio-vascular diseases [1]. Among different human abilities and qualities it is very likely that there are no more or less important abilities. However, if we talk about the area of "fitness", this role could be taken over by a satisfactory aerobic functional ability primarily in terms of efficient energy transfer, and efficient functioning of a person's circulatory and respiratory systems. Aerobic capacity, i.e. maximum energy flow appears as one of the fundamental components of endurance [11]. Endurance has been defined as the ability to sustain a default load over a long period of time [10], or as the ability to sustain physical activity over a longer period [1]. Physiological load is mostly determined by the specific intensity and extensiveness of exercise, exercise content and conditions in which physical exercise is carried out, and can be controlled by measuring heart rate, among others, using a heart rate monitor [15]. Heart rate, or the number of,, heart revolutions'' per minute, because of its accessibility and ease of measurement is a well studied physiological parameter [11]. The value of heart rate at rest and during the load indicates the level of general aerobic trainings, and a number of indirect tests used to estimate aerobic capacity and general aerobic endurance are based on the measurement of the heart rate that is proportional to the intensity and duration in the first minutes of activity [11]. Similar description can be found in the publication by the World Health Organization [13] stating that heart rate increases with the intensity of exercise and that there is at the same time a good linear relationship between heart rate and oxygen uptake during exercise. In their childhood both girls and boys have almost the same aerobic capacity, but in the later years girls lag behind as compared to boys, especially after puberty. This is mainly due to hormonal mechanism which causes differences in body composition (higher proportion of body fat in relation to muscle tissue in girls after puberty) and differences in physical activity in favor of boys which leads to differences in the oxygen transport system and in biochemical mechanism of muscles. Both mechanisms create greater muscle mass in boys than in girls [Parizkova, 1973, as cited in the 13]. Aerobic functional ability in the upper grades of elementary school can be measured by F6 test, which involves students' continuous movement (walking and running) for six minutes [3]. The area of functional ability is very interesting for researchers as can be seen in [9, 8, 7, 6, 2, 4, 14, 5]. Since the heart responds to stress (either physical or emotional) by changes in the heart rate, monitoring heart rate values is very important in the process of physical exercise, both from the aspect of dosing the loads, and from the aspect of avoiding possible accidents in the participants of exercise [16] and might help teachers to motivate students for ,,connecting'' with physical education and help more active students set their fitness goals [12]. Accordingly, the aim of this study was to monitor reaction of a young body to the test of aerobic capacity (F6), i.e. the intensity of the load that this test stimulates in students during the process of testing their aerobic capacity. The obtained results may be an indicator of the efficiency of teaching physical education, that is, of sufficient or insufficient number of stimuli to the cardiovascular system during PE classes.

METHODOLOGY

The participants of the measurement were 10 students in higher grades (grades 5-8) at one elementary school in Zagreb: 4 boys (two 5th and two 6th graders) and 6 girls (two 5th, two 7th and two 8th graders). Since the participation in measuring heart rate (HR) using a monitor was voluntary, sixth grade students

did not express an interest to participate in the study. The reasons for this may be in the process of growing up which is in this period the most intense as well as in the uncertainty about personal abilities that are accompanied by a series of turbulent changes in the body. Consequently, there may be certain discomfort due to possible negative feedback (according to the students' personal view). Measurements of the heart rate were carried out in the main part of the lesson in order to prepare students' cardiovascular and respiratory system for the efforts required by the F6 test. HR measurement was conducted using the Reebok cardiac monitor. Heart rate and percentage of maximum frequency were recorded at the start and at the lap times of each circle (1 lap = 280 m) for 6 minutes.

RESULTS AND DISCUSSION

Table 1. Individual values: heart rate (HR), percentage of maximum heart rate (% HRmax), meters ran, lap time (per lap)

Participants	HR Start I % FS max	1st lap = 280 m			2nd lap = 560 m			3rd lap = 840 m			4th lap = 1120 m			5th lap = 1400 m			
		Lap time	HR	% HR max	Lap time	HR	% HR max	Lap time	HR	% HR max	Lap time	HR	% HR max	Lap time	HR	% HR max	Meters
5th grade – boys																	
1	150 71 %	60	210	100	2' 30"	212	100	4'05"	210	100	6' 00"	210	100	--	--	--	1120
2	110 52 %	66	202	97	2' 20"	214	100	3' 44"	205	99	5' 05"	207	100	6' 00"	203	97	1260
6th grade – boys																	
3	130 46 %	61	194	94	2' 08"	197	94	3' 20"	201	98	4' 37"	206	99	5' 50"	186	89	1460
4	91 44 %	79	175	85	2' 45"	183	88	4' 07"	192	92	5' 20"	203	98	6' 00"	200	96	1260
5th grade – girls																	
5	**149 70 %**	**79**	**189**	**91**	**3' 53"**	**183**	**88**	**5' 51"**	**220**	**100**	**--**	**--**	**--**	**--**	**--**	**--**	**840**
6	**17 46 %**	**77**	**195**	**94**	**2' 55"**	**197**	**94**	**4' 49"**	**202**	**97**	**6' 00"**	**202**	**97**	**-**	-	-	**980**
7th grade – girls																	
7	**136 66%**	**75**	**170**	**82**	**3 07"**	**190**	**91**	**5' 11"**	**165**	**75**	**6' 00"**	**181**	**91**	**--**	**--**	**--**	**980**
8	**113 54%**	**81**	**189**	**91**	**2' 49"**	**208**	**100**	**4' 04"**	**189**	**91**	**6' 00"**	**206**	**99**	**--**	**--**	**--**	**980**
8th grade – girls																	
9	**134 64 %**	**64**	**195**	**94**	**2' 34"**	**171**	**85**	**4' 24"**	**172**	**83**	**6' 00"**	**145**	**75**	**--**	**--**	**--**	**1120**
10	**118**	**72**	**139**	**67**	**2' 15"**	**183**	**91**	**4' 32"**	**188**	**91**	**6' 00"**	**173**	**84**	**--**	**--**	**--**	**980**

The results in (**Table 1**) show that during the **first lap time** (280 m, 60-81 sec.) there is a rapid increase in the heart rate values ranging from 193 beats/min to 210 beats/min which indicates submaximal and maximal exercise intensity. This is understandable considering the "freshness'' of the participants in the measurements. The **second lap time** (560 m) shows a range of lap times from 2 minutes and 8 seconds to 3 minutes and 53 seconds. The range of heart rate values was from 171 beats/min (85% HRmax) to 212 beats/min (100% FSmaks) with three of the subjects having a value of 100% HRmax. The **third lap** time (840 m) brings a range of lap time values from 3 min and 20 sec to 5 min and 51 sec. As mentioned previously, in this phase of the testing, the subjects' cardiovascular system was supposed to be in the phase of a steady state. The ranges of heart rate values varied from 165 beats/min (75% HRmax) to

220 beats/min (100% HRmax), which indicates the difference in the endurance of the load among the participants during the testing process. Lower values of heart rate ranged from 145 to 173 HR/min or 75-84% HR max and were found in 7th and 8th grade schoolgirls. There were 9 subjects who participated in the **fourth round**. A fifth grade schoolgirl "used up" her six minutes on 840 meters, which indicates slightly lower aerobic abilities in relation to the other participants. Three girls (one fifth- and two seventh-graders) finished on 3.5 laps, or 980 meters while the fourth lap time (4 laps=1120 m) was successfully achieved by five students, of which one was an 8th grade girl whose heart rate value was relatively low (145 HR/min, or 75% HRmax). The **fifth r**ound had only 3 subjects. Two participants ran 4.5 circles, which accounted 1260 m in 6 minutes. HR/min value ranged from 200 (96% HR max) to 203 beats (97% HR max). One participant ran 5 circles plus 60 meters, which accounted to 1460 m, in six minutes with 186 HR/min (89%HRmax). Of the ten participants, three were singled by the number of meters ran and one of them achieved the best result (1460 meters, 89% HR max). All three students are engaged in sports in school and out of school (soccer). Hence, we can conclude that the significantly better results on this test require much more aerobic stimuli than those offered during physical education classes with a modest two hours per week.

AVERAGE RESULTS OF PARTICIPANTS

Table 2. Number of participants (N), number of meters (meters), heart rate average (M HR), maximum heart rate percentage (%HRmax), test duration (time) - average result

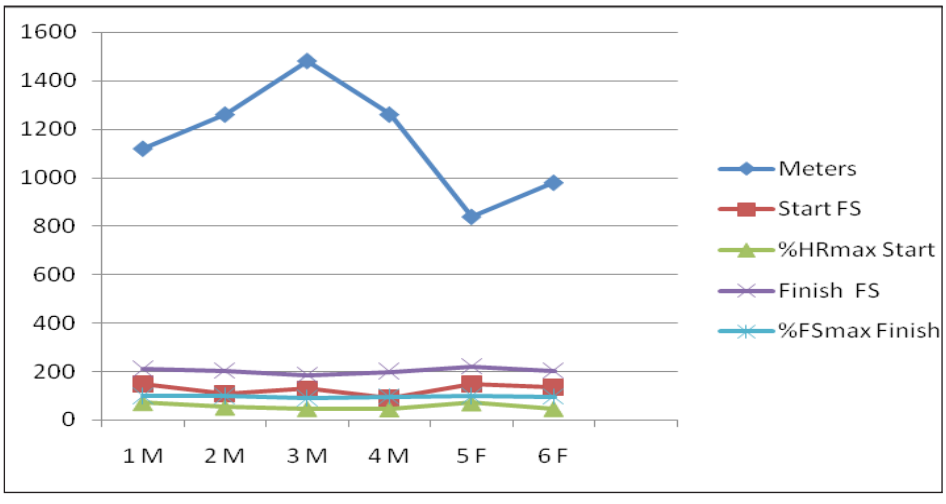
Participants (grade)	**N**	**Meters**	**M HR**	**%HR max**	**Time**
5 (boys)	2	1190	206.50	99.00	6 min
5 (girls)	2	910	211.00	98.50	6 min
6 (boys)	2	1360	193.00	92.50	6min
7 (girls)	2	1050	193.50	95.00	6 min
8 (girls)	2	**1050**	**159.00**	**79.00**	6 min
5 (boys & girls)	4	1050	208.00	98.75	6 min

Average results by categories indicate that eighth grade girls do not belong in this fairly homogeneous group. The reasons are explained in the discussion.

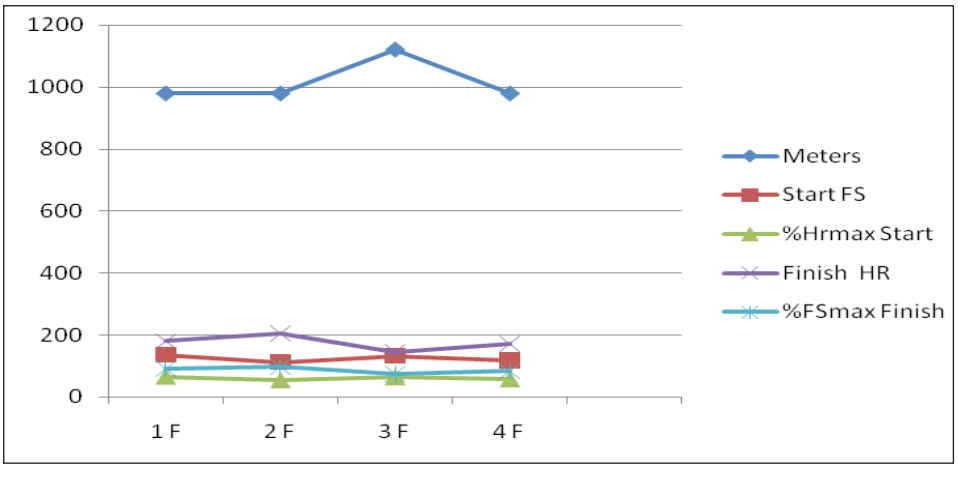
DISCUSSION AND CONCLUSIONS

It is known that the actual values of heart rate vary for many reasons (some biological indicators, the conditions of the exercise surroundings), so it is impossible to place HR max within strict frames (220 - age in years) [11]. Also, a "rise" in heart rate during submaximal efforts with HR growing rapidly is normal, and after one or two minutes (depending on the intensity of the load) it reaches a certain level and enters the steady state. Achieving a steady state at the maximum load takes 3 to 4 minutes [11]. The state of high load should not last too long and should not cause distinct fatigue which is manifested in body exhaustion and lowering of the heart rate values. The intensity of exercise then should be significantly lowered or completely stopped in order for the repair phase to take place because in such a state the cardio-vascular system cannot meet the needs of the peripheral system for blood and oxygen flow [11]. Looking at individual results, differences in aerobic capacity in this group of participants may be observed. Individually, the weakest score was 840 meters (3 laps). The best results were achieved by boys in the category of fifth and sixth graders. This can be explained by the still relatively stable organic body systems in boys and the influence of training in and out of school. Individual scores, results and heart rate values are shown in (**Graphs 1 and 2**).

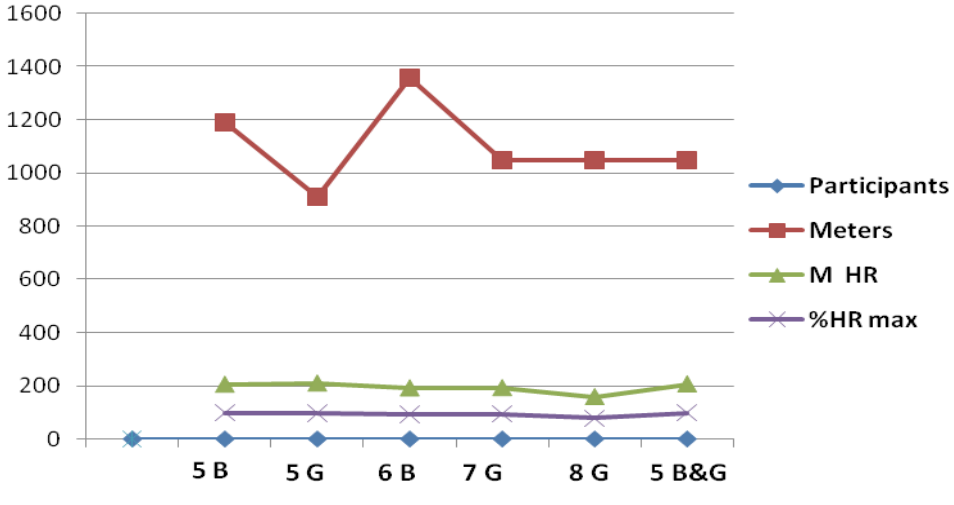
Seems that eighth grade girls do not belong in this fairly homogeneous group (Table 2). With respect to the meters ran, they have the same results as the seventh grade girls (1050 m), but their average heart rate value is significantly lower compared to all other participants. Reasons may be several: their experience in testing the aerobic capacity with F6 test which contributes to the correct dosing of load intensity, physiological factors such as the final stage of turbulent changes in organic systems in pu-



Graph 1. Meters ran, heart rate value, maximum heart rate percentage – boys (M) & girls (F) 5th and 6th grade – individual results



Graph 2. Meters, heart rate value, maximum heart rate percentage – schoolgirls (F) 7th and 8th grade – individual results



Graph 3. Meters, heart rate value, maximum heart rate percentage – all participants – average results

berty, the possibility that in the closing seconds they reduced the intensity of work (continued walking), or maybe, due to its intensity, this test is more appropriate for the population of eighth grade schoolgirls (it may be too demanding for the population of fifth grade schoolgirls: 910 m, heart rate 211 beats/min) at least in this group of participants. Naturally, this cannot be categorically asserted due to a small number of participants, but it provides guidance for further research in this direction. Slightly

lower HR values (193 beats/min, 92.50% HR max) were recorded in sixth grade boys, but in this sample they were all athletes (football). Although these are students used to training, listed heart rate values are quite high. This is also confirmed by the fifth grade students' heart rate values, one of which is also an athlete. Based on the above it may be concluded that F6 test, due to its intensity of load, is more appropriate for the category of "older" students (grades 7 and 8), at least in this group of participants. Although the average values slightly "camouflaged'' individual results, all this indicates that the F6 test is very demanding and for most students provokes submaximal and maximal efforts. Average results and heart rate values are shown in (**Graphs 3**).

The obtained individual results indicate high intensity load during the performance (up to a maximum value of HR in several participants). Therefore, the application of this test in practice requires a very good preparation of all students for testing, and caution in its application to potentially risky groups of children, as well as in risky conditions (heat, sultriness, poor subjective feeling, recovery after illness, etc.).

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ORGANIZATIONAL FORMS OF WORK IN KINESIOLOGICAL EDUCATION AND CURRICULUM DIFFERENCES IN SOME EUROPEAN COUNTRIES

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INTRODUCTION

It is accepted that kinesiological education needs to have greatest effect on the entire population, because it accompanies one human being from pre-school to higher education (Prskalo and Babin, 2006). Physical and health education as a phase in education aims for a balanced and coherent range of physical activities, it must contribute to the optimal development of individual including potential in growth and development, and physical and psycho-social competence (Hardman, 2007). It is clear that teachers of physical and health education must not only consider the physical abilities of their pupils, but they must also worry about their attitudes and influence children to understand the value of physical and health education to their future development. Pupils will be more motivated if the school periodes of physical and health education experience as enjoyable and purposeful (Chedzoy and Burden 2009). Studies show increasing involvement of kinesiology content in free time (Prskalo, 2013). The organizational forms of work in the plan and program of physical and health education (basic and differentiated plan and program) form an organic unit in the service of achieving the goal and task of this subject (Findak Prskalo, 2004). Starting from the paradigm that only the totality of organizational forms of work throughout the process of the organized training of pre-school to university level can ensure the realization of the goals and tasks of physical and health educational field, field that is of fundamental importance for the bio psychosocial development (Findak, 1995), is daily confirmed and radicalized. The total process of kinesiological education should be put under an objective scientific prism, and confirmed hypotheses and principles that follows from this process should become mandatory for all factors of kinesiological education well as education in the broadest sense of the word. Therefore, issues that science encounters every day, are te problems of entire educational system and the entire society, even civilization, and only the synergy of all the factors of education can improve the situation and ensure optimal responses aimed at the future (Prskalo and Babin, 2010).The organizational forms of work are determined not only with the primary objectives and functions of each of the area of the applied kinesiology, but also with secondary objectives and functions, ie. with goals and tasks that are realized or may be realized both through the basic program, and with the help of differentiated programs. When it comes to e.g. the field of education all organizational forms of work, which occurs in everyday school practice in terms of curriculum, extracurricular and out of school organizational forms of work, even though they differ not only in content but also in the realization, in essence make organic unity in the service of the realization of the common goals and tasks of the educational area (Bailey, 2006, Findak, 2009).

As the school period of physical and health education is a basic organizational form of work, therefore it is prerequisite for inclusion of children and pupils in all other forms of organization of work. As a basic organizational form of work school period of physical and health education provides a planned action on the anthropological status of pupils, and because of its comprehensiveness carries, strategically speaking, the highest level of accountability for the achievement of the goals and tasks of the educational area "(Prskalo and Babin, 2010). The organizational forms of work in kinesiology culture systems are regulated process of physical exercise certain structural, quantitative content, teaching methods and other characteristics (Cetinić and Vidakovic Samaržija, 2009). Organizational forms of work are

determinate by the age and sex of participants, their prior knowledge, their current state of anthropological characteristics and, of course, interested in addressing specific kinesiological activities, as well as the state of their health. Also, organizational forms of work are determined by the concrete material conditions of work, especially when it comes to those who are outside of the original action program (Findak, 2013).

Schools are presented as institutional agencies outside families with significant potential significant impact on the lives of young people. Physical and health education as a subject can play a big role in creating positive attitudes towards usual physical activity from the basic to the highest levels. Programs teaching physical and health education is not only essential for the prevention of high health risks and anti-social behavior, but also have a positive impact on the versatile design of the individual through his development, and thus to improvement of the quality of life (Ruzic Badrić and Prskalo, 2008).

The aim of this review is to include a comparative analysis of subject curricula of physical and health education in several European countries, which primarily relates to the comparison of organizational forms of work. Also, there were analyzed and programming facilities used in teaching physical and health education and duration of a school period.

METHODS

The comparative analysis included the curricula in primary schools of some of the European countries with the aim of determining presence of the organizational forms of work in the curricula of physical and health education, and which are the program differences in teaching content of the subjects. After examining the teaching curriculum of physical and health education obtained were the information on the type of organizational forms of work, programs contents and weekly number of compulsory lessons of physical and health education. With the help of this analysis insight into the current state of teaching physical and health education can be provided, as well as guidance for standardization plans in the entire geographical area of Europe.

DISCUSSION

Table 1 shows the different organizational forms of work with which the goals and objectives of physical and health education in elementary education in some European countries are achieved

The analyzed data were collected using information from the official curriculum for the subject Physical and health education particular states. Looking at Table 1, it is evident that in the teaching of physical and health education in addition to the mandatory school periods, as part of the basic program are conducted numerous facilities that are part of the basic program. The data shows that the analyzed countries fully accepted school period of physical and health education as a compulsory form of kinesiology education of pupils in primary education. All analyzed countries in their basic program of curriculum of physical and health education have some other forms of organization of work. It is evident that all the countries analyzed, have in primary education, planned swimming school i.e. training of the non-swimmers. This program is implemented differently in the analyzed curricula, but as a rule before the pupil age of ten years old. Also, it is evident that are in some countries, in the basic program, preferred winter sports, especially skiing. Their execution certainly depends on the geographical location of children. Also interesting is the fact that almost all countries have provided exercise in a natural environment, which means that the commitment to teaching physical and health education is carried out in the fresh air with the usage of various kinesiology activities

Examining the obtained data in **Table 2** it is evident that in the election or additional program of physical and health education different kinesiology contents are performed. Depending on each country, pupils in primary education are offered additional options that pupils can use to additional physical exercise outside of the original program. Each analyzed country offered various forms of additional physical exercise, and they are usually reflected in the activities that are conducted outside the framework of teaching. These activities primarily relate to the summering and wintering, where each country additionally allow pupils to enter the system of school competitions. Also physical exercise on natural environments that takes place outside the place of residence and the place of education.

Table 1. Organizational forms of the basic program of work in physical and health education educational field in the primary education of some European countries (modified according Prskalo and Babin, 2013)

CROATIA	MONTENEGRO	SLOVENIA	IRELAND	AUSTRIA	FINLAND	SERBIA	BOSNIA AND HERZEGOVINA	FRANCE	ESTONIA	LITHUANIA
School period of physical and health education	**School period of physical and health education**	**School period of physical and health education**	**School period of physical and health education**	**School period of physical and health education**	**School period of physical and health education**	**School period of physical and health education**	**School period of physical and health education**	**School period of physical and health education**	**School period of physical and health education**	**School period of physical and health education**
School period of physical and health education special program	Sports Day 5 times a year	Sports Day 2 times a year	School period of physical and health education special program		School period of physical and health education special program	Sports Day 2 times a year				
Training of non-swimmers	Swimming	Swimming	Water Sports	Swimming	Swimming	Swimming	Swimming	Swimming	Swimming	Swimming
					Winter Sports	Skiing			Winter Sports	Winter Sports
			Exercising in a natural environment		Exercising in a natural environment	Exercising in a natural environment		Exercising in a natural environment	Exercising in a natural environment	Exercising in a natural environment
Competition in the classroom Mikropauze camping Excursions Events		Excursions and hiking		Winter sports Excursions Campaigns and hiking		Contests, tours, cross-country, camping and winter, referral to the independent exercise				

Table 2. Organizational forms of the elective and additional program of work in physical and health education educational field in the primary education of some European countries (modified according Prskalo and Babin, 2013)

CROATIA	MONTENEGRO	SLOVENIA	IRELAND	AUSTRIA	FINLAND	SERBIA	BOSNIA AND HERZEGOVINA	FRANCE	ESTONIA	LITHUANIA
Wintering Summering	Elective class (sport optional)	Summer and winter outdoor school (seven day -swimming course) Walks Day excursions Competition in the classroom Events Wintering and Summering	Elective class (sport optional)	Winter sports	School autonomy in choosing activities	Elective class (sport optional)	Skiing	Winter sports	School autonomy in choosing activities	School autonomy in choosing activities
	Performance Events, School competition, School in nature camps, Additional programs (Golden sunshine, Krpan, Ciciban), Minute for Health		Exercising in a natural environment	Exercising in a natural environment			Exercising in a natural environment	Exercising in a natural environment		
			Aquatics	Other activities						
			Extracurricular activities, Competition within school	School events, School competition, Sports events						

Examining the data in **Table 3** it can be noticed that almost all the countries analyzed, have, in their program contents, represented the same or similar content in the teaching of physical and health education in primary education. Each of the surveyed countries prefer activities that relate to the elements of athletics and gymnastics. Almost all countries use the contents of dance or different rhythmic structures, and games are in particular usage. These are elementary or relay games until the introduction of various forms of team sports. In particular, this applies to the adoption of certain elements of technique of different team sports whether it is basketball, handball, football or volleyball. Also, some countries prefer the content related to health education and fitness, and pupils in primary education get the first information about that area.

Table 3. Program contents of the basic program in physical and health education educational field in the primary education of some European countries

CROATIA	MONTENEGRO	SLOVENIA	IRELAND	AUSTRIA	FINLAND	SERBIA	BOSNIA AND HERZEGOVINA	FRANCE	ESTONIA	LITHUANIA
Athletics, Dance, Games, Gymnastics	Athletics, Dance, Games, Gymnastics Health education and fitness	Athletics, Dance, Games, Gymnastics	Athletics, Dance, Games, Gymnastics	Athletics, Dance, Games, Gymnastics Health education and fitness	Dance, Games, Gymnastics	Athletics, Dance, Games, Gymnastics	Athletics, Dance, Games, Gymnastics	Athletics, Dance, Games, Gymnastics	Athletics, Dance, Games, Gymnastics	Athletics, Games, Gymnastics Health education and fitness

rimary education of some European countries

Data from Table 4 shows the annual number of school period required in teaching physical and health education. For the implementation of the previously mentioned activities which are an integral part of the curriculum, it is necessary to set time in which the planned activities will be carried out. As a numerical determinant is taken formal school period duration of 45 minutes, although in some analyzes as a determinant of the load a full hour of 60 minutes is used. In the analysis we used the data on the annual number of school periods for the 1st grade as the beginning of the process of primary education. Then the 3rd grade was taken into account, as a central part of the primary education, because most of the countries analyzed have the process of primary education at the age range from six to twelve years old. Eventually the 6th grade has been taken into account as the final age for primary education. The results show that the annual number of school periods varies from country to country. For example, countries that belong to the former Yugoslavia (Croatia, Slovenia, Bosnia and Herzegovina, Serbia and Montenegro) in their annual number of school periods remained at the lowest levels ranging between 90 and 130 school periods per year. Lower representation than that, according to available data has only Ireland. The highest annual representation in teaching physical and health education has countries from the north of the European continent, Finland, Estonia and to some extent Lithuania. Austria and France have slightly different representation in the annual number of school periods of teaching physical and health education.

Educational and health benefits of physical activity argue for a sufficient number of school periods to implement quality physical and health education in schools and for strong links between educational and sports institutions so that children of young people can have enough opportunities to implement physical activity inside and outside the school (EU Physical Activity Guidelines 2008). Physical and health education in schools is effective in increasing levels of physical activity and improving physical shape. In the study of differences in indicators of obesity that are in relation to rural and urban conditions, it is noticeable trend of increasing overweight among pupils after second grade, in particular girls, but does not indicate the need for a differentiated program of physical and health education to the living area, but it is necessary to influence the prevention of obesity by optimal activities in children involved in primary education (Tomac Šumanović and Prskalo, 2012).

However, to achieve significant health changes an additional one hour a day of physical activity organized as a play on the school playground or physical and health education class in schools is required. Increased amount of physical activity can be achieved by increasing curricular or extracurricular lessons in school and not at the expense of other subjects in the curriculum. Extracurricular and out of school physical activity can be integrated into after-school activities, which can make interventions economically neutral (EU Physical Activity Guidelines 2008), however, although all the organizational forms of work are important for achieving the goals and tasks of physical and health education, however the role of school periods of physical and health education is the greatest (Findak, Prskalo and Babin, 2011), and because precisely this form is the condition for the inclusion of pupils in other organizational forms of work, it cannot be substituted by other forms of organization of work (Findak, 2014).

Based on the obtained data it is evident that in addition to the basic forms of organization of work in the curriculum of physical and health education there also in use are other organizational forms of work (extracurricular or out of school), which aims to further meliorate the systematic development of anthropological characteristics of each pupil. Curricula of some countries direct other organizational forms of work so that pupils participate in them and that in them preferred is the quantity of physical exercise and not to give importance to competition. It is important to note here that the motivation for physical exercise in other organizational forms of work is certainly an important factor for encouraging children to engage in some sort of daily kinesiological activity. Encouraging children and young people in physical exercise should be focused on training within the school but also outside of school. Engagement in kinesiological activities within the school system, allows each child and young person the satisfaction of basic human needs such as, for example, the biological need for movement and play, need for **p**security, order and framework, belonging, self-esteem and self-actualization (Badrić, 2010). However, recently there is much more investment on the issue of improving and promoting healthy living, which is directly related to the promotion of the importance of physical exercise. Therefore, there is also incensement in discussion about how physical activity should star to be engaged in early childhood, so that the child acquires the habit of physical exercise, but also that the physical exercise becomes his lifestyle (Baric et al., 2011).

ANNUAL FUND OF SCHOOL PERIODS			
COUNTRY	1st grade	3rd grade	6th grade
CROATIA	105	105	70
SLOVENIA	130	130	130
MONTENEGRO	90	90	90
IRELAND	50	50	50
AUSTRIA	120	80	160
FINLAND	304	304	304
SERBIA	108	108	72
BOSNIA AND HERZEGOVINA	68	70	70
FRANCE	144	144	192
ESTONIA	280	280	280
LITHUANIA	160	96	180

CONCLUSION

All analyzed countries in their curricula feature as a constant, a school period of physical and health education. Minimal differences appear in the definition of other organizational forms of work. Also minor differences appear in the program contents. The biggest difference is reflected in the annual fund of compulsory school periods of physical and health education. These differences are due to unevenness of the weekly workload of teaching physical and health education in most European countries. It was noted that some countries prefer out of school compared to extracurricular activities, which leads

to different conclusions, but they are almost certain indicator of unpreparedness of the educational system to meet the needs of pupils. From aforementioned given question is how to respond in the area of Europe to the emergence of civilization diseases of modern society with the aim of preventing the negative consequences through teaching physical and health education. The goals and objectives of physical and health education are achieved by a number of organizational forms of work, and classes are a fundamental factor by which pupils are refereed into all the other forms of organization of work.

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COORDINATION ABILITIES AND BODY MASS INDEX IN THE CONTEXT OF MOTOR COMPETENCE DEVELOPMENT IN PRIMARY SCHOOL CHILDREN

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Keywords*: childhood, KTK test, psychomotor competence, education*

INTRODUCTION

Stodden et al. [10] present a conceptual model hypothesizing that low level of coordination results in limited opportunities for engagement in physical activities, poor health-related fitness and overall low level of motor skill competence leading to increased weight and obesity. Low level of motor skill competence may lead to disengagement in games, physical and sports activities in middle and later childhood. Consequently, this results in negative spiral of disengagement characterized by adopting negative attitude towards pursuing a physically active lifestyle later in life. Also, authors hypothesize that body weight may be indirectly determined by continuous development of coordination and motor skills.

Despite lack of evidence related to the association between coordination abilities and somatic development, Graf et al. [6] confirm moderately inverse correlation between coordination abilities (KTK-test) and Body Mass Index. To be explained is the causal relationship and answer to the question whether overweight and obesity result in declined motor performance and motor deficits. The design of cross-sectional studies cannot provide the answer to this question. However, studies show that physically active children, who in their leisure time participate in either organized or non-organized forms of physical activity, demonstrate higher level of motor abilities especially in the domain of motor coordination. Prepubertal children prefer especially naturally game-based, coordination demanding activities to endurance and strength exercises and activities.

A study by Gentier et al. [5] provides evidence that lower motor competence in obese children is not limited to gross motor skills and physical conditioning alone but to fine motor skills as well. According to authors, obese children experience difficulties with the integration and processing of sensory information. However, such hypothesis needs to be investigated further by seeking possible underlying mechanisms.

Williams et al. [13] report that the level of motor skills and abilities is an important factor that promotes physical activity of children since early childhood. Children with better-developed motor skills may find it easier to be active and engage in more physical activity than those with less-developed motor skills. The relationship between motor abilities and skills and physical activity may most probably be one of the crucial determinants underlying a complex mechanism of adopting a healthy lifestyle since childhood.

Overweight and obese children present lack of physical activity as remarkable characteristic of their usual behaviour and this lack may also reflect in an insufficient motor experience which reflects over the motor development. There seems to be a trend to underestimate motor abilities and skills of overweight and obese children. It is often reflected in physical education classes in which the teachers consider these children unable to reach success in motor tasks. Such behaviour may lead to less motor experience, harming the motor development of children [1]. Deficit in the motor proficiency may influence the affection-social behaviours, having a negative impact over self-esteem as well as motivation for physical activity practice [12].

Aim

The purpose of this study was to analyze associations between BMI and coordination abilities in primary school children.

METHODS

Data were collected from 436 children (boys N = 214; girls N = 222) between 7 and 10 years of age. These data were combined from several research projects conducted by the author within 2012 - 2014. All children were attending primary schools in the region of the East Slovakia. Parents and children were informed about the aims of the research project and gave their consent.

Body height was measured using portable stadiometers (Harpenden, Holtain Ltd.) and body mass using a digital scale (Omron HN-286). Values were recorded to the nearest 0.1 cm and 0.5 kg, respectively. Body mass index (BMI) was calculated [BMI = weight (kg)/height (m^2)]. BMI was assessed according to international cut-values [2]. Motor coordination was evaluated with the Kiphard-Schilling body coordination test, Körperkoordination-Test-für-Kinder (KTK) [11]. The test battery includes the following items:

Backward balance (BAB): Child walks backward on a 3 balance beams 3 m in length, of different widths: 6 cm, 4.5 cm, and 3 cm.

Hopping obstacles (HO): Child is instructed to hop on one foot at a time over a stack of foam square (50 cm x 20 cm x 5 cm). After a successful hop with each foot, the height is increased by adding another square.

Laterally jumping (LJ): Child makes consecutive jumps from side to side over a small beam as fast as possible for 15 s.

Sideways moving (SM): Child begins by standing with both feet one platform (25 cm x 25 cm x 2 cm, supported on 3.7 cm high). Places the second platform alongside the first and steps on to it. Then the first platform is placed alongside the second and the child steps on to it. This sequence continues for 20 s.

The motor quotient *(MQ)* adjusted for age and gender was calculated using the four items. The MQ allows an assessment of the gross motor development in the following categories:

not possible (MQ < 56), severe motor disorder (MQ 56 - 70), moderate motor disorder (MQ 71 – 85), normal (MQ 86 -115), good (MQ 116 - 130) and high (MQ 131 - 145). Test – retest reliability coefficient for the raw score on the total battery is 0.97. Coefficients for individual test items range from 0.80 to 0.96.

The normality test by *Shapiro Wilk* was used to verify the data distribution. The relationships between the BMI and the motor coordination abilities and MQ were analysed by the Pearson correlation (r_p). The significance level established was 5 % ($p < 0.05$) or 1% ($p < 0.01$). The sample was split by the gender and BMI cut values (Cole et al. 2000). One way ANOVA was applied to measure differences between normal weight group (NW) and overweight + obesity group (OW + OB). The data were processed in the software IBM SPSS Statistics Version 20.

RESULTS

Research group was split by the BMI cut values for children. Approximately 20 % (89) 7 – 10 years old children were overweight or obese - almost 24 % (53) girls, and almost 17 % (36) boys.

Correlation analysis (r_p) revealed a statistically significant negative association between dynamic balance (DB) and BMI as well as between motor quotient (MQ) and BMI ($p<.01$) for both boys and girls. The results showed no effect of gender on difference in observed trends (see **Table 1**).

The analysis of variance ANOVA showed statistically significant differences between normal weight children and their overweight or obese counterparts (see **Table 2**) in all studied coordination parameters except *Lateral jumping* (LJ), which may be considered the measure of lower-body frequency speed. Estimated effect size *(d)* was at the level of small and moderate effect for all significant parameters in all research groups (0,26 to 0,70).

The comparison not based on age (see **Table 3 and 4**) showed that excess body weight of girls as well as boys had a significant and negative effect on their performance in some coordination tests. Paradoxically, excess body weight did not affect motor performance parameters determined by physical condi-

tioning components, which underlie fast whole-body locomotion *(Lateral jumping LJ, Sideways moving SM)*. It seems, that body mass index is a more important factor determining motor performance in girls. Despite that, it may be concluded that the domain of coordination abilities is significantly affected by somatic dimensions and excess body weight has negative effect on the domain of these motor abilities as well.

Table 1. Correlations between physical and motor parameters

Pearson´s correlation (r)	**BMI** ***(kg.m^{-2})***	
	Girls	Boys
BAB *(n)*	**- 0,18****	**- 0,17****
HO *(n)*	- 0,01	- 0,01
LJ *(n)*	0,06	0,02
SM *(n)*	- 0,02	- 0,08
MQ *(n)*	**-0,27****	**- 0,28****

**Correlation is significant at the 0.01 level (2-tailed)

Table 2. Motor parameter comparisons between research groups

Parameter	Girls + Boys N = 436		$F_{(2,432)}$	**Sig.**
	NW N = 347	**OW + OB** N = 89		
	x ± s	x ± s		
BAB *(n)*	46,30 ±14,25	38,02 ± 14,93	23,42	0,000
HO *(n)*	50,80 ± 16,82	46,36 ± 17,74	4,82	**0,029**
LJ *(n)*	49,91 ± 15,09	48,07 ± 16,07	1,03	0,312
SM *(n)*	40,32 ± 9,17	37,73 ± 9,47	5,580	**0,019**
MQ *(n)*	98,50 ± 13,33	88,13 ± 15,85	39,48	0,000

Table 3. Motor parameter comparisons between research groups (girls)

Parameter	Girls N = 222		$F_{(1,220)}$	**Sig.**
	NW N = 169	**OW+ OB** N = 53		
	x ± s	x ± s		
BAB *(n)*	47,20 ± 13,39	38,11 ± 13,60	18,43	**0,000**
HO *(n)*	47,76 ± 16,38	44,70 ± 16,58	1,40	0,238
LJ *(n)*	50,22 ± 15,13	46,92 ± 16,27	1,85	0,176
SM *(n)*	39,54 ± 8,68	36,70 ± 9,20	4,20	**0,042**
MQ *(n)*	95,37 ± 12,34	86,32 ± 14,85	19,61	**0,000**

Table 4. Motor parameter comparisons between research groups (boys)

Parameter	Boys N = 214		$F_{(1,212)}$	Sig.
	NW N = 178	**OW + OB** N = 36		
	x ± s	**x ± s**		
BAB *(n)*	45,44 ± 15,01	37,89 ± 16,91	7,27	**0,008**
HO *(n)*	53,69 ± 16,77	48,81 ± 19,30	2,41	0,122
LJ *(n)*	49,61 ± 15,11	49,75 ± 15,84	0,01	0,961
SM *(n)*	41,06 ± 9,58	39,25 ± 9,78	1,07	0,303
MQ *(n)*	101,47 ± 13,59	90,81 ± 17,09	16,82	**0,000**

DISCUSSION AND CONCLUSIONS

Similarly with results of our study, D´Hondt et al. [3, 4] report that childhood overweight and obesity significantly contribute to lower level of motor abilities assessed by KTK testing battery [11]. Normal weight children demonstrated a similar level of MQ (Motor Quotient) in particular age cohorts (5-7, 8-9, 10-12 years). Authors found that 10 to 12 years old overweight and obese children had significantly lower level of motor competence than their overweight and obese counterparts aged 5 to 7 years. This confirms that difference in motor competence in relation to BMI increases with age.

Therefore, early and sensitive education regarding physical activity and movement directed towards physical activity promotion in overweight and obese individuals seems to be beneficial [7].

As reported by Graf et al. [6], obese children have lower level of coordination abilities, endurance and fundamental motor skills. It is assumed that lower physical activity and motor performance levels and limited development of coordination abilities co-interact or probably represent independently acting key determinants of obesity in children.

A cross-sectional study by Lopes et al. [8] showed that boys and girls aged 6 to 14 years (n = 7,175) demonstrated an inverse relationship between BMI and motor coordination. The study findings showed that overweight and obese children of both sexes demonstrated significantly lower motor coordination levels than normal weight children.

On the contrary to our study results, Psotta et al. [9] who studied 400 Czech children (mean age 9.4 ± 1 year) found that 4.4% children demonstrated motor dysfunctions. The incidence of motor disorders decreased twofold in pubertal children. Worldwide, mean values range from 5 to 10 percent. Authors reported that both boys and girls who demonstrated motor dysfunctions did not significantly differ in the BMI from their age-matched healthy counterparts of the same sex. Significant differences were not found between genders for both different levels of motor functions.

Similarly, Catenassi et al. [1] have reported that somatic parameters such as body height, body weight and BMI do not have significant effect on the domain of coordination abilities as well as fundamental motor skills.

A longitudinal study by Lopes et al. [8] dealing with motor proficiency of children aged 6 to 10 years has shown that level of motor coordination is a significant predictor of physical activity. Trend related to the level of inverse correlation between BMI and coordination abilities increasing with age indicates that in the context of movement education preschool and prepubertal children should be provided adequate "room" for playing games as well as direct teaching situations needed to develop their coordination abilities.

Recording and explaining associations between motor performance, motor abilities and motor skills in prepubertal children and their physical activity levels may to a large extent face the trend of increasing incidence of overweight and obesity since early childhood.

Coordination abilities probably play an important role in preventing, or moderating the so-called negative trajectory leading to childhood overweight and obesity. At this age, the development of coordination abilities should become a key strategy targeted at long-term prevention of obesity and promotion of active lifestyle in adulthood.

ACKNOWLEDGEMENT

The paper is supported by the Grant scientific project of the Slovak Republic with the title: „*The effectiveness of special physical activity re-educated procedures for the correction of hyperkinetic children at younger school age"* (VEGA 1/0769/13).

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THE CORRECTION OF HYPERKINETIC BEHAVIOR DISORDERS IN PREPUBERTAL PRIMARY SCHOOL INTEGRATED CHILDREN THROUGH DANCE DANCE REVOLUTION - STEP MANIA

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Key words: Integration. Prepubertal age. Disruptive behavior. Movement. Physical activities.

INTRODUCTION

At present, hyperkinetic disorder is one of the most controversial and at the same time one of the most studied disorders present in prepubertal children most often diagnosed with this disorder. Attention disorder, hyperactivity and impulsivity, three primary disorder symptoms, cause children diagnosed with this disorder serious difficulties by having negative effect on their cognitive performance, adaptation capacity with respect to their interpersonal relationships and personality development. As reported by several authors [1, 3], manifestations of hyperactivity are evident and visible.

Therefore, it may be assumed that regular participation in physical activities by children diagnosed with ADHD could be one of the options to handle problems associated with this disorder. Engaging in physical activity of Dance Dance Revolution – Step Mania (DDR) may improve following directions/rules, decrease disrupting class, promote organizational skills and relationships with peers in students diagnosed with ADHD in the school setting. Scientific evidence suggests that this issue requires attention in the school setting as well.

Close relation between children's state of mind and motor functions was studied by Blahutková et al. [2], who have graphically illustrated the relation via model of personality development, which is determined by language, social contacts, perception, physical experience, feeling, movement and one's own body. Movement is closely related to an array of mental functions and capacities. At the same time, movement represents an expressive and communication means, which allows for nonverbal expression of emotions by promoting self-expression and self-awareness. Furthermore, movement enables to get rid of aggressiveness in a socially acceptable way and to decrease adrenaline levels [8]. Therefore, movement represents one of the most beneficial domains in children's lives. Children diagnosed with ADHD are usually less talented and suffer with motor dysfunctions, fall behind their peers in the domain of both gross and fine motor skills. Hyperactivity of children with behavior disorders makes part of complex neuropsychological mechanisms, which cannot be simply corrected by volition. Despite their hyperactivity, such children exhibit negative attitude towards physical activity. Children with behavior disorders should engage in sufficient amount of movement by having the possibility of choosing type of physical activity according to their own liking. Therefore, movement may become an ideal way of relaxing. Kavale et al. [4] recommend undemanding movement games, movement rehearsal games and rhythmical exercise. Movement rehearsal results from the effort to adjust to something or to someone through movement. A child assumes a role of someone else and therefore does not have to be ashamed of their own imperfect movement. Free movement and movement images assist in developing body awareness, spatial body perception as well as perception of other children's position when moving around. Rhythmical exercises are designed to stimulate perception and to help to handle rhythm and pace, which is important not only for reading and writing, but also for activity planning. Children enhance their level of sensorimotor coordination, which is often deteriorated in children with ADHD [4].

With regard to rhythmical physical activities, we would like to draw attention to nontraditional games such as Dance Dance Revolution (also known as Step Mania, etc.). These activities are movement or dancing games with strictly set rules. They require attentional focus, ability to perceive rhythm and pace and sensorimotor coordination when being exposed to acoustic-rhythmic and visual stimuli. This danc-

ing game has attracted attention due to combination of nontraditional computer games and movement, which has made it highly popular with children.

McGraw, Burdette, Chadwick [7] point to the parallel of the game to various neurofeedback-based computer programs, which are designed to affect attention of children with ADHD. According to authors, DDR can provide similar physiological benefits to those provided by special expert methods. They assume that rhythmical physical activity based on visual and acoustic stimuli can improve the activity of neuronal networks required for reading and attentional focus and performance improvement. The use of this activity has attracted our attention to such an extent that we decided to apply it in our study. The methods section contains detailed description of the game.

The purpose of the study was to provide further evidence on hyperkinetic behavior disorders: "Classroom behavior" (3rd section of the Vanderbilt Teacher Rating Scale) in the following domains: "following directions/rules, disrupting class, assignment completion, organizational skills and relationships with peers", in prepubertal integrated children through participation in Dance Dance Revolution – Step Mania at primary school.

Taking into account not only theoretical but also practical evidence related to correction of hyperkinetic disorders: "Classroom behavior" in the domains: "following rules/directions, disrupting class, assignment completion, organizational skills and relationships with peers", in prepubertal integrated children through participation in physical activities, we sought to answer the following research question:

Is it possible to correct behavior disorders in integrated children through engaging in physical activity Dance Dance Revolution – Step mania in the school setting?

METHODS

The study was supported by the grant project VEGA 1/0769/13 "The Effectiveness of Specific Physical Reeducation Procedures on the Correction of Hyperkinetic Disorders of Prepubertal Children." This study was conducted during the school year 2013/2014. The teacher sample consisted of 20 primary school teachers working at primary schools located in Kežmarok. The student sample consisted of 8 girls and 22 boys. Both teachers and children participated in the study on a voluntary and anonymous basis. The questionnaire response rate was 100 percent. Integrated primary school children aged 6 to 10 years old were selected randomly. Prior to participation, a written informed consent was obtained from children's parents. The data were collected under own supervision and after agreement with school principals and teachers of the respective subjects.

Vanderbilt ADHD Diagnostic Teacher Rating Scale (VADTRS) is a diagnostic tool used by teachers to identify children with ADHD. The advantage of the scale is that it is easy to understand and to administer and can be clearly scored. Psychometric properties of the scale used abroad are very good, the scale reliability ranges from $\alpha = 0.79$ for depression and anxiety to $\alpha = 0.91$ for symptoms [9]. To process collected data we compared relative frequencies.

The intervention was based on the use of Dance Dance Revolution (DDR), which is a musical and dancing gameplay designed by software design company Konami in Japan. For the purposes of the study, we used the software Step Mania, which is the most widely known PC version in Slovakia and at is at present distributed as a home version for PlayStations. Children participated in the gameplay during school breaks. For the purposes of the study, we chose 2 songs from the easiest level. These songs were offered to children in the same order. For the third and the fourth game, children were allowed to choose one of these two songs according to their liking. After installing the dance pad, children were briefly instructed about the principle of the game. Children had wireless earphones for listening to music and for selecting the volume.

RESULTS

In this study, boys and girls engaged in DDR during school breaks. We studied interest of prepubertal children in *participation in physical activities during breaks, the possibility of song selection, combination of computer games and movement, manipulation with Impact Dance Pad as well as original*

character of DDR. Opinions, knowledge and interest of prepubertal children in performing DDR are presented in Tables 1 and 2.

Compelling character, spontaneity and active rest are the main features of a movement game [6]. A positive finding was that 100% of boys considered DDR to be an original gameplay. A high percentage of boys (90.96%) expressed their positive attitude towards the domain "combining computer games and movement." The possibility of active participation in physical activities during school breaks was confirmed by 68.18% of boys. The lowest percentage, 36.36%, was observed for boys' opinion regarding "manipulation with Impact Dance Pad." (see **Table 1**). Despite providing children with brief instruction, boys probably did not pay enough attention to instructions.

All girls exhibited interest in playing DDR. This game attracted their attention and girls appreciated the original nature of this game. Identical interest, i.e. 75%, was found for "possibility of song selection" and "combining computer games and movement."

Similarly to boys, the lowest percentage of girls, 37.5%, was positive about participation in physical activities during school breaks in the domains "participation in physical activities during breaks" and "manipulation with Impact Dance Pad" (see **Table 2**).

Table 1. Opinions, knowledge and interest of boys in playing DDR

	Boys	
	n	%
Participation in physical activities during breaks	15	68.18
Possibility of song selection	10	45.45
Combining computer games and movement	20	90.96
Manipulation with Impact Dance Pad	8	36.36
Original character	22	100

Source: Chovanová (2014)

Note. n - sample size, % - percentage

Table 2. Opinions, knowledge and interest of girls in playing DDR

	Girls	
	n	%
Participation in physical activities during breaks	3	37.5
Possibility of song selection	6	75
Combining computer games and movement	6	75
Manipulation with Impact Dance Pad	3	37.5
Original character	8	100

Source: Chovanová (2014)

Note. n - sample size, % - percentage

The sample of boys and girls had positive attitude towards playing DDR. Children appreciated the original character of the gameplay. Boys were positive about "participation in physical activities during breaks" and "combining computer games and movement". Gender comparison showed differences for "possibility of song selection" and "manipulation with Impact Dance Pad." Children performed DDR during school breaks. There were no statistically differences for opinions and interest in performing DDR between boys and girls (see **Table 3**).

Using VADTRS, teachers rated social behavior of children in five domains: *relationships with peers, following directions/rules, disrupting class, assignment completion and organizational skills*. All subdomains in the scale "classroom behavior" were evaluated (see **Table 4**). The results of the study showed that according to teachers 83.3% children had problematic relationships with peers and 76.7% failed to respect teachers' directions/rules, which leads to disrupting during classes. The results showed that 43.3% children disrupted in class and 73.3% had difficulties completing assignments and using their organizational skills. Participation in DDR improved relationships with peers and following directions/rules. Overall, this physical activity had positive effect on children.

Table 3. Significance of preferences between genders

	Significance
Participation in physical activities during breaks	1.517
Possibility of song selection	1.434
Combining computer games and movement	1.134
Manipulation with Impact Dance Pad	0.057
Original character	0

Source: Chovanová (2014)

Table 4. Classroom behavior

Classroom behavior	Teachers' response on a 1 to 5 scale before DDR	Teachers' response on a 1 to 5 scale after DDR
Follows directions/rules	1excellent **0** 2 above average **0** 3 average **0** 4 sufficient **23 teachers (76.7%)** 5 insufficient **7 teachers (23.3%)**	1 excellent **0** 2 above average **0** 3 average **27 teachers (90%)** 4 sufficient **3 teachers (10%)** 5 insufficient **0**
Disrupting class	1 excellent **0** 2 above average **0** 3 average **17 teachers (56.7%)** 4 sufficient **13 teachers (43.3%)** 5 insufficient **0**	1 excellent **0** 2 above average **0** 3 average **20 teachers (66.7%)** 4 sufficient **10 teachers (33.3%)** 5 insufficient **0**
Assignment completion	1 excellent **0** 2 above average **0** 3 average **8 teachers (26.7%)** 4 sufficient **22 teachers (73.3%)** 5 insufficient **0**	1 excellent **0** 2 above average **0** 3 average **17 teachers (56.7 %)** 4 sufficient **13 teachers (43.3%)** 5 insufficient **0**
Organizational skills	1 excellent 2 above average 3 average **12 teachers (40%)** 4 sufficient **18 teachers (60%)** 5 insufficient	1 excellent **0** 2 above average **0** 3 average **16 teachers (53.3%)** 4 sufficient **14 teachers (46.7%)** 5 insufficient **0**
Relationships with peers	1 excellent **0** 2 above average **0** 3 average **25 teachers (83.3%)** 4 sufficient **5 teachers (16.7%)** 5 insufficient **0**	1 excellent **0** 2 above average **0** 3 average **27 teachers (90%)** 4 sufficient **3 teachers** (**10%)** 5 insufficient **0**

DISCUSSION AND CONCLUSIONS

Malá [5] reports that children with behavior disorders fail to respect other people, lack adequate self-control, exhibit informality inappropriate for their age, which results in overall rejection of these children in both home and school environment. This leads to frustration, which together with low tolerance to stress, results in showing off, negativism, and later in behavior disorders. The author assumes that such children are not emphatic, altruistic and are unable to control their responses to their environment.

The study findings provide further evidence on benefits of Dance Dance Revolution – Step Mania for integrated children diagnosed with behavior disorders and hyperactivity. The results showed that children were provided with educational stimuli through engaging in physical activity during school breaks. Increasing interest, effectiveness and esthetics of physical activities had positive effect on prepubertal integrated children, especially on their classroom behavior, which improved significantly. Integrated children diagnosed with disruptive behavior started "following directions/rules" and their "disrupting in class" decreased. Children improved in the domains "assignment completion", "organizational skills" and "relationships with peers." The study underlines the beneficial effects of movement on physical and mental health of children. This makes physical activity an irreplaceable part of our lives. Study findings have shown that rhythmical physical activity (based on visual and acoustic stimuli) has positive effect on children with hyperkinetic disorder.

RECOMMENDATIONS FOR PRACTICE

To correctly diagnose disorders of integrated children with ADHD in the school setting.

To establish a positive emotional contact and feeling of understanding between teachers and integrated children with ADHD in the school setting.

Expose children to a sufficient volume of new and interesting physical activities.

ACKNOWLEDGEMENTS

This study was supported by project VEGA 1/0769/13 "The Effectiveness of Specific Physical Reeducation Procedures on the Correction of Hyperkinetic Disorders of Prepubertal Children" conducted at the Faculty of Sports, University of Prešov in Prešov.

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LEVEL OF PHYSICAL ACTIVITY OF STUDENTS FROM "ANGEL KANCHEV" UNIVERSITY OF RUSE

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Key words: *physical activity levels, GPPAQ, students*

INTRODUCTION

Insufficient physical activity (PA) levels which increase the risk of chronic disease are reported by almost two-thirds of the population (Heron N et al., 2014). The positive impact of movement on man's health status, indisputably proven, is the reason about the great scientific interest directed to the study of the motive activity in between various age and social groups of the population.

In methodical literature on world scale, physical activity has been an object of study in 1205 scientific investigations as compared to the world data base PubMed since 1973 till now; 1073 of the publications (89%) have been written during the last ten years. The distribution of the number of publications is presented in **fig. 1**. Stable increase of the interest toward the theme is observed; 2014 data cover the month of August.

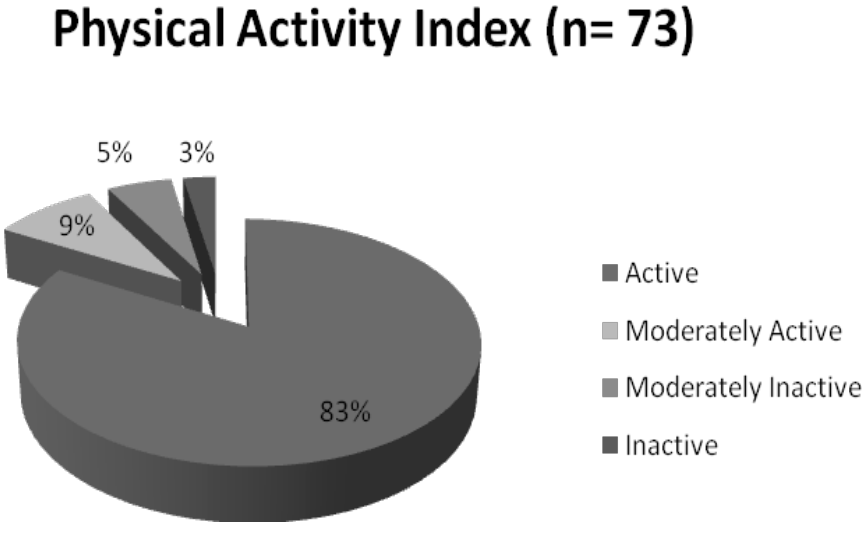

Fig.1. Number of publications 2004 – 2014 years

The insufficient research of the physical activity level for the various age groups in Bulgaria and the acknowledged importance of the motive activity for the general health status of the population caused our interest to the theme.

The aim of the study is to determine the level of physical activity of students from „Angel Kanchev" University of Ruse.

METHODOLOGY

The Contingent of the study is 73 students from „Angel Kanchev" University of Ruse, aged 19 to 25 years. Studied are 46 men and 27 women. The average age of the students under study is 20,7 years while respectively men's average age is 21,6 years and the women's is 19,3 years **[Table 1**].

The used research method is: The General Practice Physical Activity Questionnaire (GPPAQ). The GPPAQ is a validated screening tool that can be used to assess adult (16-74 years) physical activity levels. It gen-

erates a simple, 4-level Physical Activity Index (PAI) categorizing patients as: Active, Moderately Active, Moderately Inactive, and Inactive. The General Practice Physical Activity Questionnaire (GPPAQ) was commissioned by the Department of Health and developed by the London School of Hygiene and Tropical Medicine as a validated short measure of physical activity. It was developed to assist primary care trusts (PCTs) to meet the National Service Framework recommendations that "primary care teams assess and record the modifiable risk factors for each of their patients, including physical activity" (http://www.patient.co.uk).

Table 1. Characteristics of the contingent

	Number	Average age
Men	46	21,6
Women	27	19,3
Total	73	20,7

RESULTS

The level of the physical activity of the students under study from the "Angel Kanchev" University of Ruse is registered by a single fill in of the General Practice Physical Activity Questionnaire (GPPAQ) which was translated and printed. We have entered the results from the filled in questionnaire into the questionnaire internet page. The questionnaire aims at establishing the motive activity of the persons under study during the last week and cover questions like that:

During the last week, how many hours did you spend on each of the following activities?

- Physical exercise such as swimming, jogging, aerobics, football, tennis, gym workout, etc.
- Cycling (including cycling to work) and during leisure time.
- Walking (including walking to work), shopping, etc.
- Housework or childcare.
- Gardening or DIY.

The possible answers are: none, some but less than 1 hour; 1 hour but less than 3 hours; 3 hours or more.

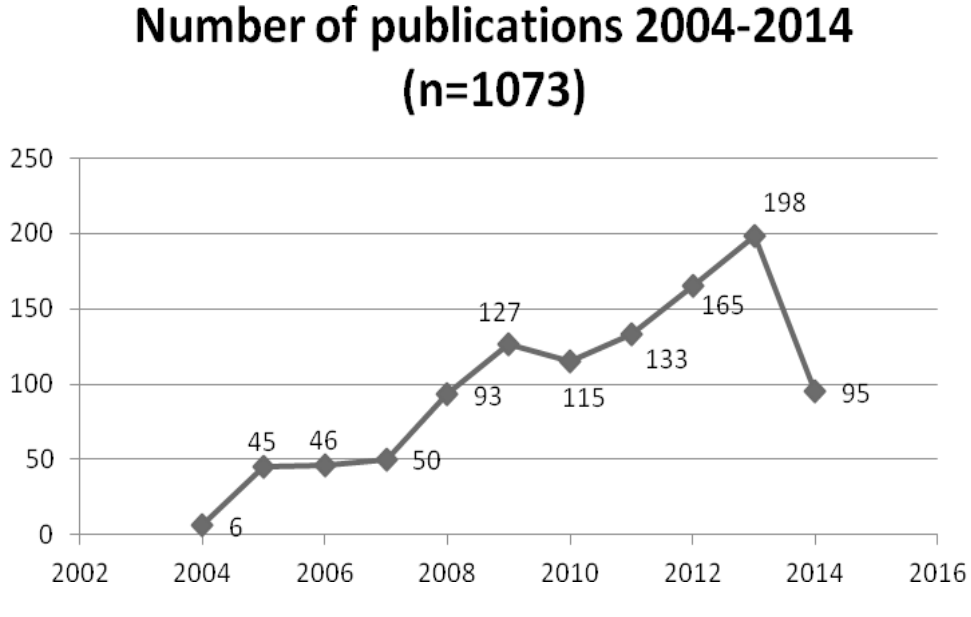

Fig. 2. Physical Activity Index

Another question in the questionnaire relates to a self evaluation of the habitual speed of walking, etc.

The generalized results are presented in **fig. 2.** The following results have been recorded for the contingent we have studied: active – 83%; moderately active – 8, 85%; moderately inactive – 5, 24%, inactive – 2,74%.

We have expected that the prevailing part of the students belong to the active category but we have been surprised by the fact that within that age group of young people there are, yet inconsiderable percentage, such people who belong to the inactive category. The availability of students in the category moderately active and moderately inactive is an indication of the need to propagandize the active way of living in between the young people. It is necessary to provide both accessible scientific information about the negative impact of the inactivity and provision of possibilities for practicing physical activity and sport by the young people.

DISCUSSION

The level of the physical activity in between the students is treated in the context of various issues in the world literature. Feng Q et al (2014), investigate the associations of physical activity with depression, anxiety and sleep quality. A total of 1106 freshmen (471 females and 635 males) aged 18.9±0.9 years were included in the study. The results show that high physical activity decreases the spread of depression and anxiety and increases the sleep quality of the students under study.

Lehmann F et al (2014) investigate BMI, physical inactivity, cigarette and alcohol consumption in female nursing students. The authors follow up the changes of the above mentioned indicators in a five years study. Investigations have been made in 2008 and in 2013. The results for the year 2013 are the following: 259 female nursing students completed the questionnaire in 2013. 31.6% of them were either overweight or obese, 28.5% exercised less than once a week, 42.9% smoked between 10 and 20 cigarettes a day and 72.6% drank alcohol, wherefrom 19.7% consumed alcohol in risky quantities. In comparison with the year 2008 the percentage of overweight and obese students and the percentage of alcohol consumers at risk increased significantly. The basic conclusion is that it is necessary to develop strategies for promoting the healthy way of life.

Kim J et al. (2013) have studied the impact of the physical activity on the bone density. Investigated are 111 medical men students. Height, weight, percent body fat and muscle mass were estimated by bioelectrical impedance, and bone mineral density (BMD) was obtained using calcaneal quantitative ultrasound. The results reported that the height and current physical activity showed a correlation to the Osteoporosis Index.

Rao CR et al (2012) study the physical activity of medical students. The half of the 240 students have actively participated in sports activities. The greater part of them was with normal BMI - 165 (69%); (51) 21% were overweight, while 7 (3%) were obese. The correlation between active in sport girls and boys is 62% v/s 38% in favor of the boys. The rest of them have pointed out the following reasons for being inactive in sport: lack of time 46 (60.5%), laziness (61.8%), and exhaustion from academic activities (42%). The conclusion made by the authors is again related to the need of promoting the active way of life between the students.

The literature we have studied and the investigation we have made give us the reason to think that although there is a tendency for promoting the active way of life, additional efforts are needed in that aspect. According to us, on one side it is necessary to hold lectures related to explaining the negative impact of the inactivity and its etiological relation with a range of diseases of high medical and social importance as some metabolism problems and cardiovascular diseases. On the other side, it is necessary to propagandize the active participation of the students both in their physical education and sport lessons and non formal sports activities organized in the university.

CONCLUSIONS

The GPPAQ is an easy and useful method for assessment of physical activity levels for adults. According to the method, most of the surveyed are classified as active. The proved positive impact of the physical

activity on man's health state imposes the popularization of the active way of life between the young generations.

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A COMPARISON OF ATTITUDES TOWARD PHYSICAL ACTIVITY BETWEEN FUTURE PRIMARY SCHOOL TEACHERS AND FUTURE PRESCHOOL TEACHERS

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Key words: *Attitudes, Semantic differential, Students, Primary school teacher, Preschool teacher*

INDRODUCTION

Attitudes are judgments and they determine one`s behavior. Attitudes are formed by, affect how we feel, what we do, how we think, and can be changed as a function of experience [10]. Attitudes unlike other dispositions are not innate, but they are acquired during the development of the individual and is always attached to an object, person or event. Attitudes are complex, containing three components; cognitive, affective (emotional) and behavioral [15, 22]. They are formed through experiences in life-long process of socialization, either in direct contact with the object position or through the interaction with environment. As they are acquired they can be changed under influence of various factors. Factors that influence the formation of attitude, also influence on personality development and socialization of individuals, which at the same time partly consists of the formation of attitudes. Stott (1974.) explained that the attitudes and prejudices develop like other aspects of human development through individual interactions and interactions with the environment. Children form attitudes in early childhood, gradually acquiring categories, attitudes and prejudices under the influence of the important people in their life [6, 19, 23]. Zajonc (1968.) has pointed out that for improving the attitude towards the object it is sufficient to expose itself without intervention. However, Perlman & Oskamp (1971.) stated that the effect of the improvement in attitude is only possible if it is neutral or positive. The affective component is a central aspect of each attitude because it is closely linked to with the evaluation of the object`s position for which are necessary some of the elements of cognition. If the object`s position is perceived as pleasant and appealing, it creates a positive emotional relationship, but if the object`s position is seen as repulsive or uncomfortable, a negative emotional relationship will form. Based on these components person locates the object position on the continuum of positive-negative.

Attitudes are hypothetical constructs and cannot be directly measured, but we can conclude about them indirectly, based on verbal statements of the respondents. Attitudes are commonly measured with self-assessment methods; Likert-type scale, semantic differential scale and Thurston type scale. Semantic differential is a type of assessment scale designed to measure the connotative meaning of objects, events, or concepts or emotional components of attitudes. Connotations are used in order to direct attitude to a given object, event or concept. Today it is one of the most widely used scale for measuring attitudes. The semantic differential measures people's reactions to stimulus words and concepts in terms of ratings on bipolar scales defined with contrasting adjectives at each end. It can be used to describe not only persons, but also the connotative meaning of abstract concepts - a capacity used extensively in effect control theory. The method is easy to administrate and practical, sensitive to small differences in attitude, highly versatile, reliable and generally valid [5]. Today it is widely used scale for measurement of attitudes, one of the reasons why is the versatility of the items. The bipolar adjective pairs can be used for a wide variety of subjects.

Physical activity is defined as any body movement that is derived by activation of skeletal muscle, and resulting with production of energy [3]. According to WHO (1946.) physical activity includes all movements, including movement in everyday life, work, recreation and sports activities, and is categorized according to the level of intensity from low through moderate to severe, or high intensity [16]. The positive effects of physical activity are well known, so for the wellbeing of children it is necessary to promote and undertake actions to form attitudes that support physical activity and healthy lifestyle through the lifespan [8, 11, 17]. Benefits for children are in these domains: emotional wellbeing, health, mental health, social skills, learning and productivity, positive school environment and reduction in anti- social behavior. Appropriate practice of physical activity assists young people to: develop healthy musculoskeletal tissues (i.e. bones, muscles and joints); develop a healthy cardiovascular system (i.e. heart and lungs); develop neuromuscular awareness (i.e. coordination and movement control); maintain a healthy body weight. Physical activity has also been associated with psychological benefits in young people by improving their control over symptoms of anxiety and depression. Similarly, participation in physical activity can assist in the social development of young people by providing opportunities for self-expression, building self-confidence, social interaction and integration. It has also been suggested that physically active young people more readily adopt other healthy behaviors (e.g. avoidance of tobacco, alcohol and drug use) and demonstrate higher academic performance at school. However, according to the definition of health [25], it is defined not only as the absence of disease but also as a state of complete physical, mental and social well-being. Evidence of association of physical activity with psychological health generally indicate that regular engagement in physical activity is associated with a greater sense of wellbeing, especially with a better mood [7], and reducing stress [7, 9]. Stephens et al. (1985.) suggest that the level of physical activity is significantly declining in the period between adolescence and adulthood, and the students` age is the transition period between adolescence and adulthood, which has been recognized as crucial for the adoption and retention of habits to physical exercise. Inactivity in childhood and adolescence gradually undermines the health of the individual, and significantly more severe consequences are present in the middle and old age.

Students who are studying to work with children have a great responsibility for young generations. Their attitudes are very important because children see them as role models and copy their behavior. They become very important persons beside family members and peers, so they have a significant influence on children. Primary school teachers should develop and foster the appropriate skills and social abilities to enable the optimum development of children, according to their age, ability and aptitude. They should also link pupils' knowledge to earlier learning and develop ways to encourage it further, and challenge and inspire pupils to help them deepen their knowledge and understanding. For a child, successful preschool and school experience is very much depending on quality of their teachers. Preschool teachers are responsible for the educational and social development of children between the ages of 3 and 5, and primary school teachers from age 6 to 14 years.

Aim and Hypothesis

The aim was to investigate future primary school teacher's and future preschool teacher's attitudes toward physical activity. Participants will show neutral attitudes toward the physical activity.

METHODS

Participants were students at Teacher`s Faculty in Zagreb. There was 101 participant; 56 (55%) future primary school teachers and 45 (45%) future preschool teachers. Participants were all female, average age of participants was 21 years. Attitudes of both groups of participants were anonymously investigated.

For assessing emotional component of attitudes the Osgood semantic differential scale was designed [14]. Seven point semantic differential scales were constructed to detect the connotative meaning of the concept of physical activity. Future primary and preschool teachers were asked to choose where it`s position lies between nine pairs of bipolar adjectives.

Data were analyzed revealing information on three basic attitude dimensions [14]: evaluation (good-

bad, happy- sad, safe- dangerous), potency (big- small, strong- weak, smooth- rough) and activity (warm- cold, fast- slow, easy- hard). Evaluation factor indicates whether respondent thinks positively or negatively about the object. Potency factor indicates how respondent perceives the power of the object. Activity factor indicates weather the object is active or passive. In constructing semantic differential scales we used three pairs of bipolar adjectives for each of the factors were used (**Table 1.**). To guard against possible bias responds toward a particular result we changed the polarity of some adjectives, which was reversed later in analysis. On the semantic differential scale we did not mark the values because we did not want respondents to know which more desirable answers are. When entering date the values had been added, from left to right 3,2,1,0,-1, -2,-3.

Table 1. Bipolar adjectives

ADJECTIVES	FACTOR
GOOD-BAD	ASSESMENT
WARM-COLD	
BIG-SMALL	
STRONG-WEAK	POWER
SAFE-DANGEROUS	
SMOOTH-ROUGH	
FAST-SLOW	ACTIVITY
HAPPY-SAD	
EASY-HARD	

RESULTS AND DISCUSSION

Results show that there are no negative attitudes only positive and three neutral (**Table 2. and Fig. 1**). There are some differences between the future primary school teachers and future preschool teachers but they are small and not statistically significant. The evaluation factor indicates that future preschool teachers and future primary school teachers have the same attitude toward the physical activity. It is the most positive factor, so we can conclude that participants know and value physical activity and it`s benefits. Attitudes are positive but they can be even more positive under an influence of appropriate intervention. The awareness can be raised through information and personal experience.

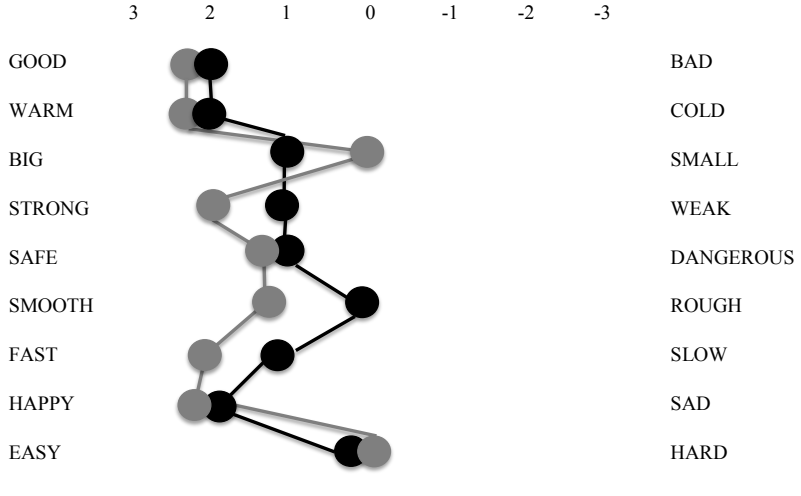

Fig. 1. Comparison of results/ median of future primary school teachers and future preschool teachers

Legend: Future primary school teachers- black, Future preschool teachers- grey

Table 2. Descriptive data

	FUTURE PRIMARY SCHOOL TEACHERS			FUTURE PRESCHOOL TEACHERS		
	M	Med	SD	M	Med	SD
GOOD-BAD	1,86	2	1,43	1,96	2	1,19
WARM-COLD	1,91	2	1,27	1,47	2	1,27
BIG-SMALL	0,86	1	1,49	0,84	0	1,55
STRONG-WEAK	1,07	1	1,19	1,71	2	1,38
SAFE-DANGEROUS	1,09	1	1,62	1,00	1	1,43
SMOOTH-ROUGH	0,52	0	1,29	0,69	1	1,35
FAST-SLOW	0,98	1	1,39	1,51	2	1,34
HAPPY-SAD	1,55	2	1,55	1,87	2	1,46
EASY-HARD	-0,04	0	1,57	-0,07	0	1,68

The potency factor revealed that there are some small differences between future preschool teachers and future primary school teachers in all three bipolar pairs of adjectives. This factor has neutral attitudes in both groups. Future primary school teachers could improve in area of performing physical activity, and future preschool teachers could improve in the area of importance of physical activity. The activity factor also reveals no negative but some neutral attitudes for both groups. It indicates that both groups can improve when it comes to applying physical activity, is it easy or hard with direct experience.

Vračan et al. (2009.) concluded that students are obviously informed about the benefits of physical activity because 94% considers physical activity to be very important but 56% of them are not included in any form of physical activity besides “Physical and health culture” class on college. According to Vračan et al. (2009.) for students from Croatia, the main source for practicing physical activity on college during the “Physical and health culture” class. According to Croatian studies 66% of students attending University of Zagreb do not participate in any physical activity, and 2% is active in professional sports [4]. According to results of a study conducted in Split, there are 53,6% of male students and 20,3% of female students who participate in physical activity [1]. In comparison, students from Zagreb participate less in physical activity then students from Split. A study was conducted with students from Teacher Faculty University of Zagreb [13], and it shows that 44,5% of students engage in physical activity during their leisure time (walking, running, hiking, bicycling, aerobic, fitness, football, basketball, etc.). These results are compatible with the results for University of Zagreb [4], and they are lower than results from University of Split [1]. Croatian results are congruent to other authors [12, 17, 2] which show that in USA and Australia less than 50% of students engage in physical activity.

When we sum earlier studies with our, we can say that our results are very good because they show no negative attitudes toward physical activity, only positive and neutral which can be enhanced. It is a long way from an attitude to performance. We see from previous studies that around 40% [13] of students act according to their attitudes. For future preschool teachers and future primary school teachers, it is important they have a positive attitude towards physical activity that they can transfer through their work to children. In the case they themselves do not practice regular physical activity, they cannot be a role model that children will imitate, but nevertheless they may encourage kids and be a role model in terms of education and information about the importance of physical activity.

CONCLUSION

Results indicate that there is same space for improvement and intervention, particularly in attitudes which are neutral. Attitudes can become more positive under the influence of personal experience, so future teachers can be informed and thought how to address those areas in appropriate manner. Awareness and information level can be raised with further education of the future teacher population. Future primary school teachers and future preschool teacher have a big responsibility because their

occupation includes that they are role models for children, and their attitudes and behavior is being observed and adopted by children they teach.

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INVESTIGATION OF THE RELATIONSHIP OF PARENTS FOR EDUCATIONAL NEEDS OF CHILDREN WITH SEN

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***Keywords**: SEN , child, family, school, teacher.*

The birth of a disabled child in the family changes completely the relationship between the parents on one hand and between them and all other social factors. The first reactions of parents invariably associates with recriminations associated with emotions and debates of different nature.

The relationship of the parents, and the broader social attitude towards disabled children vary in different areas. The level of involvement of the parents in the processes of growth, development and education of these children may also vary. This largely influents then proper cognitive and emotional personality formation biosocial children according to their potential, and the choice of efficient methods for the overall impact for the purpose of successful correctional education and work.

Participation of the parents in all processes of formation and development of children with disabilities in Bulgaria is extremely topical and in no small part a discussion issue.

The high pace of economical growth, the complication of the production process, the fast growth of the population, the deterioration of the economical system and the associated unfavorable impact over the life and actions of humans, contribute to the increased number of people with different disabilities.

Statistics from WHO show that in 1970 only about 10% of the world population were considered handicapped. Today according to the "World report on disabilities" 2012, made according to the number of population in 2010= an increase in the volume of people with disabilities is shown – 15% of the population or around 1 billion people.

In the different countries, the attitude towards people with SEN (Special Educational needs) is an indicator for the development of the social conscience. Nowadays the national politics for people with disabilities is related mainly to delivering the minimal social aid for such people.

The integration of people with SEN in the society is possible if the social conscience, the conditions connected to the work of national institutes, work on all levels of providing an independent life.

This implies provision of real possibilities for participating in all sorts and form of social life, including CRF and sports, on the same level as the rest of the members of society.

One of the most important institutions in the society, connected to the development of the human personality and which could not be replaced by any other institution, is the family. The family is a key factor which creates a constant impact over all phases of development of people. The gaps in communication in the family contribute to the inadequate entry into the system of social relationships.

The participation of parents in all the processes of forming and development of the children with disabilities is a very relevant issue. In this connection, a big attention is required for the topic of increasing the level of awareness of parents on the issues of adaptation of the children with SEN in school.

***Purpose of the investigation**:* to show the attitude of parents to the educational needs of children with SEN in connection to their integration in common schools

In connection to the purpose of the investigation, there are the following tasks:

1. Theoretical statement of the issue.
2. Creation and application of a survey
3. Analysis of the results and output patterns

Contingent of the investigation: 70 parents of children with SEN in Sofia

Methodology of the investigation

The current investigation has been concluded in 2013.

A survey has been developed, including 10 questions, each of which could be responded with only 1 answer. The received information has been processed with IBM SPSS Statistics 19 by applying a frequency analysis (one-dimensional distribution of the frequencies).

ANALYSIS OF THE RESULTS:

The viewpoints of the teachers, specialists and parents, differ. There is on agreement on solving the presented issues. Each of the sides is ready to help, however the expectations of each side differ. The teachers in initial education spend most of the day with the children. This makes their view different from the one of the parents. In the same time the teachers are presented with the dilemma of integrating the different children as their measures and goals are pushing them. This applies to the cases in which the parents refuse to acknowledge the existing problem with their children. Things are a lot more clear when there is a document for the illness of the child – then the rules, possibilities and expectations change. The ensurance of proper conditions for sick children should be gradual and we should not forget that the existence of such a document allows this to happen in a form much more proper for the child. In these cases an individual program is being developed, allowing the opportunity for gaining knowledge with a speed appropriate for the child. The issue is when there is no document for the child – this makes the application of adequate measures hard and in the same time the parent even if inclined to diagnosing the child, does not accept instructions, but requires "special" attitude towards their child. In reality the educational system is presented with a set of obstacles of different character: some disruptions get diagnosed hard and at a late stage because of unclear clinical picture, the delaying of consulting a specialist, the lack of attention towards the issue; a lot of the children have not attended kindergartens which is why the issue is not known; because of the specifics of the activities in the kindergartens; specialized help is given mainly in the school and it is hard to happen in the kindergarten – which would be of help for the teachers in the elementary schools.

The survey that has been conducted showed that a big part of the parents do not have enough information on the nature of the disruption of their child as well as a view on what are the possibilities for development. The role of the teacher to motivate the parents to cooperate in the execution of an educational program in such cases is key. The teacher of physical education and sports should posses a creative spirit to be able to apply new methods and experiment with new approaches. This is the path of adapting children with SEN in the society.

According to the survey parents do not communicate enough with their children. There are activities which could be done together with the parents in an initial phase. In this way all parents would be integrated to the issues of children with SEN. It is clear that there is a need of a lot more work for achieving this goal.

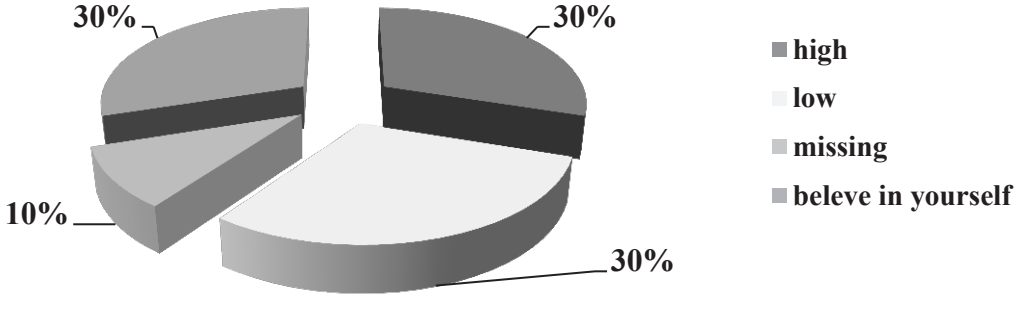

Fig. 1. Responses to the question: On what level is the relationship between you and the teacher?

The answers of question 7 "On what level is the relationship between you and the teacher" are not surprising: I trust only myself. This is a protective reaction of the parents which is not being understood by some of the teachers. The requirements of the parents, the difference of their children is an issue which should be expressed out loud and with a positive approach on both sides. Partnering with parents and the evaluation of the parents capabilities is part of the work of the teachers. There are always good results if the parents are engaged to work together with the teachers. An important approach towards the parents is honesty, periodical reviews and surveys with them, informal discussions. Creating schools for parents is a great way of all groups being engaged: sick and healthy children, friends, specialists.

Another question in the survey is 8. "Where do children with SEN belong". The prevailing opinion is that such children should be in the common schools, not in a separate class. The majority of the parents of children with disabilities want their children to be integrated to the others. Is this possible and achievable?

The lack of trust towards the teacher, the negligence of the difference, the will to integrate by all means, is a wrong approach. The creation of an individual approach for each child requires knowledge from the teacher, the parents – of "normal" children and sick ones.

On the other side, the teacher is the architect of the environment: they work with the child, with the family and the rest of the parents of children in the class, they delegate responsibilities for finding information, acquiring skills from the parents for education at home. From another side teachers are facing the issue of acknowledging that their children need special education as well as the lack of tolerance from the others.

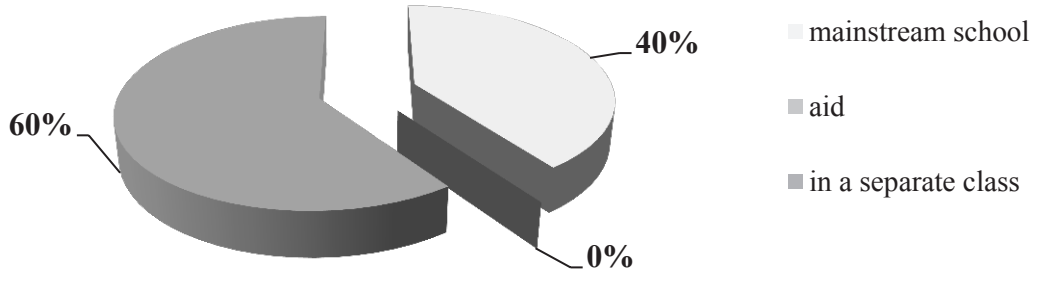

Fig. 2. Response to the question: If suggested by the teacher, will you visit a specialist for diagnosing SEN?

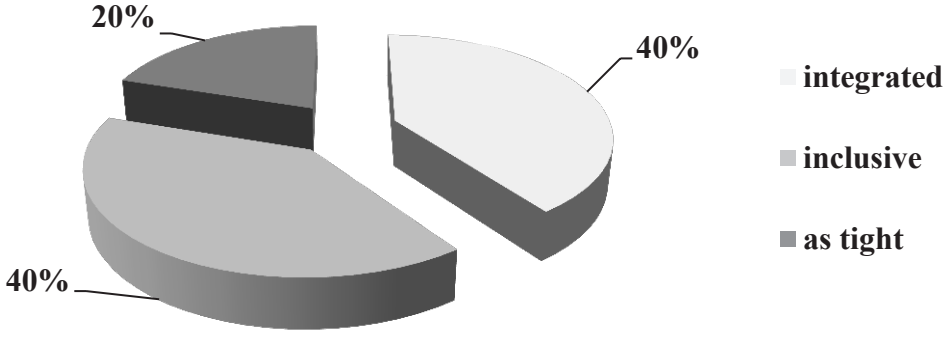

Fig. 3. Responses to the question: "Where do children with SEN belong?"

The parents are divided in half percentage-wise on question 9: "should the education of children with SEN be integrated or inclusive". This is most probably connected to the lack of knowledge on the specific of working with such children. The opinion of the specialists is that the integration of children with disabilities is hard to complete. One of the main issues in the integration of such children is the evaluation of their achievements and motivation as well as the lack of special program for working with them.

CONCLUSION:

1. Parents do not have realistic information on the condition of their child
2. Half of the surveyed families have conditions, material and spiritual, for proper development of their children
3. Only some of the parents work with their children at home after school hours
4. Parents mostly act intuitively and do not have the right methods and means of work
5. Only some of the parents of children with SEN have the will to be informed from the specialists on the right approaches of working with their child
6. The diagnoses of the pupils are incomplete
7. The relationship between teachers and parents in the work with children with SEN is normatively ensured – according to the situation, according to the moment, according to the conditions in school, according to the conditions at home, according to the conditions in the society.

ACCORDING TO THE RESULTS OF THE SURVEY, WE CAN MAKE THE FOLLOWING CONCLUSIONS:

1. The re-socialization of children with SEN at school will be effective if:
   - ✓ There is a completely built system for preventive and correctional-educational activity
   - ✓ There is a favourable micro environment, stimulating positive changes in children
   - ✓ The forms, methods and approaches for educational communication with children, especially in the classes for physical education, are properly selected.

2. The activities and physical exercises and outdoor sports in a pool are an effective means of prophylactics and correction of the disruptions. Studies in this area show increase in both intellectual and physical possibilities. As a result to these activities children manage to form (to a certain extent) independence in the process of education.

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INDICATORS OF KINANTROPHOLOGIC CHARACTERISTICS IN STUDENTS WITH COCHLEAR IMPLANTS IN INDIVIDUALIZED PE CLASS PROGRAM CREATION

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Key words: *PE class, pupils with cochlear implants, anthropologic characteristics*

INTRODUCTION

The first cochlear implant in the Republic of Croatia (RH) was installed in 1996, and approximately 500 implants have been installed up to date. According to some surveys, approximately 16 children annually require a cochlear implant [10]. Therefore, it can be concluded that there are currently about 350 children witch CI, or 12.5 classes with 28 students, in Croatian schools.

The study of motor development in children and pupils with hearing impairment is important for several reasons. Parizkova (1996) claims that motor development has a crucial role in the development of intellectual abilities during the first two years of life, whereas motorically more capable children more easily acquire information from the environment that surrounds them. Furthermore, Bushnell and Boudreau (1993) point out that some motor skills may necessitate the development or improvement of other skills, such as perceptual or cognitive at early stages of development. However, an important requirement for quality motor development, in regard to the development of motor abilities and skills, is postural control and balance, which serve as fundamental conditions for successful performance of other everyday motor movements [13]. It is certain that well-developed hearing and vestibular apparatus in particular, are necessary for the stability of body and control of gravitational forces in motion. Some studies have indicated that hearing loss can have an impact on the development of balance and other motor abilities [5,7], and this is particularly noticeable in children and adolescents who, in addition to hearing impairment, have some form of damage to the vestibular apparatus [2, 20]. Through application of various instruments (M-BAC, BOT2, TGMD, Eurofit), researchers have detected differences mostly in balance [4,6], repetitive strength and flexibility [21], but also in fine and gross motor skills [17]. Children with hearing impairments frequently achieve below-average results from reference standards in test batteries [8, 19, 23].

However, few researchers have explored the differences in the development of motoric skills and abilities in children with hearing impairment with and without a cochlear implant. Generally, studies indicate that children with early cochlear implantation have an improved level of motor skills development [14, 16, 22].

In PE classes students with CI participate in regular educational program with some specific methodological adjustments. It has not been established whether there are any specifics in this population in work programming regarding the level of development of kinanthropologic features. The aim of this study is to determine the level of motoric abilities of children with cochlear implantation as compared to the reference values of Bruininks-Oseretsky Test of Motor Proficiency

METHODOLOGY

Sample:

The study was conducted on a sample of 15 subjects (5 males and 10 females) aged 6-19 years, with hearing disability and a cochlear implant. All participants attend the regular educational program in educational institutions in Croatia. The parents of each subject gave written consent for research which was approved by all of the relevant institutions in the Republic of Croatia.

Sample of variables:

The assessment of motoric abilities and skills was carried out by using second edition of Bruininks-Oseretsky Test of Motor Proficiency, which consists of eight subtests for the assessment of fine and gross motor skills.

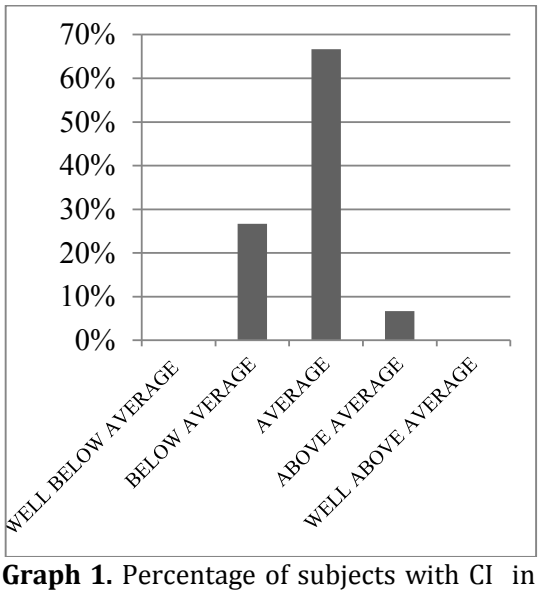
The data was collected during 2014, with help of two experienced teachers of PE, who carried out tests with each subject individually.

Methods of data processing:

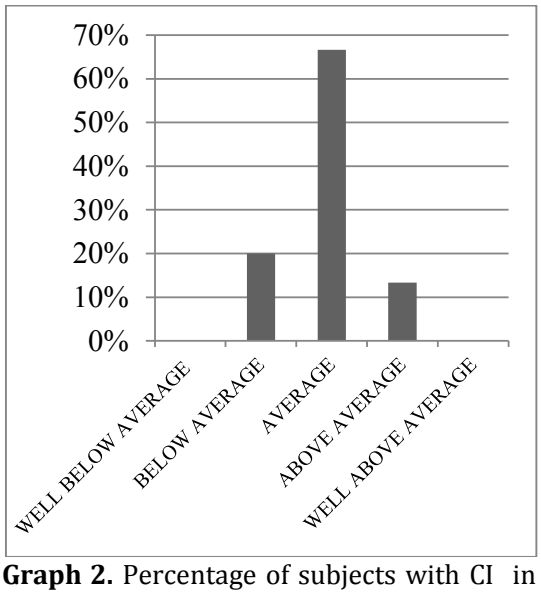
Raw results were obtained for each subject using statistical software BOT-2 ASSIST version 1.0. The results were transformed into point scores on the basis of which the respondents were ranked into five descriptive categories (well below average, below average, average, above average, well above average). The percentages of respondents in individual descriptive categories for each subset of the measuring instrument were calculated based on the obtained results.

RESULTS

The results (**Figure 1-9**) indicate that subjects with hearing impairment and with an integrated CI unit mostly achieve average scores in all subtests as well as in the total score, but do not achieve well above average scores in any subtests, whereas a very small number of subjects achieve above average results. It can also be observed that a very high percentage of subjects achieve below average results in all subtests, and well below average results appear mainly in the subtests for the assessment of gross motor abilities. The most prominent is how a high percentage of subjects with CI achieve below average and well below average results in upper limb coordination, bilateral coordination and balance subtests. The results show that 40% of subjects score below average and well below average results in upper limb coordination tests and bilateral coordination tests, and 53% of the subjects achieve below average and well below average results in balance tests, which is the only subtest where the number of below average results is larger than the number of average and above average results combined.



Graph 1. Percentage of subjects with CI in descriptive categories BOT2 in Fine motor precision subtest

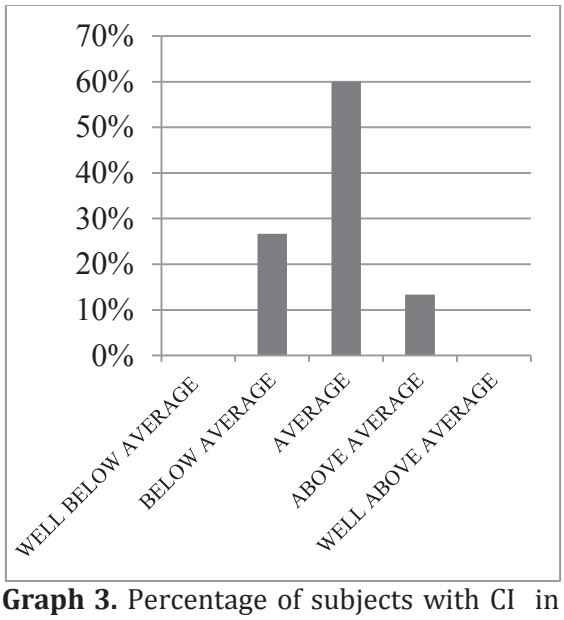


Graph 2. Percentage of subjects with CI in descriptive categories BOT2 in Fine motor integration subtest

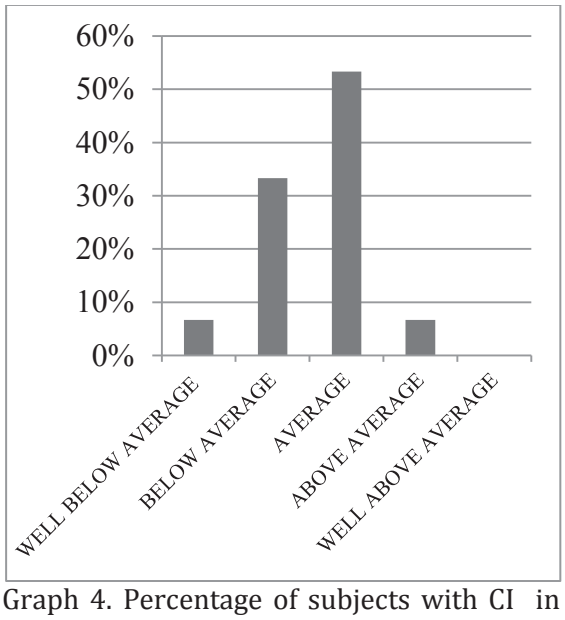
DISCUSSION AND CONCLUSION

Numerous studies that have dealt with motor skills of children with hearing impairment without a CI indicated that the children with impaired hearing show suboptimal levels of motor skills, especially in balance [4, 5, 8, 12, 15, 17, 19, 21, 23]. Studies on children with hearing impairment with a CI are somewhat rare, and the results obtained from these studies are quite contradictory and mainly relate to balance [3, 6, 18, 20]. Cushing et al. (2008) has noted a difference in motor abilities depending whether CI

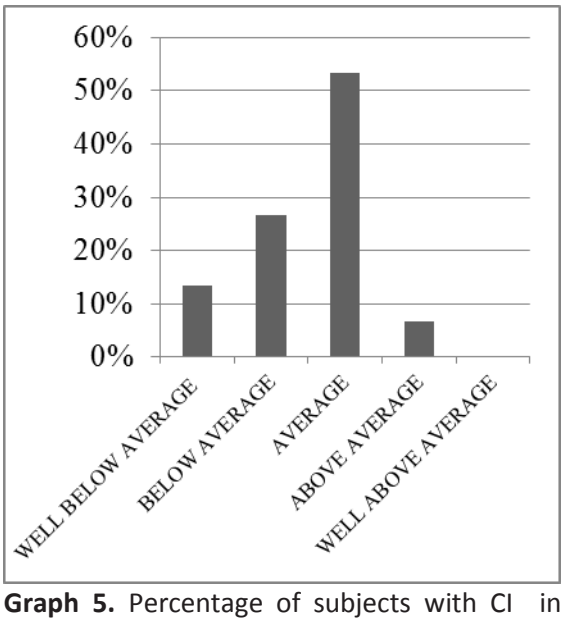
was turned on or off, where children with their CI turned on achieved better results, whereas the rest of the researchers observed no differences in motor skills between children with or without CI [6, 18, 20]. Unambiguous results have been obtained only when comparing children with CI and children without hearing disability, where children with CI achieved significantly inferior results [3, 6, 18, 20].



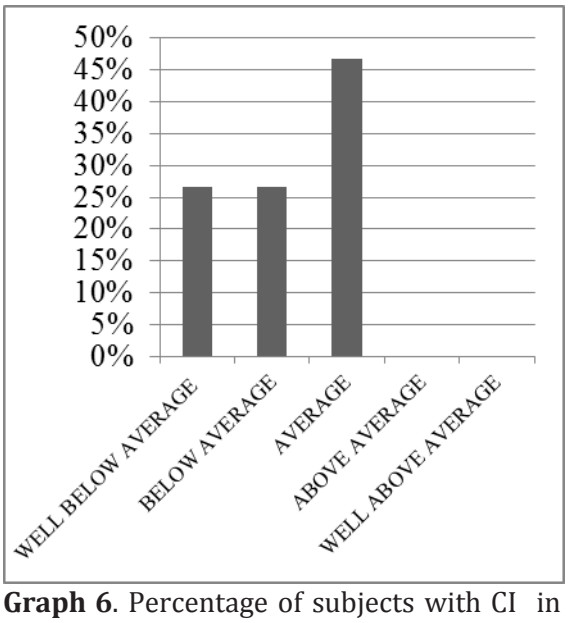
Graph 3. Percentage of subjects with CI in descriptive categories BOT2 in Manual dexterity subtest



Graph 4. Percentage of subjects with CI in descriptive categories BOT2 in Upper limb coordination subtest



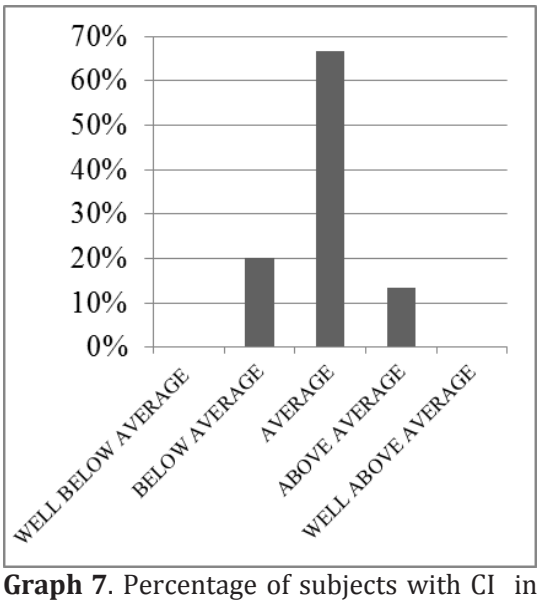
Graph 5. Percentage of subjects with CI in descriptive categories BOT2 in Bilateral coordination subtest



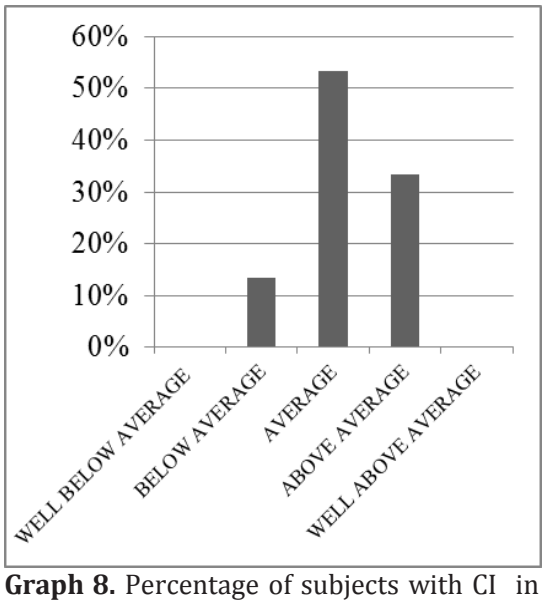
Graph 6. Percentage of subjects with CI in descriptive categories BOT2 in Balance subtest

Balance disorders in people with hearing impairment and a CI were observed by several researchers and assert the findings of this study, namely, they confirm the high percentage of subjects with below average and well below average results as observed in this study. Gheysen, Loots & Van Waelvelde (2008), using Movement Assesment Battery for Children (M - ABC), One – Leg Standing Test and Korperkoordinationstest für Kinder (KTK - Test) on a sample of subjects aged 4-12 years has found out that the subjects with hearing impairment and a CI achieve significantly worse results than respondents without hearing disabilities in all dynamic and static balance tests. Similar results have been noted by Cushing et al. (2008) using BOT2 battery of tests, and Jernice, Nonis, and Yi (2011) and Suarez, Angela, Suarez, Rosales, Carrer & Alonso (2007) using a Force Plate platform.

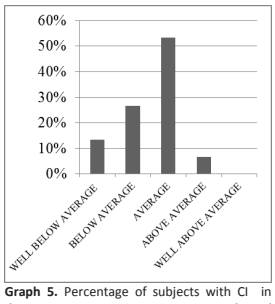
Furthermore, the studies of motor skills in children with hearing impairment and a CI have found that such children score significantly worse results than children with normal hearing in fine and gross motor skills tests. Shall (2010) and Gheysen, Loots & Van Waelvelde (2008), using a M-ABC battery of tests noted that subjects with CI are inclined to worse results in tests of manual dexterity and ball skills. A large percentage of respondents who scored below average and well below average results in the individual subtests suggests that the subjects with CI have less developed motor skills.



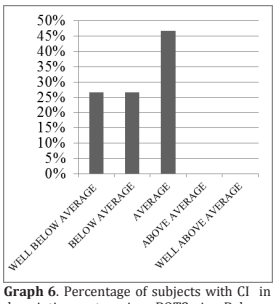
Graph 7. Percentage of subjects with CI in descriptive categories BOT2 in Running, speed and agility subtest



Graph 8. Percentage of subjects with CI in descriptive categories BOT2 in Strenght subtest



Graph 5. Percentage of subjects with CI in descriptive categories BOT2 in Bilateral coordination subtest



Graph 6. Percentage of subjects with CI in descriptive categories BOT2 in Balance subtest

The aim of this study was to determine the level of motor abilities and skills in children with cochlear implants who participate in regular educational system in the Republic of Croatia. The results indicate negative deviations in results for children with CI as compared to the reference values of Bruinkins-Oseretsky test in certain motor skills, especially balance and manual dexterity. Since hearing-impaired children with CI have the possibility of integration into regular education system, these deviations suggest that certain modifications in PE classes are necessary. The use of custom methods and adequate

kinesiological operators is required in order to encourage the quality development of degraded motor skills in children with hearing impairment.

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METHODOLOGICAL DIFFICULTIES IN PHYSICAL EDUCATION CLASSES IN PUPILS WITH SPECIAL EDUCATIONAL NEEDS

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Keywords: physical education class, pupils with special educational needs, methodological difficulties

INTRODUCTION

In physical education classes motoric impairments reflected through movement problems, perceptual motion disorders or chronic illnesses often have a great impact on educational achievements. It is extremely important to identify children with chronic illnesses and disabilities in motoric development and to detect the problems faced by teachers working with such children in physical education classes.

In Croatian educational system every pupil who has difficulties in learning or adopting the subject matter is considered to be a pupil with special educational needs. Under this standard, students are divided into categories depending on the type of damage that is causing special needs.

As a part of elementary education system there exist curricula for education of students with disabilities in regular schools. There are also instructions for design of customized programs which are based on regular programs and prepared by teachers directly involved in educational work with disabled children. These programs are developed at the beginning of each school year for each child with disabilities individually, and for every educational content which has been found to require adjustment (Ljubić 1999, according to OECD, 2007).

According to the Ministry of Science, Education and Sports (MZOS) in the Republic of Croatia (RH) there are 897 educational institutions (regular schools) and about 1,270 school districts on mandatory educational level. There are 23 schools which have special classes for children with disabilities, and 17 special educational institutions for children with disabilities. According to the available data on children and pupils with educational disabilities in Croatia provided by the MZOS, primary education included about 7,800 school children with disabilities integrated into regular classes and 3,936 pupils enrolled into special programs (MZOS, 2013).

Teachers working with children with special educational needs face numerous difficulties and limitations, especially in terms of organization and selection of methods and contents for the implementation in the teaching process. Studies by Hodge et al. (2004) indicate that the teachers have positive attitudes about inclusion of people with special educational needs in physical and health educational classes, as well as different strategies for success when integrating such pupils into class, but also signal problems they face with the conduct of such classes.

However, despite tendencies for inclusion of children with special educational needs into regular classes, teachers do not feel adequately trained and believe that they do not have sufficient expertise for conducting such classes. The study conducted by Haycook and Smith (2011) has shown that teachers were more likely to use extracurricular forms of work to provide children with special educational needs with facilities and kinesiological operators appropriate to their abilities and needs, and thus do not separate them from other children during regular teaching process.

The educational system is required to identify children with special educational needs, including children with disabilities in motor development, and detect the problems faced by teachers working with such children. Prompt identification, quality educational work and positive attitude of teachers towards solving the difficulties faced in the teaching process are the key to overall work with children with special educational needs.

Therefore, the aim of the study was to use a questionnaire in order to analyze the difficulties faced by teachers when selecting teaching and learning methods and exercise methods in the field of physical education. The results should have a direct practical application through identification of developmental disorders and difficulties in the class implementation. Based on the acquired data we could find optimal solutions and organizational forms of work which would positively contribute to child development by quality formulating and programming of physical education classes.

METHODOLOGY

Sample

Methodological difficulties faced by teachers working with students with physical disabilities and chronic illnesses were tested using a method of constructed questionnaire on a random sample of 50 female teachers and two male teachers from across the Republic of Croatia. The range of service for teachers who participated in the study ranged from 11 months to 33 years. Type of study completed by the teachers involved in the research are represented in **Table 1**.

Table 1. Type of study completed by the teachers involved in the research

Type of study completed:	**n**	**%**
undergraduate	3	6
graduate	25	48
integrated undergraduate and graduate	19	37
expert	2	4
specialist graduate	1	2
other	2	4

Sample of variables

The survey was conducted through a questionnaire designed in two parts - general and specific. The general part of the questionnaire provided data about the education of the teachers and their personal knowledge about work with children with special educational needs. The questions were closed type (dichotomous).

The specific section of the questionnaire was open-ended and was aimed at assessing didactic and methodological difficulties that teachers have in conducting PE classes when applying methodical and organizational forms and methods of work with students with special educational needs.

The success of integration of children with special educational needs was evaluated using a Likert scale of 1 to 5 according to the following description:

1 – 100% failure, cannot be integrated

2 – about 75% failure

3 – 50% success, 50% failure

4 – 75% success

5 – 100% success

The questionnaire was voluntarily taken by teachers from all over the Republic of Croatia. It had been made available by a Google document through a web interface. The information about the survey had been posted on the Professional Association of Teachers website (www.razredna-nastava.net) and had been sent to the mail addresses of schools in Croatia. The address where the survey was located is as follows:

https://docs.google.com/forms/d/1ZItNPzA3clXVX1gK2TQHrPAVKJrubMCHeGBnegJdE_k/closedform

METHODS OF DATA PROCESSING

After data collection the results were entered into the statistical data processing program SPSS 17.0. In order to obtain an estimate of didactic and methodological difficulties that teachers have in conducting physical education classes when applying methodical and organizational forms and methods of work with pupils with special educational needs, basic descriptive statistics were calculated and presented through means, frequencies, shares and ranks responding to individual variables.

RESULTS AND DISCUSSION

Table 2. General part of the questionnaire describing education and familiarity with work with children who have special educational needs

QUESTION	ANSWER	n	%
During your studies, did you have a course that pertained to motor impairment or chronic diseases in pupils?	YES	21	40
	NO	31	60
During your past work, did you have any additional training on the topics of didactic and methodological difficulties in children with motor impairment and chronic diseases?	YES	15	29
	NO	37	71
Do you feel you need additional education on the subject of didactic and methodological difficulties in children with motor impairment and chronic diseases?	YES	49	94
	NO	3	6
Do you have a pupil with motor impairment in your classroom?	YES	7	13
	NO	45	87
During your work, did you ever have a pupil with a chronic illness in your classroom?	YES	19	63
	NO	33	37

The results from **Table 2** indicate that the majority of teachers had not been adequately educated during their study (60%), did not continuously train (71%) to address specific methodological problems, while 94% of teachers want additional training. 56% of teachers have had a student with motor impairment in their class, while 63% had students with chronic illnesses. These results are consistent with previous studies which had shown that teachers in the Republic of Croatia have relatively positive views on the integration of school children with disabilities in regular primary and secondary schools (Kis-Glavas, 1999, Ljubić, 2003), but those who introduce changes in Croatian schools are primarily those teachers who have undergone additional training.

Table 3. Shows the evaluation of the possibilities for the implementation of methodological forms of work organization (MOOR) in pupils with special educational needs:

MOOR	OLS	AST	DIJ	EPL	BRO	BSK	KUB	SB	LEU	PRT	AS	RN
Frontal	4	5	5	4,5	4,3	4,1	4	3	3,5	4	4,14	3
Group	4	5	5	5	4,8	3,5	4	4	4	5	4,43	1
parallel-divisional	4	5	5	4,5	4,3	3,5	4	4	4	3,5	4,18	2
parallel-alternating	4	5	5	4,4	4,3	3	4	4	4	3	4,07	5
alternating-divisional	4	5	4,8	4,3	4,3	3	4	4	4	3,5	4,09	4
TOTAL	4	5	4,96	4,54	4,4	3,42	4	3,8	3,9	3,8	4,2	
RANKING	5	1	2	3	4	8	5	7	6	7		

Legend: OLS – musculoskeletal system damage (bones, joints, muscles), AST-asthma, DIJ - diabetes, EPL-epilepsy, BRO - bronchitis, BSK – locomotive system diseases, KUB – chronic inflammatory bowel syndrome

The analysis of the teaching profession study curricula indicates that the teachers are primarily trained for subject teaching. Even the classroom teaching curricula is focused on study of subjects. The process of teacher education ignores other forms of educational work in schools (such as extracurricular activities, work with children with disabilities, working with gifted children, etc.). (OECD, 2007).

The research results indicate that there is still a large number of students of pedagogical academies and regular teachers who do not consider themselves ready for the educational integration of children with special educational needs, and who believe that they do not have the necessary knowledge and skills to be able to work with children with disabilities (Wagner Jakab, 2003). Expert assistant-teachers are also not sufficiently qualified for work with children with developmental disabilities (as they receive only basic information through their studies), yet in practice they are the most frequent profile of assistants in preschool institutions and schools.

As the educational integration of children with special educational needs is mandatory by law in Croatia since 1980, it is necessary that teachers are prepared and trained in order to meet the demands of their jobs. Therefore, one of the primary tasks of the Croatian Government must be systematic and continuous training of teachers for work in this area.

It seems logical to assume that the undergraduate teaching studies will need to be revised in due time in order to comply with the current situation in the educational system, thus creating a systematic programs of additional professional development and teacher training through state institutions.

According to some studies (ETTA, 2013) the main interests of teachers on topics of professional training are the areas of teaching methodology, work with students with special needs (both gifted students and students with disabilities), subject knowledge, subject methodology, pedagogy and psychology. It seems that the areas of higher priority are directly related to their school work, while more general topics, either at school or higher levels, are less important.

Table 3 shows the evaluation of the possibilities for the implementation of methodological forms of work organization (MOOR) in pupils with special educational needs:

Legend: OLS – musculoskeletal system damage (bones, joints, muscles), AST-asthma, DIJ - diabetes, EPL-epilepsy, BRO - bronchitis, BSK – locomotive system diseases, KUB – chronic inflammatory bowel syndrome, SB – heart disease, LEU - leukemia, PRT - obesity, AS –arithmetic mean, RN - order

From Table 3, which shows the evaluation of the possibilities for the implementation of methodological forms of work organization (MOOR) with students with special educational needs, high values of the arithmetic mean of responses indicate that the class teachers highly assessed the feasibility of almost all MOORs.

Since the arithmetic mean of all assessments of students' involvement is 4.2, it is possible to conclude that teachers believe that about 75% of MOORs can be successfully implemented in PE classes when working with children with special educational needs. The highest rate of success was observed when applying collective forms of work organization (work in pairs or groups of three or four). These results are understandable given that during the implementation of such an organizational form of work there is a possibility of specific help to pupils with special educational needs by their peers.

The results show that less favorable forms of work are more complex work forms such as parallel-alternating - AS (4.07) and alternating-divisional work forms - AS (4.07). These results are understandable considering that in such a complex form of work, due to the higher intensity of exercise, the pupil with special educational needs is less likely to receive help by their peers or teachers during the work process. From the arithmetic means it is evident that the application of all MOORs is almost entirely successful in pupilss with asthma - A (5.0), diabetes - AS (4.96), epilepsy - AS (4.54) and bronchitis - AS (4.4). These results are understandable considering that there is a specific need for adjustment of primarily exercise methods in these children, which can be seen from the data in Table 4.

The lowest value estimates - AS (3.42) of the pupil's involvement in MOOR are the pupils with locomotive system diseases, obese students - AS (3.8) and students with heart illnesses - AS (3.8). Given that these values correspond to the assessment, according to which such pupils can be successfully included in MOORs in 50-75% of cases, it can be concluded that there is a need for individualization of teaching process to include such pupils in appropriate, probably simpler forms of work.

Table 4 shows the evaluation of the possibilities of implementation of work methods when working with pupils with special educational needs.

METHODS		OLS	AST	DIJ	EPL	BRO	BSK	KUB	SB	LEU	PRT	AS	RN
Teaching methods	oral presentation	3,4	4,7	4,6	4,6	4,6	3,3	3,2	3,2	4,2	4,5	4,03	3
	demonstration	3,5	4,5	4,6	4,5	4,6	3,3	3,3	4,5	4,1	4,2	4,11	1
	set motoric exercises	3,3	4,7	4,6	4,6	4,4	3,3	3,3	4,3	4,2	4,2	4,09	2
Exercise methods	standard repetition	3,3	4,6	4,6	4,5	4,6	3,7	3,3	4,5	4	4,1	4,12	3
	variable	3,5	4,6	4,7	4,7	4,5	3,3	3,3	4,5	4,3	4,3	4,17	2
	situational method	4	4,5	4,7	4,7	4,5	3,3	3,3	4,5	4,2	4,2	4,19	1
Learning methods	synthetic method	3,5	4,5	4,7	4,7	4,7	3,8	3,3	4,7	4,2	4,3	4,24	1
	analytic method	2,3	4,2	4,7	4,7	4,7	2,4	3,6	4,7	4,2	3,4	3,89	3
	combined method	3,5	4,7	4,7	4,7	4,7	2,4	3,6	4,5	4,2	4,1	4,11	2
TOTAL		3,36	4,6	4,7	4,63	4,58	3,2	3,35	4,4	4,2	4,14	4,1	
RANKING		8	4	1	2	3	10	9	5	6	7		

Legend: OLS – musculoskeletal system damage (bones, joints, muscles), AST-asthma, DIJ - diabetes, EPL-epilepsy, BRO - bronchitis, BSK – locomotive system diseases, KUB – chronic inflammatory bowel syndrome, SB – heart disease, LEU - leukemia, PRT - obesity, AS –arithmetic mean, RN – order

From the Table 4, which shows the evaluation of the possibilities of implementation of work methods when working with pupils with special educational needs, based on the high values of the arithmetic mean, it can be observed that the class teachers highly assessed the feasibility of almost all methods. Considering the high value of arithmetic means, which shows values above 4, it is evident that almost all teaching methods can be successfully implemented. Teachers considered that the most successful teaching method for children with special educational needs is the method of demonstration - AS (4.11). This is understandable given that this method can be successfully applied when working with all pupils with special educational needs who do not have a vision impairment or attention disturbances. The most successful method of training when working with pupils with special educational needs was situational exercise method - AS (4.19). These results were to be expected considering that the application of this method highly affects the motivational processes of pupils who are not directly related to the difficulties of students with special educational needs.

The most successful learning method was considered to be synthetic method with value - AS (4.34). A study conducted by Prskalo, Babin (2012) in children without disabilities suggests a significant difference score before and after the effects of the experimental procedure in subsamples in which analytical and synthetic methods of learning were applied and advantages in applying synthetic methods of learning for the younger population. In addition to these advantages of the synthetic learning methods in primary schools, other benefits should be pointed out; easier formation of the correct image of the whole structure of movement, easier understanding of cause-and-effect relationship of the individual stages, logical motion sequence which has a positive effect on the perception of the basic idea of the whole operation, positive effect on motivation, facilitates the creation and use of kinesthetic information which represent a significant source of data during the adoption of the new movement, and adoption of a regular rhythm of movement from the first moment which makes it easier to control the inertia and internal force of the movement system (Milanovic et al., 2003).

The teachers have the greatest difficulties in applying the work methods when working with students who have locomotive system diseases, which is shown by the lowest value - AS (3.2). Since all of the

other difficulties were assessed higher, it can be concluded that the teachers consider that the methods can be applied with a minimum of 50% success and 50% failure rate in this population. As with MOORs, the results indicate that when applying the work methods in classes with students who have special educational needs, there is a need for individualization of work in order to encompass all the pupils in the teaching process and to apply the appropriate work methods.

CONCLUSIONS

It can be concluded that it is possible to successfully engage the pupils with special educational needs in all methodological forms of work organization (MOOR), and work methods. Most successful are easier forms of work, such as group work, demonstrations, variable exercises, analytical and combined methods. More complex MOORs, such as synthetic method, repetition and resolution of motor tasks and standard repetitive methods, have proven to be less successful.

Based on the above analysis it can be assumed that successful implementation of educational integration of children with special educational needs largely depends on the continuous professional development of teachers and establishment of a system of early identification of development needs and possible difficulties in teaching process when working with children who have special educational needs. In the center of the contextual reflection of the problem is an extremely complex educational process which occurs in interaction with all its individuals and their peculiarities, and is conditioned by a certain didactic orientation on the basis of which different educational methodologies and forms of work are shaped.

The Analysis of the questionnaire has shown that the identified problems identified can occur during the teaching process when adjusting work content and selecting the methods of teaching, learning and exercising. Therefore, we can conclude that careful individualization of the teaching process can significantly affect the quality of PE classes.

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PEDAGOGICAL STAFF 'S ATTITUDE TO PHYSICAL EDUCATION FOR CHILDREN WITH SPECIAL EDUCATIONAL NEEDS

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Key words: *physical education, adapted physical education, children with special educational needs*

The problem with students in mainstream schools, who have difficulties in learning, has existed in the pedagogical practice for a long time. These difficulties are mainly observed in the performance of conventional instructions of the teacher and the mastery of relevant educational programs [5]. For these students we have used different names - from "difficult child ", "children with delay in the psycho- physical development ", "children with learning difficulties " to children with "special educational needs " (SEN) .

Considering the experience gained so far, it should be noted that these children can be trained and the teachers who work with them should rely on the positive in them, on their proper attitude towards learning activities, in order to intensify their mental and motor activity with systematic and varied work, clarifying the meaning of the specific tasks to enrich acquired experience and knowledge with new information. It is necessary to seek opportunities for individualized learning, according to the specifics of each one of these children.

So far as it is known the Adapted Physical Activity (APA) is a part of the general process of adapting a number of activities that accompany everyday's life and the education of these people, in particular children with various diseases and disabilities. APA is directed not only to the practice of an activity in the group in particular, but it also aims at providing better life, opening up opportunities for exploiting the potential and equality of these people, and ensuring human rights and positive change in the public consciousness [7].

Adapted Physical Education (APE) is perceived as an integrative expression and logical consequence of both physical education and adapted physical activity and therefore, in defining its objectives and tasks, it must fulfill their goals and objectives as a baseline. The purpose of physical education - as a vital part of a single line of tasks within the didactic and educational process- is to contribute to the formation of positive personality in the students. To fulfill this purpose, instruments and methods for body culture must be applied: exercises, motor games, sports activities and related intellectual knowledge [3].

Summarizing the above mentioned goals of APE is considering the aspects of physical education to restore the work and health of students with altered health status to the highest possible degree. Moreover, it is also important to persuade them that regular exercise is good for them, that it is a pleasant and likeable activity so that they incorporate it into their daily lives, which in turn will give them a chance for a better quality of life, achieved through the educational process.

Although it would be great to suppose that all physical education teachers (PETs) rely on Adapted Physical Education (APE) specialists to help them satisfy the needs of their students with disabilities, this unfortunately is not the case in many parts of the world. When APE specialists are not available, PETs need the tools to make appropriate planning, assessment, and instructional decisions in order to provide quality physical education services to a student with a disability [3].

This mission for PETs is not without challenges given the increasing demands for accountability, decreasing resources and increases in both class size and diversity of the students in our schools. According to the latest version of the Ordinance on the education of children and pupils with special educational needs and / or chronic diseases (Bulgaria) it is acceptable to train up to five children with special educational needs within a class [4].

Translating this into actual numbers would look like this: If you are an elementary PET and your school has 500 students, 20 students would have great enough needs to require APE and another 40 students would have less severe needs that typically could be addressed in general physical education (GPE) but may require some APE support services. That, of course, s is in addition to the other 420 non- special education students in your classes with normal range of abilities [8].

Meeting the needs of all of your students requires collaboration, long- range planning and continuous communication between all parties who work with your students. Referring to these conclusions and to our country works on a new law project to set educational standards in line with European and international requirements [2, 7]. The new law regulates basic legal principles in education and provides for the establishment of state educational standards, which consist of compulsory performance requirements and conditions, and processes for their achievement in pre-school and school education, but it leaves enough space to educational institutions and teachers to comply with the specific environment. It is expected that State standards will cancel the multiple and sometimes conflicting regulations, instructions and other acts that function now [6].The new project relies on common principles in preschool and school education which says that training and education of children and young people has to be carried out within a cultural-educational environment by creating guarantees for the protection and development of the different cultures and traditions within the general educational policy. Kindergartens and schools have to apply the principles of inclusive education, taking into account the individual differences in learning needs of each child and student and adapting them to include all children and students in education, culture and community [1].

Since this law is still only a project the present research initiative in the field of general physical education for children with special educational needs was planned.

Based on the theoretical analysis and taking into account the various difficulties of teaching staff in dealing with children with SEN in mainstream schools, were formulated the following working hypothesis: A pilot survey, developed and implemented by us, will give us a clear idea of the level of the pedagogical staff‘s attitude to physical education for children with special educational needs

The aim of the study was to determine the motivation, attitude, knowledge and skills

of pedagogical staff in physical education and sports training to students with SEN.

METHODOLOGY

This study was conducted in the period February to June 2014. The objects of investigation were 55 teachers and 20 principals.

The object of study was the motivation, attitude, knowledge and skills of pedagogical staff in physical education and sports training, to students with SEN.

To conduct the study we used the following methods:

- Theoretical analysis
- Survey method
- Comparative analysis
- Frequency Analysis

RESULTS AND ANALYSIS

The first issue that was important to us in terms of work experience was the number of years our respondents had practiced their profession. Figure 1 shows the results where among the teachers these are respectively 18.1% have 0- 5years, 3.6% have 5- 10years, 10.9% have10- 15years, 67.4% over 15 years of professional experience, and for school principals 20% 0-5 years,20% 5-10 years, 0% 10-15 years, 60% over 15 years. From those answers we understand that the teaching staffs we have interviewed have considerable work experience and therefore their opinion is authoritatively regarding our study topics.

Figure 2 and **figure 3** present the results of the opinion survey of teachers and principals, respectively, on the inclusion of children with SEN in mainstream schools. The diagrams show that 20% of teachers

accept the idea fully, 65% accept it to a certain extent, 13% Do not accept it and 2% have no opinion on the matter. School principals opinions differ: 17% accept the idea fully, 83% take it to a certain extents. In general the attitude of the pedagogical staff to the idea of inclusion of children with SEN in mainstream schools can be described as positive, regardless of the high level of preferences for answer B, where respondents accept the idea to a certain extent, which indicates an amount of hesitation.

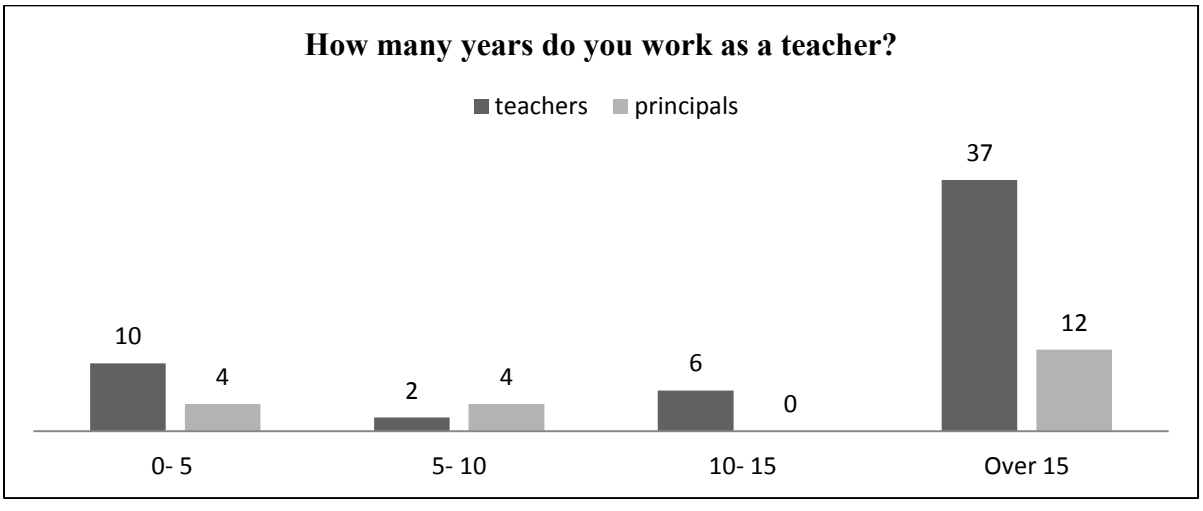

Figure1. Years of teaching experience

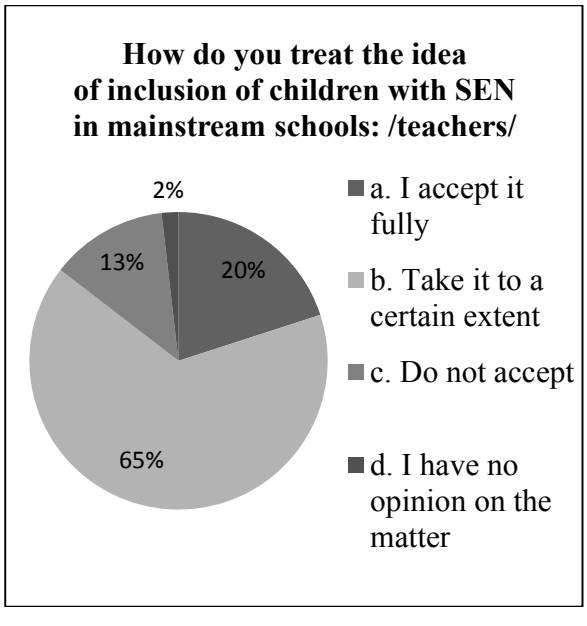

Figure 2. Attitude of teachers to inclusion to inclusion

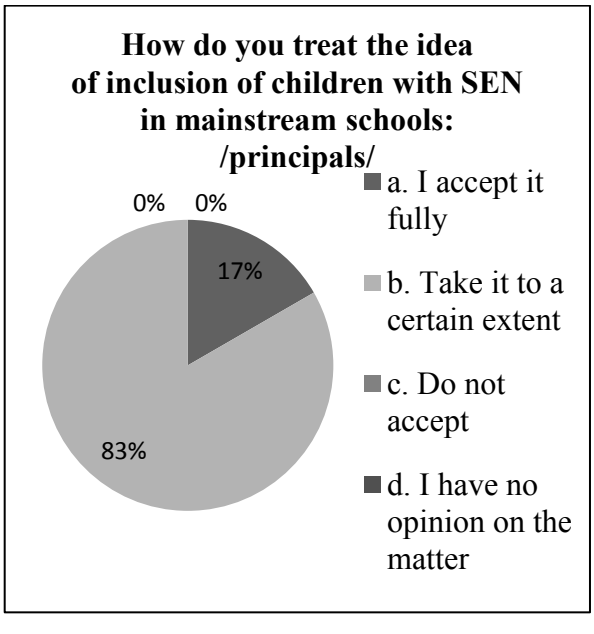

Figure 3. Attitude of principles

Figure 4 presents the reasoning of the previous question. Here it is apparent that 48% of the teachers accept the idea because every child has the right to be trained in mainstream schools, 28% accept the idea because every child has the right to education, which would accelerate integration in society, 9% do not accept the idea due to lack of proper training system for children with SEN in mainstream schools, 5% do not accept the idea due to lack of supportive environment in mainstream school, 7% do not accept the idea due to lack of qualified personnel for training children with SEN in mainstream schools, 2% do not accept the idea because of the large number of children in classes, 0% Other. These results show that Bulgarian lecturers consider children with SEN entitled to training, supportive environment and inclusion in society but do not think that there is an adequate training system and skilled human resources available.

Figure 5 illustrates the results of the question:"Are you willing to work as a teacher of physical education and sport with children with SEN?". Here 31% of respondents are agree, to a large extent: 36% are agree, to a medium degree; 18% are agree, to a small extent and 15% do not agree. In **Figure 6** illustrating the question "Do you think that you yourself possess the necessary knowledge and skills to work with children with SEN?" teachers' answers are as following: 15% answer positive, 60% consider that they are competent to some extent and 25% answer negative. This distribution of the percentages suggests that teachers evaluate themselves as not sufficiently prepared to conduct lessons in physical education when there are children with SEN.

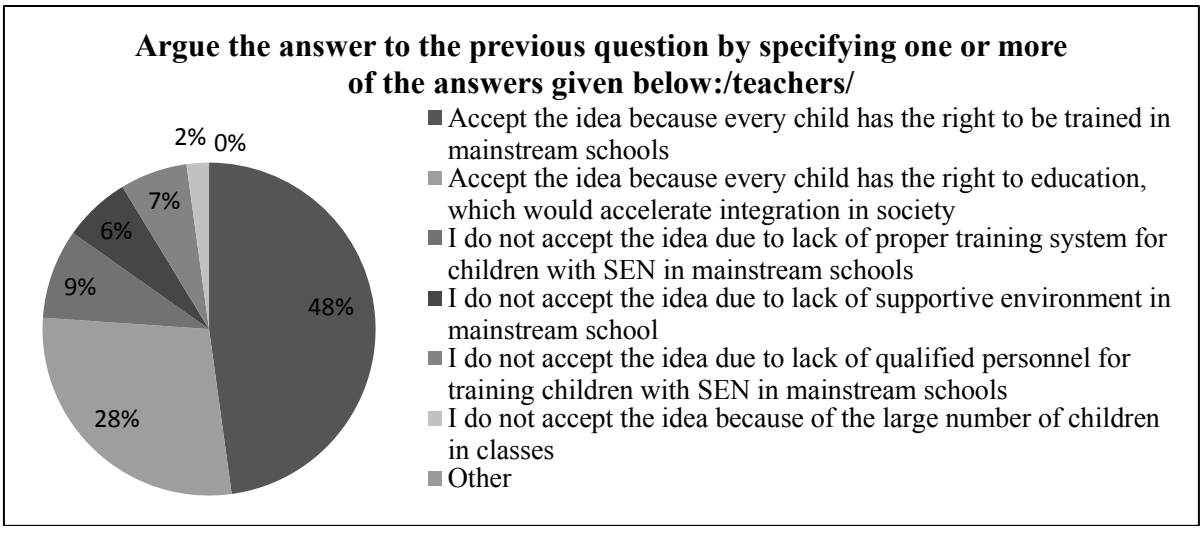

Figure 4. Justification of the attitude of the teachers towards inclusive education of children with SEN

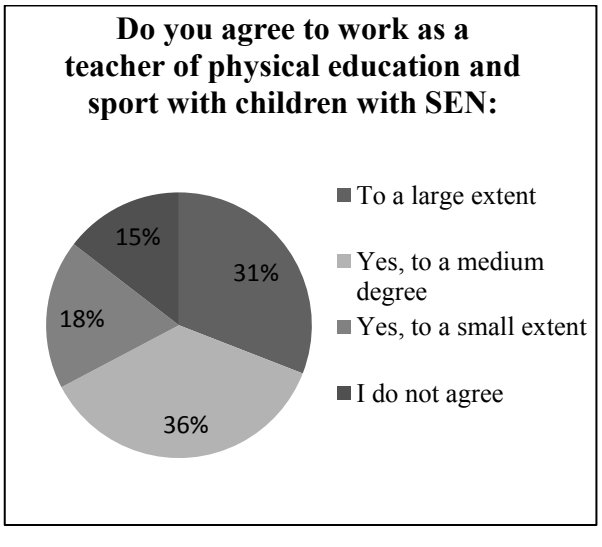

Figure 5. Level of willingness of teachers to work with children with SEN

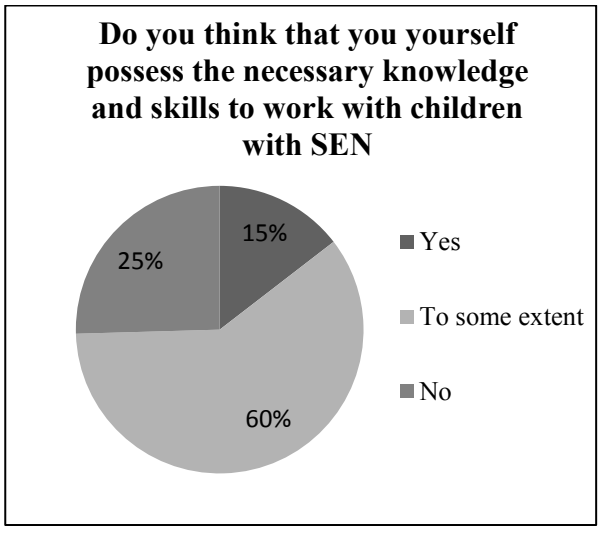

Figure 6. Self-assessment of teachers for their competence to work with children with SEN

Figure 7 refers to answer of the question: "Would you participate in training courses or seminars concerning the teaching of physical education and sport for children with SEN?" Here the percentages are respectively 16 % would participate, under any circumstances,42% if the course is free, 22% if the course is be paid by the employer , 14% are not interested in such a course , 4 % do not think the course will be useful to them and 2% have other opinion.

Based on the quantitative distribution of the above- mentioned responses is also the study of the opinion of school principals about the level of competence of teachers to work with children with SEN in physical education and sport.

On the question "Do you think that the pedagogical staff has the necessary knowledge and skills to work with children with SEN?", 30% of the directors believe that teachers are sufficiently prepared, 60% are of the opinion that teachers only partially have the necessary competence and according to 10%, physical education teachers do not have the necessary training (**Fig.8**)

Following this logic, was the addition of question to school principals whether they would finance the training of the pedagogical staff so that they could obtain qualification for teaching children with SEN. On this question 100% of them stated categorically answer „Yes"(**Fig.9**)

Analysis and interpretation of the results of the questionnaire survey in terms of the Bulgarian secondary education has led to the definition of the following conclusions and recommendations.

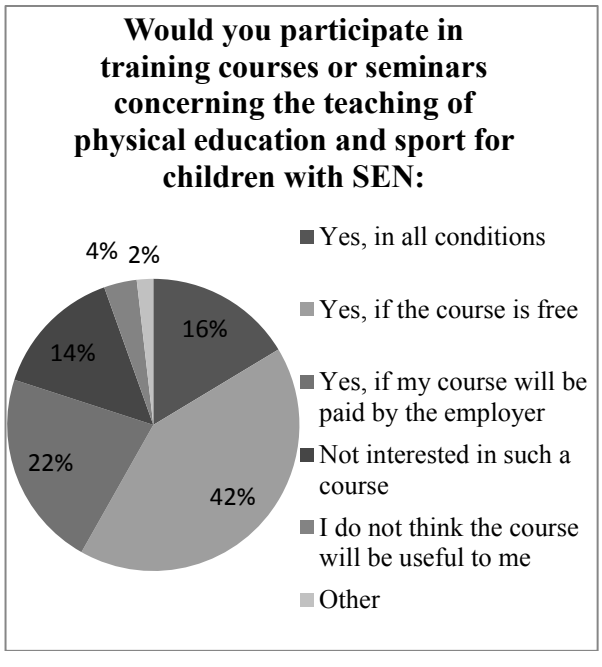

Figure 7. Willingness of PE teachers to further qualification for working in terms of inclusive education

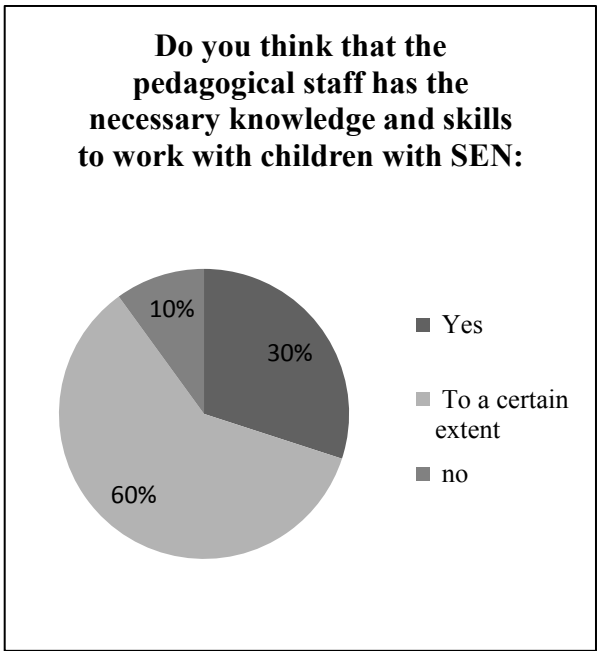

Figure 8. Opinion of school heads about the level of qualification of the PE teachers to work with children with SEN

Figure 9. Willingness of school principals to fund retraining of pedagogical staff to work with children with SEN

CONCLUSIONS:

- Bulgarian lecturers consider children with SEN entitled to training, supportive environment and inclusion in society but do not think that there is an adequate training system and skilled human resources available.
- School principals as well as teachers evaluate themselves as not sufficiently prepared to conduct lessons in physical education when there are children with SEN.
- Teachers show a high degree of interest in a given subject and great desire to acquire new skills and competences in order to work effectively with children with SEN in physical education and sports classes
- In general, the attitude of the pedagogical staff to the idea of inclusion of children with SEN in mainstream schools can be described as positive

RECOMMENDATIONS

- Accessible educational programs for teacher training in physical education and sport for the education of children with SEN in mainstream schools should be developed.
- Funding for vocational training courses and seminars for teachers in order to work effectively with children with SEN in physical education and sports classes should be planned.
- A proper system for training children with SEN in the conditions of inclusive education in the Bulgarian education system should be developed.

In conclusion it can be summarized – the above described recommendations should be the first steps towards the building of supporting and optimal functioning model for educating children with special educational needs in general schools as part of the Bulgarian educational system.

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CHILDREN'S ATHLETICS AND ITS PLACE IN SCHOOL PHYSICAL EDUCATION IN BULGARIAN

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Key words: *kid's athletic, physical education, IAAF.*

INTRODUCTION

School physical education is a pedagogical process aimed at improving the physical development of adolescents' part of the education system. Two main components are characterizing the pedagogical process: education and instruction. They relation between them includes education in knowledge, practice skills and development of students' physical abilities.

Athletics as a widely spread major sport is practiced among people in all ages and professions as a mean for physical development and mental relaxation. In this type of activity, the athlete is trying to achieve sport result measured in time and space – depending on the type of discipline.

Athletics combine various disciplines including running, throwing, jumping and walking events. Sport specialists understand the importance of athletics and its place in the physical culture program. Her admission as "Queen of sports" comes not only from the fact that it is one of the oldest practiced sports, but because the fact that certain elements from the athletics exercises are basis for most modern sports. We cannot imagine proper training process without their existence [2].

The variety of athletic exercises features with their natural character and different coordination difficulty. Due to this fact, they have important place in school physical education main objectives. Athletics exercises combined with the means of other sports contribute greatly to the foundation of the necessary minimum of physical abilities in children [3].

Supreme governing body regulating competition administration and athletics development is IAAF / International Association of Athletics Federations/. IAAF Kid's athletics aims at laying playful athletic exercises and disciplines making athletics favorite sport in schools worldwide.

"Athletics for children" (see **Figure 1** [1]), as adapted for children format for training and competing in athletics. The conception has two main objectives:

- to make athletics most popular (individual) sport in schools worldwide;
- to enable children prepare most effectively for their future in athletics;
- Athletics for children is characterized by the following facts:
- Enables large number of children to participate in the same time in individual races (see **Fig. 2**). [1];
- Children can practice it in any place (stadium, playground, gym, all available sport areas, etc.);
- It is a team race and gives the opportunity to place children in mixed teams (boys and girls);
- Children can train basic athletic abilities;
- Everyone will help the team – encouraging team spirit. Every children earns points for his/her team.
- Competition duration is between 1 and 2 hours;
- There isn't need for great number of umpires and skill requirements vary depending on the age and the abilities of the participants.

The basic principle of "Athletics for kids" is team spirit. There are three age groups:

- Group I – children aged 7 – 8 years;
- Group II – children aged 9 – 10 years;
- Group III – children aged 11 – 12 years;

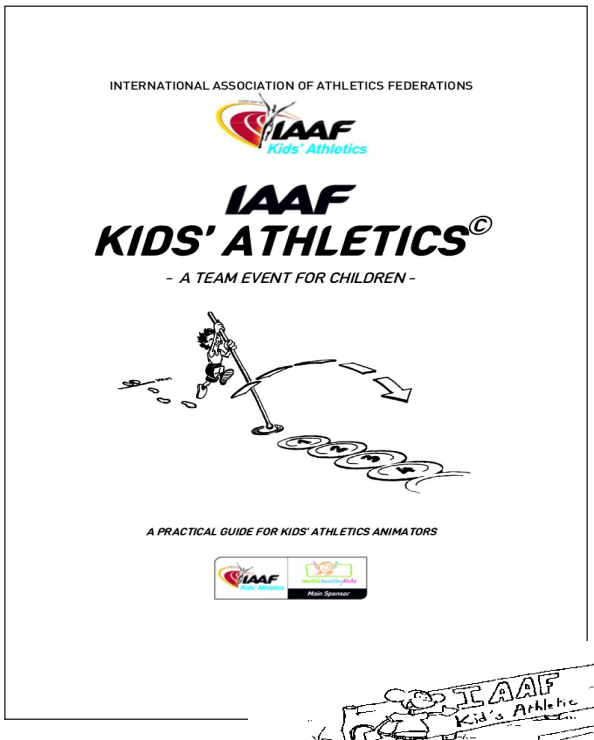

Figure 1. IAAF Kid's athletics manual [1]

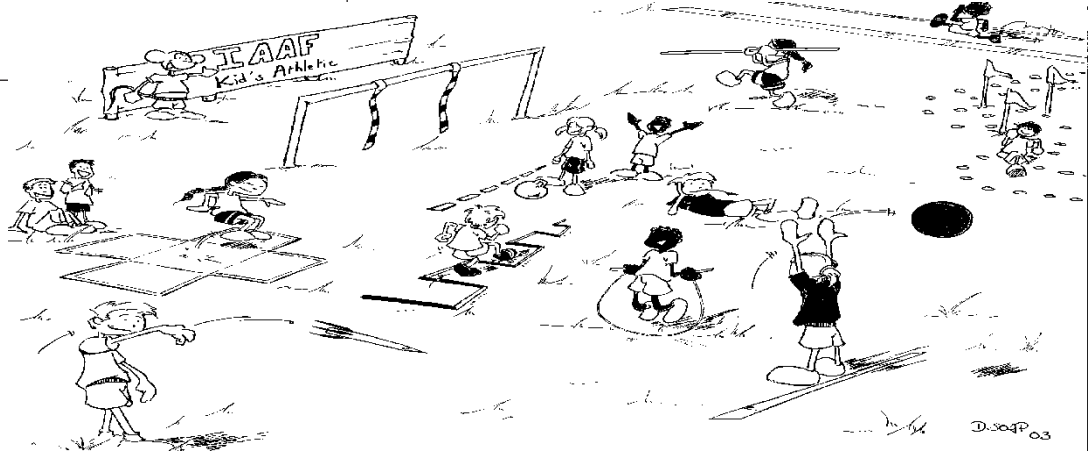

Figure 2

All participating children must compete several time in each of the group events. The competition is organized according to the watershed principle, so all teams go through each of the stations. Each station takes 1 minute time for every child to compete – in other words 10 minutes, 10 children. After the completion of the various disciplines (sprint, running, hurdle running, throwing and jumping), all teams together participate in the endurance run at the end of the competition.

The disciplines in "Kid's athletics" and its complexity is divided according the age of the children practicing it. The main disciplines are: sprint running, hurdle running, relays jumping, throwing and endurance running.

METHODOLOGY

The aim of the following study is to compare the results achieved by children in the IAAF "Kid's athletics" competition in various cities in Bulgaria at the age group 7 – 8 years.

We analyzed the performance of the children from the first age group. The following cities conducted IAAF "Kid's athletics": Bourgas, Sofia, Sungurlare, Gabrovo. The games used in this age group are included in Figure 1 – The IAAF "Kid's athletics" manual [1].

All competitions involve six participating teams. Team include up to 10 children.

RESULTS

The variation analysis allowed us to determine the average results of the games in different cities in Bulgaria. To determine the best and worst results of each game, as well as comparing speed endurance, upper limbs strength and coordination abilities of children from selected cities.

Table 2 present the processed data and shows that in the sprint and hurdle relays best results were achieved by children from Gabrovo (1,55 minutes) closely followed by children from Sofia (1,56 minutes). Worst results in this game were achieved by children from Sungurlare (2,40 minutes). Average results range between 1,82 (Gabrovo) and 2,78 (Sungurlare) The largest difference between best and worst results (R) we find in Sofia (-1,39) and Bourgas (-0,12). This makes us think that children in Bourgas possess similar abilities for sprint and hurdles running.

Biggest deviation from the mean value we observe in the results of children from Sofia – S=0,49.

With the help of variation coefficient (V%) we can conclude that in the cities of Sofia and Sungurlare the sample is satisfactory homogeneous (22% and 13%). In the other three cities the sample is highly homogeneous – V ranges between 10 and 12%.

Table 1. Games included in the first age group – 7 – 8 years.

№	game	measured in	evaluation of competition result
1.	Sprint and hurdle relay	minutes	-
2.	Formula 1	minutes	-
3.	Jumps in square	points/15 sec.	+
4.	Throwing a kids javelin	centimeters	+
5.	Throwing a medicine ball	centimeters	+
6.	8 minute endurance run	count/8 min.	+

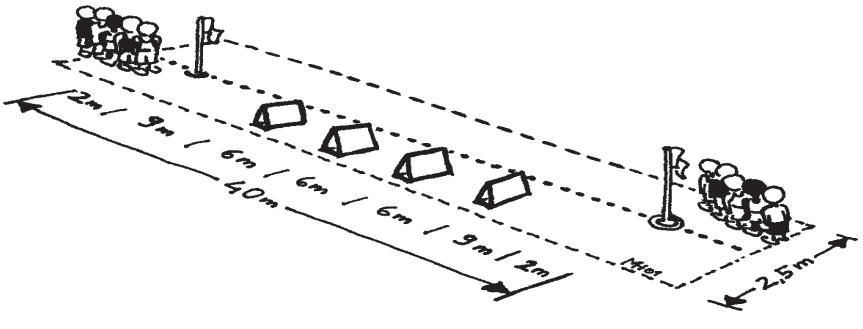

Figure 3. Sprint and hurdle relay.

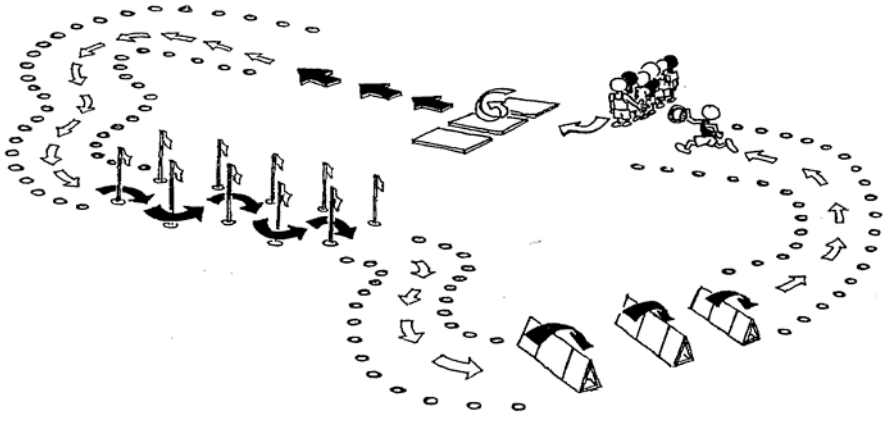

Figure 4. Formula 1

Table 2. Competition results.

index / game	city	$\bar{X}$	S	R	X min.	X max.	V (%)
Relays with sprinting and hurdle running	Bourgas	2.15	0.05	-0.12	2.20	2.08	2
	Sofia	2.19	0.49	-1.39	2.95	1.56	22
	Sungurlare	2.78	0.37	-0.75	3.15	2.40	13
	Teteven	2.11	0.26	-0.7	2.37	1.67	12
	Gabrovo	1.82	0.16	-0.46	2.01	1.55	8
Formula 1	Bourgas	3.08	0.06	-0.17	3.21	3.04	2
	Sofia	2.89	0.25	-0.52	3.09	2.57	8
	Sungurlare	3.51	0.05	-0.15	3.58	3.43	2
	Teteven	3.13	0.08	-0.21	3.21	3.00	3
	Gabrovo	2.97	0.31	-0.88	3.24	2.36	10
Jumping in squares	Bourgas	28.17	2.71	8	25	33	10
	Sofia	28.83	1.94	5	26	31	7
	Sungurlare	46.67	4.72	14	40	54	10
	Teteven	52.33	10.21	31	36	67	20
	Gabrovo	53.67	8.64	22	43	65	16
Throwing children javelin	Bourgas	107.3	10.37	22.9	96.7	119.6	10
	Sofia	78.6	6.10	16.7	69.5	86.2	8
	Sungurlare	154.7	17.17	49.4	139.0	188.4	11
	Teteven	101.9	12.57	37	88.9	125.9	12
	Gabrovo	59.1	9.61	26.4	50.0	76.4	16
Throwing medicine ball	Bourgas	36.0	1.77	4.8	33.4	38.2	5
	Sofia	37.0	3.96	10	32.8	42.8	11
	Sungurlare	42.0	6.94	18.4	31.4	49.8	17
	Teteven	31.3	5.45	15.1	21.7	36.8	17
	Gabrovo	30.2	3.10	8.8	25.2	34.0	10
8 minute endurance run	Bourgas	62.5	5.36	15	58	73	9
	Sofia	29.5	1.87	5	27	32	6
	Sungurlare	67.7	6.25	17	57	74	9
	Teteven	61.5	8.33	22	49	71	14
	Gabrovo	41.3	3.78	10	37	47	9

The situation is the same with Formula 1 game (see **Figure 4**) where the fastest children from Gabrovo were able to cross the finish line for 2,36 minutes, from Sofia for 2,57 minutes and from Teteven for 3 minutes. The children from Sungurlare have comparable abilities according to their speed because their difference in results is the smallest (R=-0,15) and in Bourgas – R=-0,17. The difference from the previous and this game is that here the samples from all cities are highly homogenous – V ranges between 10% and 12%.

In the jumping squares (see **Figure 5**) most points collected children from Teteven – 61 points. We find biggest difference in results also in Teteven – 31 points. Children from Sofia achieved the lowest result in this game compared to the other cities. Children from Bourgas registered 33 points.

In the kid's javelin throw best performance showed children from Sungurlare, Teteven and Bourgas – respectively 188,4 cm, 125,9 cm and 119,5 cm. The smallest difference between best and worst results we find in children from Sofia – R=16,7, but we must note that they are not the worst performing.

Children from Sungurlare the the medicine ball from kneeling position far from children from other cities – 49,8 cm. The closest results is the one of the children from Gabrovo – 34,0 cm. The weakest result in this game is registered in Teteven – only 21,7 cm. Biggest difference between results we find in Sungurlare (R=18,4) and smallest difference we find in Bourgas (R=4,8). This means that the team from

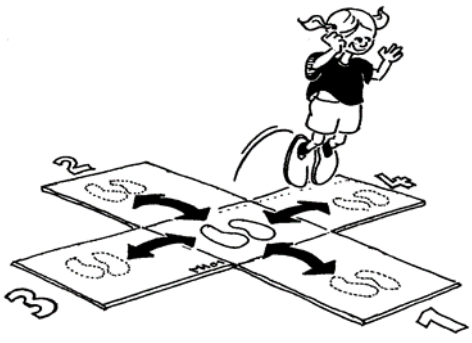

Figure 5. Jumps in square.

Bourgas had approximately the same upper limbs strength abilities.

Samples from the cities of Sungurlare and Teteven are sufficiently homogenous (V=17%), while those of other cities range between 10 – 12% (highly homogenous).

In the 8-minute endurance run most cards collected the children from Sungurlare (total 74) and Bourgas (73). Here the children from Sofia collected only 32 cards.

DISCUSSION AND CONCLUSIONS

The analysis of children performance in Kid's athletics competitions from the five cities in Bulgaria allow us to draw the following conclusions:

With best future sprint and hurdles runners (see Figure 8) differed the cities of Gabrovo, Sofia and Teteven.

We find greater upper limbs strength in the children from Sungurlare and Sofia.

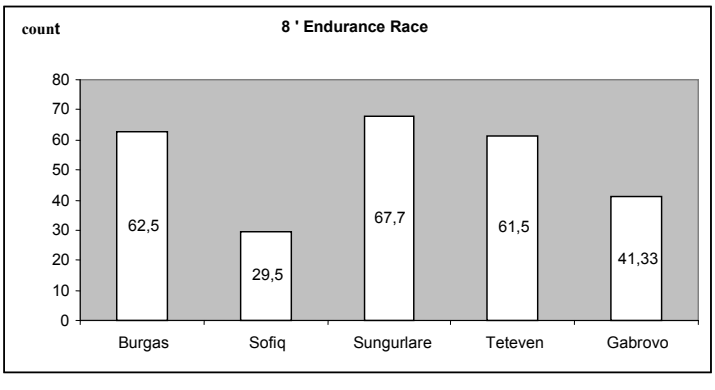

Figure 7. 8 minutes endurance run

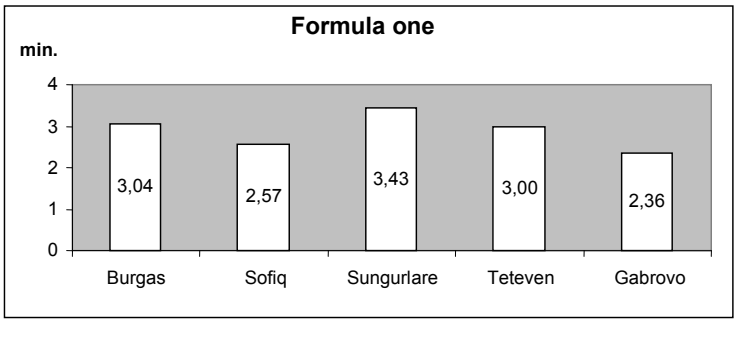

Figure 8. Formula 1.

Best results in endurance and in javelin throw showed children from Sungurlare, Teteven and Bourgas.

Based on the results analysis and conclusions we can say that the purpose of "Kid's athletics is achieved. Main target is to enable children from early age to prepare most effectively for their future in athletics with the help of different games based on the athletic disciplines.

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APPLICATION OF MOVEMENT VISUALIZATION MODELS DURING THE STUDY OF GYMNASTIC EXERCISES

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Key words: *gymnastics, technique, models, training*.

INTRODUCTION

Nowadays, one of the basic methods giving opportunities and advantages for studying of the technique and structure of sports exercises is modeling. In modeling of such a complex system as human body, is necessary to be determined a purpose of modeling and in conformity with it the most appropriate type of model have to be chosen. The exercise which is putting into practice as well as the most important moments of its performing has to be well visualized, which is very useful in process of training. Models for visualization of the exercise are successfully applied into the gymnastics practice [1, 2, 3].

The purpose of this study was to be presented models for visualization of the movement, which shall be used during studying of gymnastics exercises.

METHODOLOGY

In process of studying the exercises when the movement passes in more than one plain the observation of implementation of some moments from performance of the exercise could be embarrassed. For clarifying of technical particularities of such exercises, using of 3D model of the exercise will be an advantage. At the training upon gymnastics there should be available visual information about motion and activities of the athlete, which has to be taken by observation from different viewpoints. This means that performance of the exercise should be shot by two perpendicularly situated cameras (**Fig. 1**).

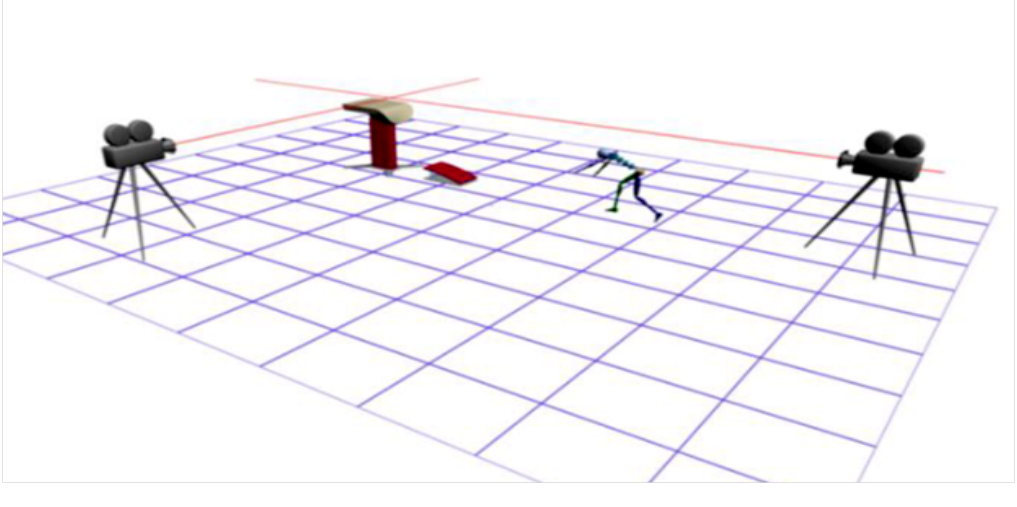

Fig. 1. Video shooting of spatial movement by two perpendicularly situated video-cameras

The taken images shall be transformed (fig. 2) into 3D model by the means of specialized 3D animation software (for example 3D Studio Max). This process is too labour-intensive, but once built up in this way, the 3D model of the exercise allows observation of the movement in different perspectives.

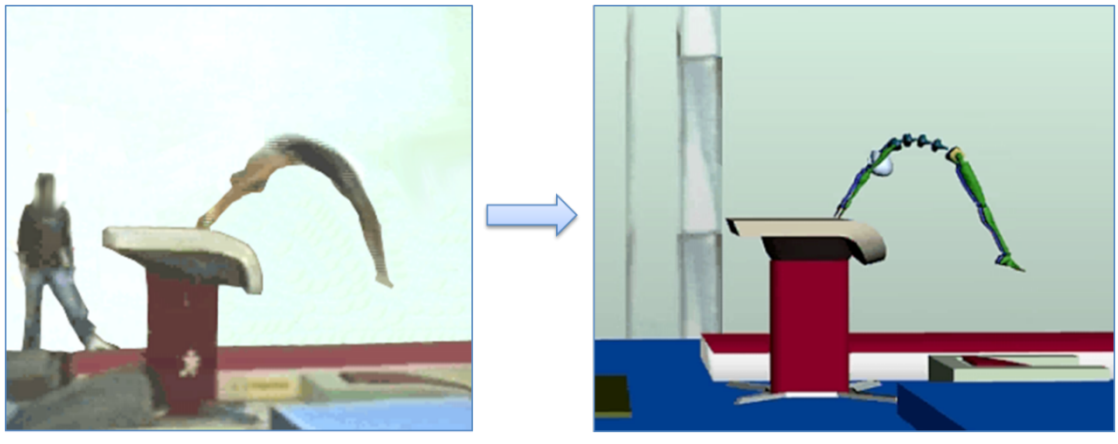

Fig. 2. Transformation of the real performance of the exercise (image on the left) into 3D model (image on the right)

Positional models are appropriate to be applied for visualization of key moments from performance of exercise. They can be presented as 3D or 2D models, depending on the exercise. To build a positional model is also necessary to have kinematic information of the movement. The required coordinates and orientation of segments of the body could be taken after video shooting and processing of the video material by a specialized software (for ex. APAS, fig. 3a). Initially for this purpose, we choose a model (standard) performance of the exercise, which is of interest for the training (for example – horizontal bar exercise "Tkachev").

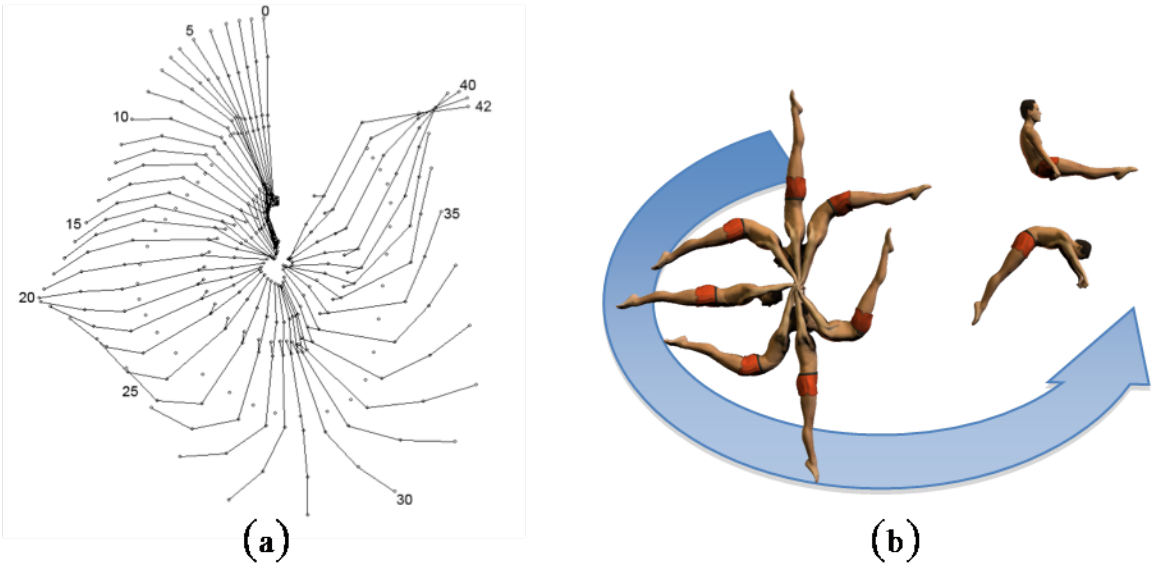

Fig. 3. Stick figure (a) and positional model (b) of horizontal bar exercise "Tkachev"

Next step is to build up separate poses of performance for which Poser 3D animation program is applied (fig. 3b). The position and configuration of the body is fixed like figures only for selected key moments. The series of figures of the most important moments in the course of the exercise is a positional model of performance of the exercise as a pattern.

RESULTS

We will demonstrate the possibilities of getting information for training by performing of an exercise with complex three-dimensional movements. The exercise is "Yurchenko" type with 2 and ½ twisting

around the body longitudinal axis. On the fig. 4 are shown frames of the body in rotational movements in three separate plains. The moving of the whole body is not shown for convenience. Thus, frame by frame, we can observe the whole performance of the exercise in three plains.

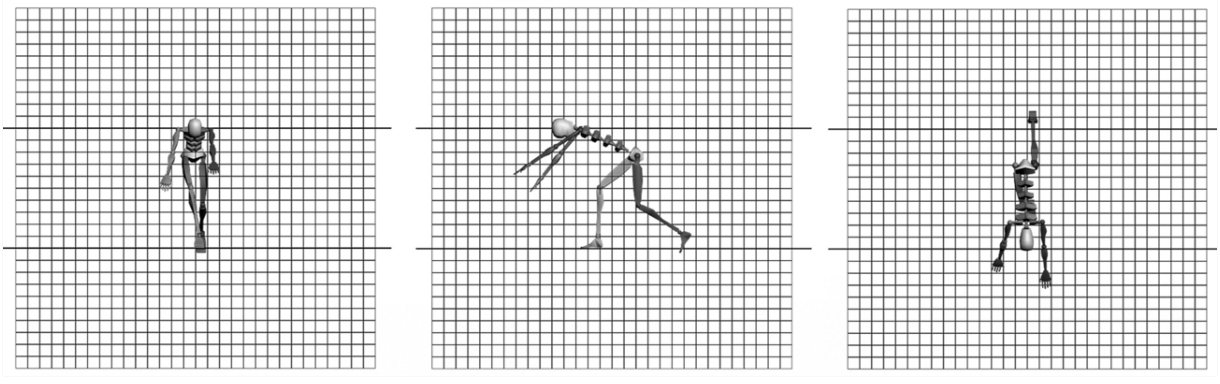

Fig. 4. Observation of the exercise in different plains from three different viewpoints – in front view, side view and top view_

By the means of this model the trajectories of different points of the body, which are of interest for the analysis can be illustrated (fig. 5).

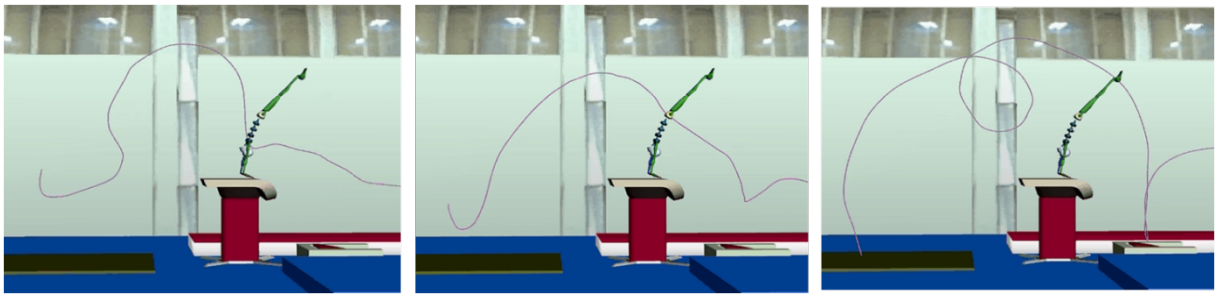

Fig. 5. Trajectories of shoulder, hip and ankle joints

Similar models (fig. 6) could be made for different exercises on different apparatus, where 2D (plain) observation gives incomplete visual information and the movement analysis will not be correct enough.

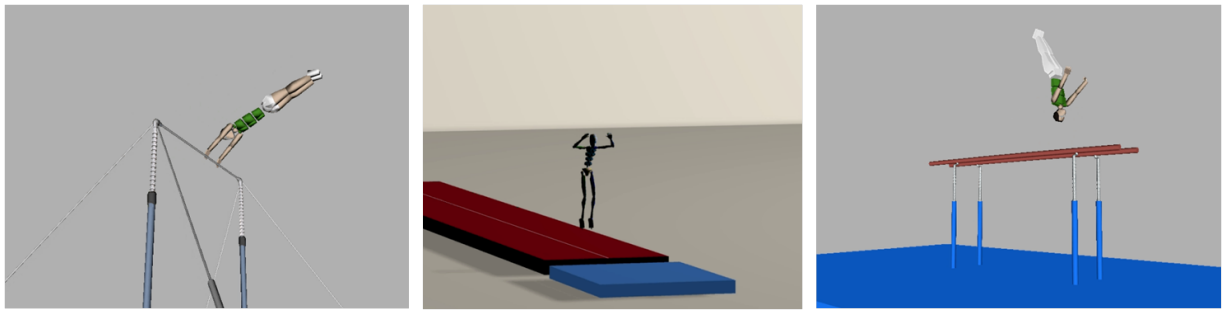

Fig. 6. 3D models of exercises on different gymnastic apparatus

After building up of positional model of a specific exercise, we can proceed with its application in practice. The same exercise, which was performed by the gymnast is recorded as a video file and is visualized by computer, on the monitor of which was also presented the positional model (fig. 7).

DISCUSSION

One of the most frequently used methods for analysis and modeling of the movements is method of comparative biomechanical analysis between movements or exercises, performed by athletes with different qualification. Indicators that naturally are changed with increase of the level of technique skills and which distinguish the sportsmen at their technical level are tracing out. With aim to achieve the

best form of masterly performance of the exercise in practice is applied an approach, which compares the characteristics in the main phases of performance of the exercise of elite gymnast (pattern of performance) and the gymnast in process of training. The aim of the trained gymnast is to correct the performance on that way which will give him/her opportunity to be closer to the presented pattern of performance. Differences between the gymnast and the model are reference point for the achieved technical level of performance. This study presents models of exercises on apparatus for vault and horizontal bar. In a similar way, other models of different exercises can be created and applied in the training.

Fig.7. Application of positional model for making of routine corrections in horizontal bar training

CONCLUSIONS

The application of considered models gives the gymnast and his coach the chance to watch the movement in details, to make comparison and to find position differences at the most important stages of the exercise between both performances – standard and of the trained gymnast. The proposed and shown models could be used for training in gymnastic in initial stages as well as in training of elite gymnasts.

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STUDY OF INFLUENCE OF SPECIALISED ALTITUDE MESOCYCLE ON ADAPTATION POTENTIAL WITH ELITE BOXING ATHLETES

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Key words: *altitude training, hematological parameter, specialized mesocycle*

INTRODUCTION

The study of the effects of altitude training on the adaptation capacities of elite athletes is a problem with recognized practical and scientific significance. Many athletes from different sports included in their training programs altitude mesocycles with different duration and goal- orientation.

In boxing the most commonly altitude training is included during the transition period or in the first half of the preparatory period, with duration 20-25 days. In case the competitions take place on 500-1500 m altitude prior the days of the one competition.

In the content of altitude mesocycle training means for increasing the specific adaptation abilities of boxers are included.

The dynamic of the adaptation changes in altitude conditions goes through three main stages: acute acclimatisation – 4-6 days were primary functional adaptation changes appear under the influence of altitude climatic conditions and training tools; second transitory stage to the main adaptation – 5-8 days with improvement of the training parameters and third – main adaptation – after 15 days stay in altitude conditions, characterised by the high parameters of the training loads either the intensity or volume. The stress is on the specialised exercises.

Regardless of the empirical application by some coaches, the problems of adaptation to high-altitude conditions for boxing athletes in our, including in foreign scientific literature have not found a relevant attention.

High functional requirements for boxers determine the use of altitude training as a key element of the overall system of preparation. Improvements the levels of aerobic endurance and speed-strength qualities contribute to high performance work-capacity to the last-minute of the boxing match and to the end of the tournament. This in turn leads to greater efficiency and economy of technical and tactical skills and habits.

Logically, purpose of the research and scientific argumentation are the structure, content and sequence of different altitude mesocycles within the annual training cycle in boxing.

The Hypothetical basis

On the basis of practical experience and some scientific researches is hypothesized that the enhancement of functional adaptation potential of elite boxing athletes in altitude hypoxic conditions must be a basis for better development of specific competitive work-capacity.

Purpose of the study

The present study investigates the magnitude and the quality of the changes appearing in altitude conditions on haematological and physiological parameters of work-capacity of the top-level boxing athletes.

STUDY DESIGN

Subject

The subjects of the study were 10 high-level Bulgarian national boxing athletes – men and juniors. All procedures were performed in accordance to the Declaration of Helsinki on the use of human subjects.

The altitude training camp took place in Belmeken - 2048 m altitude, Bulgaria; for the period of Sep-

Table 1.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
		26.09.2012	**27.09.2012**	**28.09.2012**	**29.09.2012**	**30.09.2012**
		Departure for Belmeken	**07:30** Warm up 10 min Sports game 2x10 Continuous running Technical and tactical training (dumbbells) 20min Work with sport equipment 3x3x1 Gymnastics 15min	**07:30** Warm up 10 min Sports game 2x10 Cross-country running Technical and tactical training (dumbbells) 20min Work with Sport equipment 3x3x1 2min continuous Gymnastics 15min	**07:30** Warm up 10 min Sports game 2x10 Cross country running* Technical and tactical training (dumbbells) 20min Work with sport equipment 3x3x1 3min continuous Gymnastics 15min	**10:00** Sport game 2x20 Cross country running* Gymnastics 15min
		13:00 Lunch			**11:30** Warm up 20min Sport game 2x15 Strength complex-1 Technical and tactical training (dumbbells) 20min Gymnastic 15min	
		17:00 Warm up 10min Sport game 2x15 Cross country running Technical and tactical training (dumbbells) 30min Work with sport equipment 1/3x3x1 2/3x3x1 Medicine ball 20min Gymnastic 15min	**17:00** Warm up 10min Sport game 2x15 Evenly running Technical and tactical training (dumbbells) 30min Work with sport equipment 1/3x3x1 2/3x3x1 Medicine ball 20min Gymnastic 15min	**17:00** Warm up 10min Sport game 2x15 Evenly running Technical and tactical training (dumbbells) 30min Conditioned fight 1/3x3x1 2/3x3x1 3/3x3x1 Work with sport equipment - 3min continuous Gymnastic 15min	**17:00** Warm up 10min Sport game 2x15 Evenly running Technical and tactical training (dumbbells) 30min Conditioned fight 1/3x3x1 2/3x3x1 3/3x3x1 Work with sport equipment - 3min continuous 3min working Gymnastic 15min	**16:30** Sport game 2x20min Recovery Sauna Massage
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
01.10.2012	**02.10.2012**	**03.10.2012**	**04.10.2012**	**05.10.2012**	**06.10.2012**	**07.10.2012**
07:30 Warm up 10 min Sport game 2x10 Cross country running* Technical and tactical training (dumbbells) 20min Work with sport equipment 3x3x1 3min continuous	**07:30** Warm up 10 min Sport game 2x10 Cross country running** Technical and tactical training (dumbbells) 20min Work with sport equipment 3x3x1 3min continuous	**07:30** Warm up 10 min Sport game 2x10 Cross country running** Technical and tactical training (dumbbells) 20min Work with sport equipment 3x3x1	**07:30** Warm up 10 min Sport game 2x10 3x800x1.30 Technical and tactical training (dumbbells) 20min Work with sport	**07:30** Warm up 10 min Sport game 2x10 Cross country running* Technical and tactical training (dumbbells) 20min Work with sport equipment Intervals 6x10”	**07:30** Warm up 10 min Sport game 2x10 3x800x1.30 Technical and tactical training (dumbbells) 20min Work with sport equipment Intervals 6x10”	**10:00** Rest day

Table 1

Gymnastics 15min	Gymnastics 15min	Intervals 6x10"x10" Gymnastics 15min	equipment 3x3x1 4min continuous Gymnastics 15min	3x3x1 Intervals 6x10" Gymnastics 15min	3x3x1 Intervals 6x10" Gymnastics 15min	
11:30 Warm up 10min Sport game 2x15 Strength complex-2 Gymnastics 15min		**11:30** Warm up 20min Sport game 2x15 Strength complex-1 Technical and tactical training 20min Gymnastics 15min	**11:30** Warm up 10min Sport game 2x15 Strength complex-2 Gymnastics 15min		**11:30** Warm up 20min Sport game 2x15 Sprints 10 Jumping 4x3x1 Gymnastics 15min	
17:00 Warm up 10min Sport game 2x10 Technical and tactical training (dumbbells) 30min Conditioned fight 1/3x3x1 2/3x3x1 3/3x3x1 Work with sport equipment 3min continuous Medicine ball 1x3x1 Gymnastic 15min	**17:00** Warm up 10min Sport game 2x10 Technical and tactical training (dumbbells) 30min Conditioned fight 1/3x3x1 2/3x3x1 3/3x3x1 Work with sport equipment 3x3x1 2min working Gymnastic 15min	**17:00** Warm up 10min Sport game 2x10 Technical and tactical training (dumbbells) 30min Conditioned fight 1/3x3x1 2/3x3x1 3/3x3x1 Work with sport equipment 3min continuous 2min working Medicine ball 1x3x1 Gymnastic 15min	**16:30** Sport game 2x20min Recovery Sauna Massage	**17:00** Warm up 10 min Sport game 2x10 Technical and tactical training (dumbbells) 20min Work with sport equipment Intervals 6x10" 3x3x1 Intervals 6x10" Medicine ball 1x3x1 Gymnastics 15min	**17:00** Warm up 10 min Sport game 2x10 Technical and tactical training (dumbbells) 20min Training fight 1/3x3x1 2/3x3x1 3/3x3x1 Work with sport equipment 5min continuous Gymnastics 15min	**16:30** Sport game 2x20min Recovery Sauna Massage

tember – October 2012. The team followed training sessions twice per day during 22 days specialized mesocycle with main the task of developing and improving the aerobic capacities and speed-strength abilities of the boxers and their gradual transformation into the specific competitive work-capacity. Experienced coaches supervised training. Blood samples were taken twice – before and after training camp from the antecubital vein under standardized conditions between 7.00 and 8.00 a.m. On the **table 1** the original training msesocycles are presented.

PARAMETERS

Hematological

The following parameters were determined using RAL (Spain) apparatus: haemoglobin; erythrocytes; leucocytes, haematocrit, mean corpuscular volume; mean corpuscular haemoglobin, mean corpuscular Hgb content, thrombocytes and lymphocytes (**Table 2**).

Table 2. Hematological parameters

Parameters	Abbreviation	Referent's values
Haemoglobin	HB	111-168 g/l
Erythrocytes	RBC	3,7 – 5,2 T/l
Leucocytes	WBC	4,4 – 12,5 G/l
Haematocrit	HCT	31 – 45%
Mean corpuscular volume	MCV	70 – 93fl
Mean corpuscular haemoglobin	MCH	23-43 g/l
Mean corpuscular Hgb content	MCHC	320 – 360 g/l
Mean corpuscular Hgb content	LY#	154 – 521 x 10Ù9/l
Lymphocytes	PLT	20 – 40 %
Thrombocytes		

For all statistical tests, SPSS.13.0 software was used.

All variables are presented as means (± S.D.). As normal distribution was assumed, the t-criteria of Student for parametric comparisons of the two related samples compared the changes in hematological parameters.

RESULTS

1. Mean, variability and significance of the differences for hematological variables

Table 4. Changes in haematological parameters (means±standard deviation and comparative t-criteria) after 22 day live and train high (p£ 0, 05; * – statistically significant

Variables	`C - Pre		`C - Post		t -test	a
	`C	S±	`C	S±		
Hemoglobin	146	8.79	151	9,44	1.94	0.08
Erythrocytes	4.78	0.29	5.11	0.31	3.25*	0.01
Leucocytes	5.73	1.27	6.62	1.44	2.18*	0.05
Hematocrit	0.42	0.02	0.45	0.02	2.92*	0.01
Mean corpuscular volume	88.00	3.02	89.00	3.23	1.56	0.15
Mean corpuscular hemoglobin	30.60	1.35	29.68	1.14	5.45*	0.00
Mean corpuscular Hgb content	345.00	4.98	332	4.02	5.62*	0.00
Lymphocytes	1.88	0.56	1.83	0.34	0.37	0.72

The statistically significant differences can be observed for the following variables: erythrocytes (t=3,25, α=0.01), leucocytes (t=2,18, α=0.05), hematocrit (t=2,92, α=0.01), mean corpuscular hemoglobin (t=5,45, α=0.00) and mean corpuscular Hgb content (t=5,62, α=0.01). Approximately 3,42% in Hgb, 6,5% in the erythrocytes and hematocrit 96,6%) is observed, indicating the process of immediate adaptation of the hypoxia.

Unchangeable remain the values of Hb (146 ± 8,79 vs. 151±9,44g/l, Pt=0,92), mean corpuscular volume Hgb (88 ± 3,02 vs. 89 ±3,23f/l, Pt=0,85), and lymphocytes (1,88 ± 0,56 vs. 1,83 ±0,37 g/l, Pt=0,28).

Figure 1 shows the variability of the hematological variables during conventional form of altitude training. The lowest variability (or a high homogeneity) was established before the experiment. The most stable variables remain the following: MCV, MCH and MCHC.

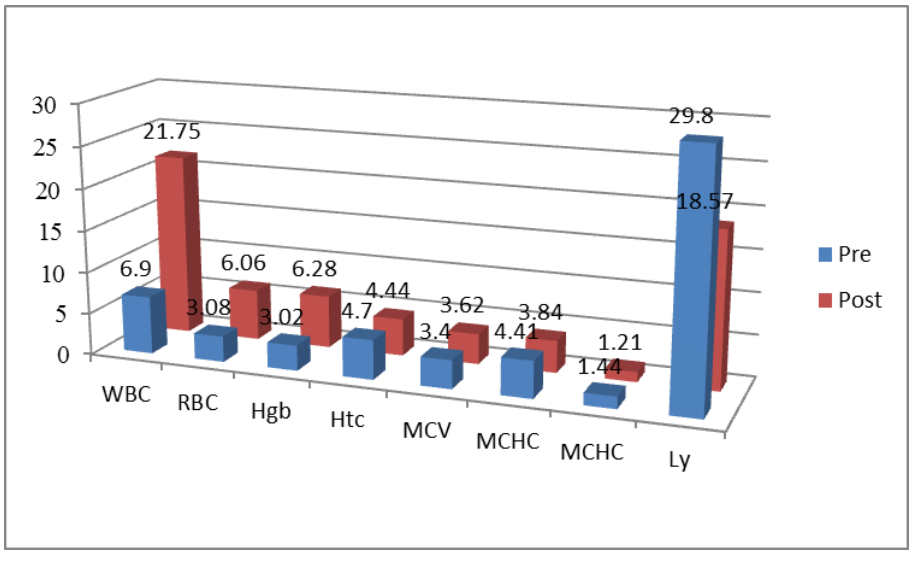

Figure 1

The lymphocytes stay with the highest variability before and after the experiment (V=29,89% and V=18,57).

2. The correlation between the variables

Table 5 shows the correlations between haematological variables.

Table 5. Correlations between hematological variables after the experiment (*p ≥ 0, 05, * - significant correlations*)

Variable	WBC	RBC	Hgb	HCT	MCV	MCH	MCHC	Ly
WBC	**1**							
RBC	.67*	**1**						
Hgb	.67*	.80*	**1**					
HCT	.77*	.86*	.95*	**1**				
MCV	.24	-.15	.43	.34	**1**			
MCH	.02	-.27	.35	.18	.93*	**1**		
MCHC	-.53	-.38	-.09	-.38	.07	.42	**1**	
Ly	.45	.22	.34	.50	.35	.21	-.36	**1**

The following significant positive correlations could be observed:

- between WBC and RBC (r=-0,67);
- between Hgb and WBC (r=0,67);
- between Htc and WBC (r=0,77);

- between Hgb and RBC (r=0,80);
- between Htc and RBC (r=-0,86);
- between Htc and Hgb (r=0,95);
- between MCH max and MCV (r=0,93).

The observed intra-correlations between the haematological variables are logical and normally functional.

DISCUSSION

Our results provide clear evidence that the training, specifically well-oriented significantly changes some hematological parameters, mainly erythrocytes, hematocrit, MCH and MCHC during a 22-day mesocycle and exposure to a high altitude (2048m).

This may lead to an improvement of the sea-level performance capacity of the boxers. That provides clear evidence of the complete influence of the hypoxia, the nature of the work and the rapid course of the adaptation process.

The high homogeneity of hematological variables before and after the experiment, using the hypoxia, shows that attitude changes the hematological status of the boxers.

This research confirms the fact that adaptation towards hypoxia, irrespective of the applied concept, has specific character. That statement is shared by many researchers and scientists, such as Chapman, Stray - Gundersen, Levine, 1998; Fridmann et al., 2005; Martin, 2006. It most probably has to do with an individual mechanism for adaptation to high-altitude conditions, which divides the athletes in two major groups: “responder” and “non-responder” towards altitude stress. Adaptation to sharp hypoxia stress however cannot be considered as an indicator for receptiveness of the hemoglobin’s mass of different athletes. (Fridmann et al., 2005).

The observed non-significant changes in Hb can be related to the very high starting mean value, near to the referent and substantial individual variation in hematological response to altitude (Gore et al., 1998). The observed non-significant changes in Hb can be related to the very high starting mean value, near to the referent and substantial individual variation in hematological response to altitude (Gore et al., 1998).

In some publications (Wehrlin, Marti, 2006; Spencer, McLean, Kolb, Chapman, Saltin, Levine, 2006; Heinicke, K., I.Heinicke, Schmidt, Wolfarth, 2005), it is accepted that the increase in the erythrocytes can be attributed to the slow adaptation reaction, but is also related to the increase in erythropoietin (EPO), which, on the other hand, stimulates the erythrocytes synthesis from the bone brain. Most of the investigators stated that a longer period of time is necessary for an effective stimulation of the active synthesis.

The positive changes in leucocytes may be informative for their activation, respectively activation of the immune status of the athletes (non-clinical inflammation) and also the influence of the well-oriented training tools.

Most probably, the altitude is a factor – mediator of the immune repression (Bailey, Davies, 1997).

CONCLUSION

The performed experiment with top-level Bulgarian national boxers shows that the hypoxia can be used as a stress-factor for provoking new adaptation changes related to the blood system.

Probably the specific performance on sea level can be improved but the new studies are necessary.

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SURVEY ON THE AGE DYNAMICS OF SOME OF THE BEST TENNIS PLAYERS IN THE WORLD AND IN BULGARIA

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Keywords: *dynamics of development, establishment of starting age of tennis activities, duration of initial training, competitive activity, age of retirement from competitive activity*

The analysis of the dynamics of training and competition of some of the best athletes is important to establish the main stages of this process proceeds.

Its specific change in the longitudinal isolates plan can serve as an example and comparison of adolescents, their parents and coaches. It is famous dictum that "History is written by the best."

Aim of study:

1. Specifying the starting age for activities - preparation and tennis competitions. The content of this stage include: training of key technical elements of the game and physical development according to the natural resources of each child.

   Participation in competitions in the sports calendar of clubs and country for each age group. For this period P. Sampras points "I was a boy and everything that has been achieved is by hard work."
2. Duration of initial training to start participating in competitions from ITF, ie as professionals.
3. Duration of competitive activities to achieve the highest level of ranking in the world rankings.
4. Age of withdrawal from sport competition.

METHODS

The scientific analysis comprises monitoring to the development of players.

- Competitors from the rank list of WTA and ATP for 2012 and 2013 - respectively -121 males and 100 females from WTA and 122 males and 100 females from ATP, and also 15 of the best Bulgarian athletes of both sexes – sexes – Manuela, Katerina and Magdalena Maleeva, L. Bacheva, Ts. Pironkova, Gr. Dimitrov, Or. Stanoychev, T.Enev and M.Velev, etc.
- Establishing the age of reaching № 1 in the world rankings for the different years of 21 females and 25 male players.
- Benchmarking and comparison of the investigated data.

ANALYSIS OF THE RESULTS

The study shows that the development of the competitors of both sexes there are specific features:

1. **Initial age to start training activities.** It is approximately the same, even though it vary according to the prevailing conditions, the physical and psychological characteristics of the children, parents' attitudes and their ambition for their future growth as a tennis player. The aspirations for success are set out in the first steps towards mastery in the sport especially if parents are former prominent tennis players.

For most of the tested athletes the beginning of the training activity is between 4 and 7 years old. There are significant exception - M.Hingis - 2 years, Sht.Graf – 3 years, as well as Na Li /China / which begins on 9 years.

The average age of the rankings of the 100 women in 2012 was 5.93, and for 2013 - 6.03, while the limited number of competitors from Bulgaria was 6.06 years – Table 1

Similar are the differences and for the men - 5.79 and 5.84 respectively at the world's best tennis players and a 6.33 in Bulgaria. There are also outstanding athletes who started training at a very early age

as A. Murry /UK/ - 3 years, R. Nadal /ESP/ at 4, but there are also players like D.Ferer, who start at 13 years of age (Table 1).

Table.1.

Initial age to start training activities.- %										
age	2	3	4	5	6	7	8	9	10	11
Females										
2012	1.28	5.12	29.07	14.1	17.94	20.5	6.41	7.89	3.84	
2013		9.52	16.66	13.09	19.04	17.81	13.09	8.33	2.38	
BG			13.33	20	26.66	26.66	13.33			
Males										
2012	5.61	4.49	15.73	21.34	20.22	14.60	7.86	6.74	1.12	2.24
2013	2.15	6.45	15.05	24.73	18.27	13.97	10.75	5.37	2.15	
BG.			6.66	13.3	20	33.3	26.66	13.33		

Table.1.

Age for starting training activities. - %										
Age	2	3	4	5	6	7	8	9	10	11
Female	0.82	8.26	19	18.18	17.35	18.18	9.09	6.61	2.47	
Male	4.09	4.91	17.21	21.31	18.85	16.39	7.37	9.01		0.82

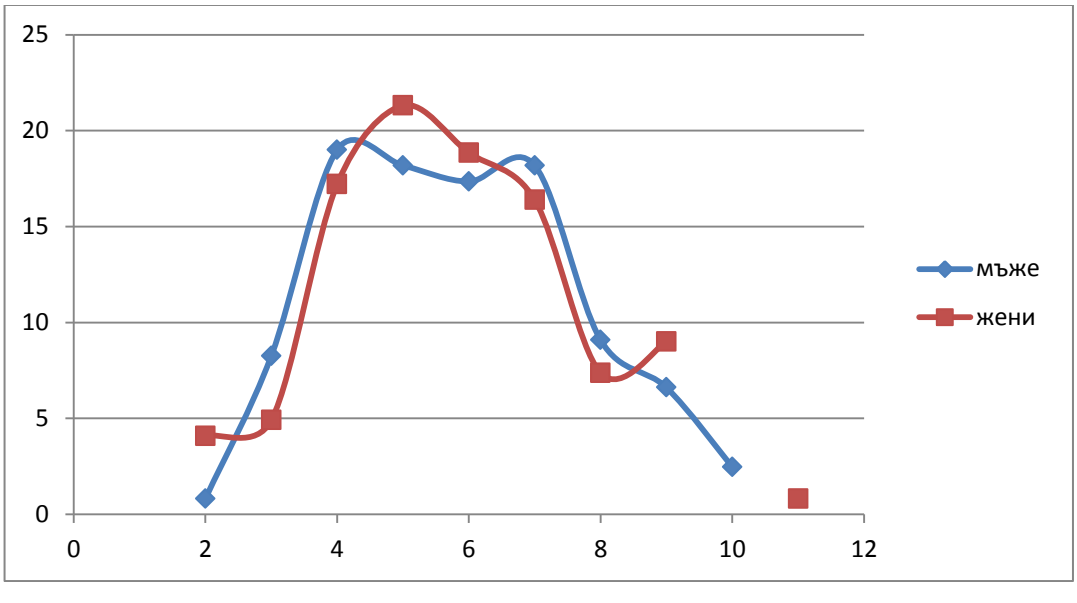

Fig.1

Data from the research also showed that in the world's elite the competitors the highest percentage of those who start at 5 and 6 years old, while the ratio of the Bulgarian athletes is between 6 and 8 years. We can highlight the early starting age for the beginning with the training activities in tennis of the best Bulgarian players - Gr. Dimitrov - 5 years and Tsv.Pironkova - 4 years old - Table 1.

2. **Age for starting professional competitive activities - PRO**. It shows the level, effectiveness and efficiency of the actual training and competition activity carried out from the beginning until now.

Achieved level of preparation is essential for the performance of tennis players because it allows them to participate actively in sports - competitive activities with a desire to achieve victories and progress in

the world hierarchy. It is expressed as well as the achievement of personal authority and importance in these environments, but with opportunities for funding.

The survey showed that the average age of participation in this activity is especially valuable for each one of the top-level players - for 2012 and 2013 it is 18.09 and 15.1, and - 15 and 16.25, respectively, for men and women. It is seen that in males the trend is to decrease, while for women it is about to increase the age. Against the backdrop of the displayed data, the Bulgarian players have too big quantities - 22.07 and 23.46 for women and men. – Table.3.

Table.3

Age for starting a professional competitive activity / PRO / -%										
Age	14	15	16	17	18	19	20	21	22	23
Female										
2012	34	42	15	8	1	6.41	7.89	3.84		
2013	11.11	26.38	22.22	16.66	15.27	6.94	1.38			
BG.	7.14	14.28	21.4	28.57	21.4	7.14				
Male										
2012		8.42	7.36	18.94	30.52	15.78	11.57	3.15	2.1	2.1
2013		2.17	11.95	20.65	36.95	17.39	4.34	2.17	1.08	2.17
BG.				20	26.6	26.6	13.33	6.66	6.66	

3. Duration of the different phases and dynamics of their age in the elite competitors.

Competitive activity and exercise of each tennis player has a different duration as, development and overall performance. It depends on the conditions for conducting sports training and expression, coaches, methodology, success in competitions, health and so on.

Studies show that there are some differences in the average data for both genders:

- The training activity started significantly earlier in women. Values of the age of initial training /especially in women/ compared with men, especially with Bulgarian players are significantly lower - Table 3. The same applies to the starting age for participation in professional sports-competitive activities. The difference in age is approximately two years. This is also indicative of their ranking among the world elite. For the first the evaluation is per I place, according to the Bulgarian competitors- it is ranking on the number of points - Table 3

Table 4

Stages of development, the best competitors pass - X avg.				
Gender / indicators	Beginning in training	Professional competitive activities - / PRO/	Age - The First in world rankings	Year of withdrawal
Female	4.71	15.23	21.19	31.28
Male	6.14	16.24	23.16	32.05
BG - Female	6.66	16. 57	22.07	28.5
BG - Male	7.26	18.8	23.46	30.7

The analysis of the age of quitting sports - competitive activity is also different - higher with the best of the world's elite and smaller with Bulgarian competitors. Table 4

CONCLUSIONS

1. The study was aimed at detecting a wide range of problems which compares the developments in quantitative values of the world's best competitors and Bulgarian competitors in a gradual and comprehensive plan.
2. The study covers the best competitors for 2012 and 2013 in the world and Bulgarian tennis. The results will show to everybody the trends in the world's best and Bulgarian athletes, who have focused their efforts to reach the tops of the sport.
3. The study shows the longitudinal development of age aspect of age of beginning, the level of realization and the withdrawing from competition. For most of them it is very important, because, somewhat it become a profession with the relevant responsibility and priority.
4. The study of specific quantitative indicators in the development of the competitors - tennis players must be subject to ongoing analysis and to serve as a benchmark with which have to comply all current and future competitors.

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ANALYSIS OF THE RESULTS IN LIFESAVING WORLD CHAMPIONSHIPS – EGIPT, 2010 AND AUSTRALIA, 2012

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Key words *(lifesaving sport, competition, result, features)*

Lifesaving is a relatively new sport. The first competition was held in 1955. Two years earlier the first demonstration of competitive disciplines was made.

Lifesaving sport originally is imposed as a sport of applied nature. The goal was through competition to exchange experiences, to demonstrated new exercise and elements which are used in rescuing techniques.

The present competition program includes pool and surf (open water as ocean, sea, lake and etc.) events.

Unifying factor for all water rescue organizations around the world is International lifesaving federation (ILS). The main goal of ILS is to reduce drowning in the global aspects (3, p. 3). One of the mechanisms for that is conducting and organizing the sport events. Thorough the sport ILS is able to lure in a very attractive way the young people into the cause of saving lives. Still no one has done a study how many of the lifesavers remain in the system of water rescue after the end of their active competitive career. But in Bulgaria this percentage is almost 100%.

ILS is the body that develope a lifesaving sport on the international level. ILS is recognized by many other international organizations as IOC, WHO, CISM, Sport Accord, IMGA, ARISF, IWGA, corresponding with ICRC, IFRC, TASC and IFSTA (5). There are 114 National lifesaving organizations which are members of ILS.

Tournaments which are conducted under auspices of ILS include (6):

- WORLD CHAMPIONSHIPS, called **RESCUE SERIES**
- REGIONAL CHAMPIONSHIPS as: **European Championships**, **Junior European Championships**, Middle East Competitions;
- Lifesaving sport is included in several international MULTI-SPORTS EVENTS such as: World Games, Military World **Games,** World Masters Games, Commonwealth Championships, Military World Championships.

Bulgaria also has a place in the sport.

Bulgaria also has a place in that sport. Since the establishment of Bulgaria Water Life Saving Service (which is part of the Bulgarian Red Cross) in 1964 and its first participation in the World Championships in 1967 Bulgarian athletes won their first awards. Up to now in the lifesaving history Bulgaria has won 7 World titles and number of ranking in the top in international competitions. Unfortunately in the recent years the achievements of Bulgarian athletes in this sport significantly reduced.

Like many other sports lifesaving also has different periods of change. (1, p. 61).

Current competitive program of the highest sports forum in lifesaving sport - Rescue Series, include 10 disciplines in swimming pool and 10 in surf environment (6 individual and 4 relays). With each succeeding competition the number of countries and participants is constantly growing along with this and rivalry. In the Rescue 2010, 43 Nations and more than 3 000 athletes took part in the competition. (4)

Increasing rivalry and poor performance of Bulgarian athletes direct us to the choice of our topic.

Studying the outcomes of the last two Rescue series held in Egypt, 2010 and Australia, 2012 we emptied the following **working hypothesis**: There are countries that are represented in Rescue Series with

teams specialized only in the pool events or in surf events. This gives them enough points in the final team standings to occupy the front rank.

The aim of our study is to: Analyze the final results in the man ranking from the competition disciplines in pool and surf event in the last two World Lifesaving Championships and to establish characteristics affecting overall.

The tasks that we set to achieve the aim are:

- Surveying the results in the different pool and surf disciplines;
- Preparing the graphical models of the result in the final man ranking in the pool and surf events to all nations earned points;
- Analyzing the graphical models and preparing recommendation for possible opportunities for higher position in the final ranking in Rescue series.

THE METHODOLOGY OF THE STUDY INCLUDES

- Research and analysis of documents / competitive rules /;
- Systematic and statistical processing of data;
- Expert assessment;
- Pedagogical analysis.

DISCUSSIONS AND ANALYSES

On (**Fig. 1**) shows how it has developed the sport water rescue in the last 20 years. It illustrates the increasing number of nations taking part in the World Championships.

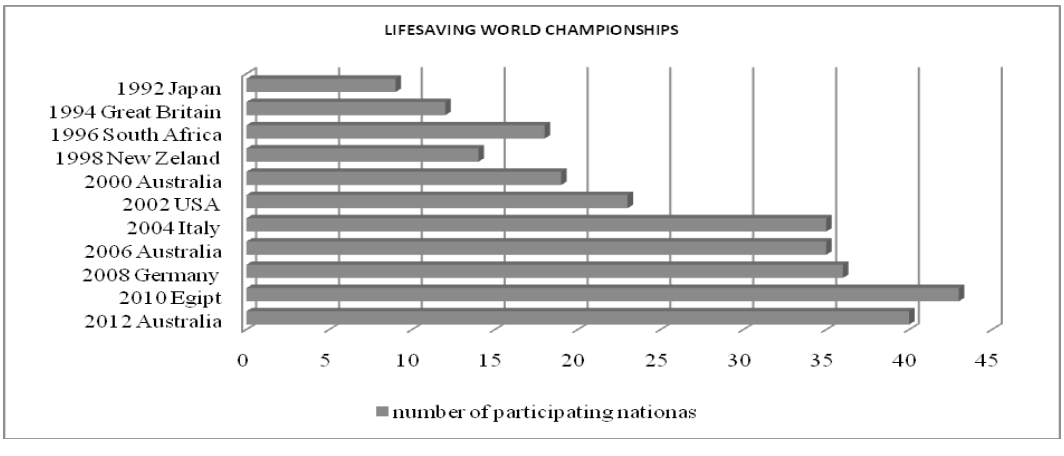

Fig. 1

The next graph (**Fig. 2**) demonstrates that in the both studying RS the ratio number of participating nations to the number of the nations earned points in the final ranking is relatively constant. This allows us to define a survey as reliable.

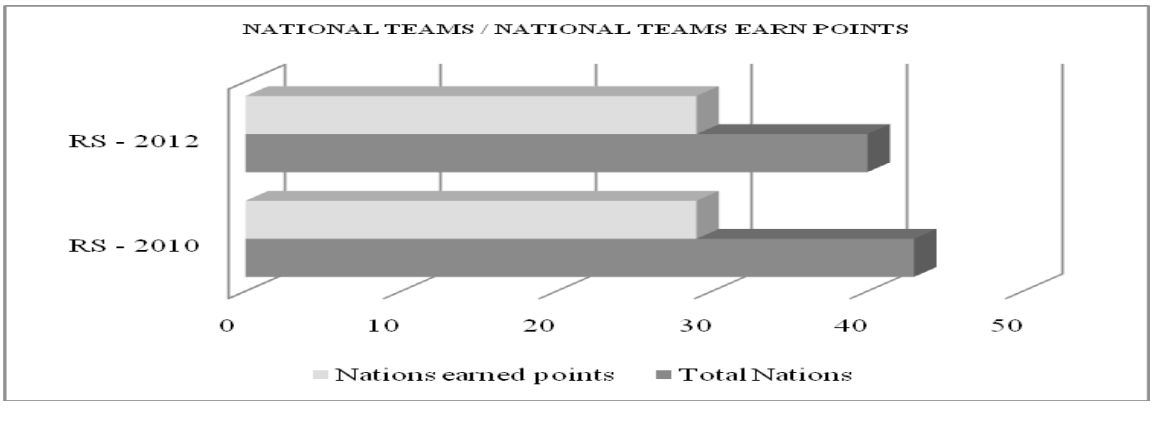

Fig. 2

There have been several specific features in the allocation of the male result in the different pool and surf disciplines during the RS 2010 which is shown in percentages at the Fig. 3.

From 29 countries, earned points in the final standings, almost 50% of them are earned either from the disciplines in the pool or just those at surf. Nine nations mainly took points from the pool events, as Germany, Italy, China, Poland, Chinese Taipei, Norway, Singapore, Ukraine and Bulgaria. On the other hand the athletes from 5 Nations - Great Britain, USA, Egypt, Ireland and Slovenia had better result specific in ocean events.

7 nations are qualify with a relatively equal number of points as well as the pool and the surf disciplines - New Zealand, Australia, France, Spain, Denmark, Switzerland and Iran.

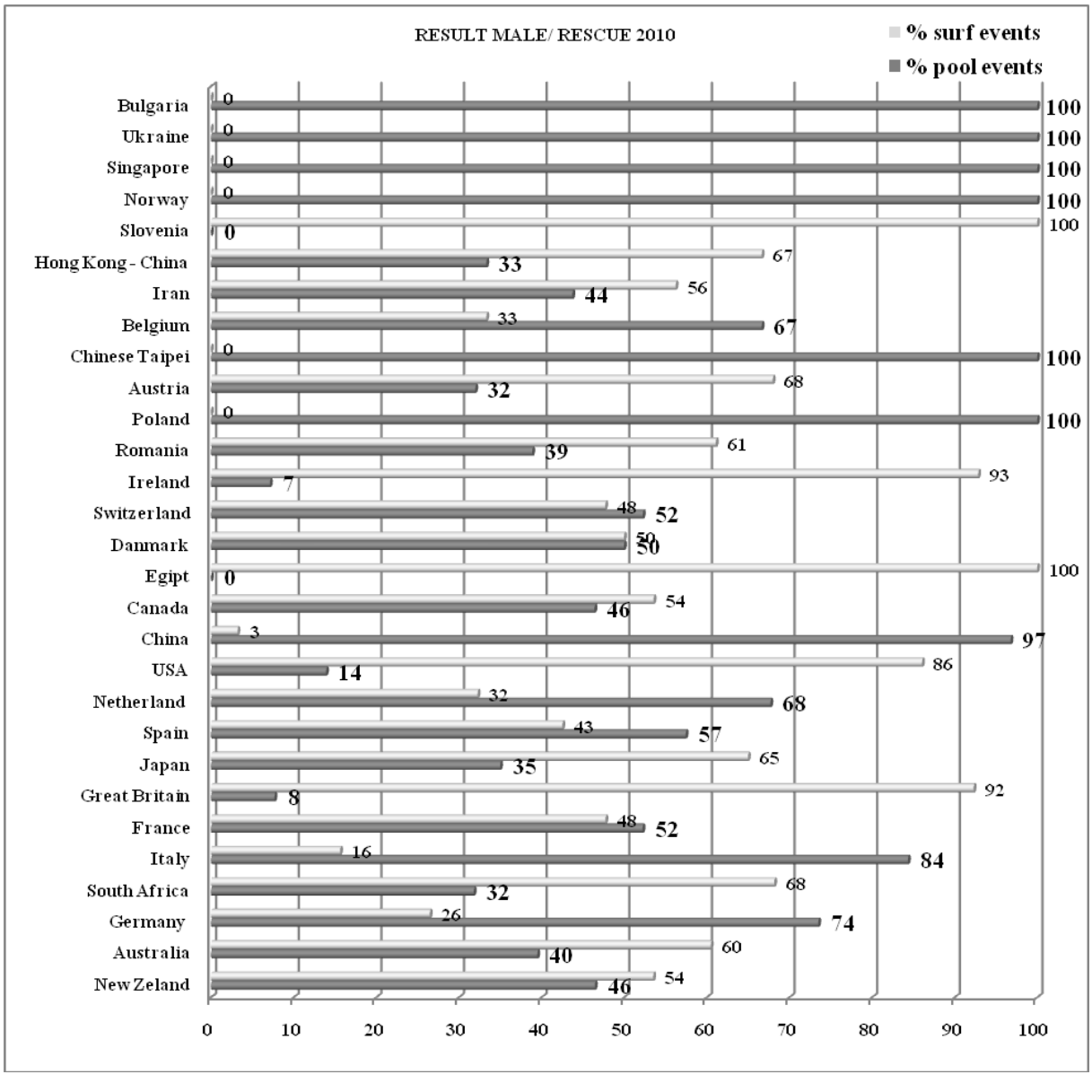

Fig. 3

Analyzing mainly in which disciplines generally the participants made frontal ranking shows that more of the countries that takes part in the competition do not emphasis on the complex athletes that are equally good in pool and surf disciplines. It is notable that in most cases these are very well trained athletes in the disciplines associated with running on the beach (beach sprint, beach flags, beach relay) or in the disciplines related to paddling (ski race, board race, board relay). In both kinds of disciplines required very specific training. The ILS competition rulebook is not obliges competitors to participate both to the pool and surf disciplines during the Rescue Series. This allows some countries to include in

the composition of the team highly trained track and field athletes or paddlers who get top position. Is largely undermines lifesaving sport and distorts the original idea - to have complex athletes.

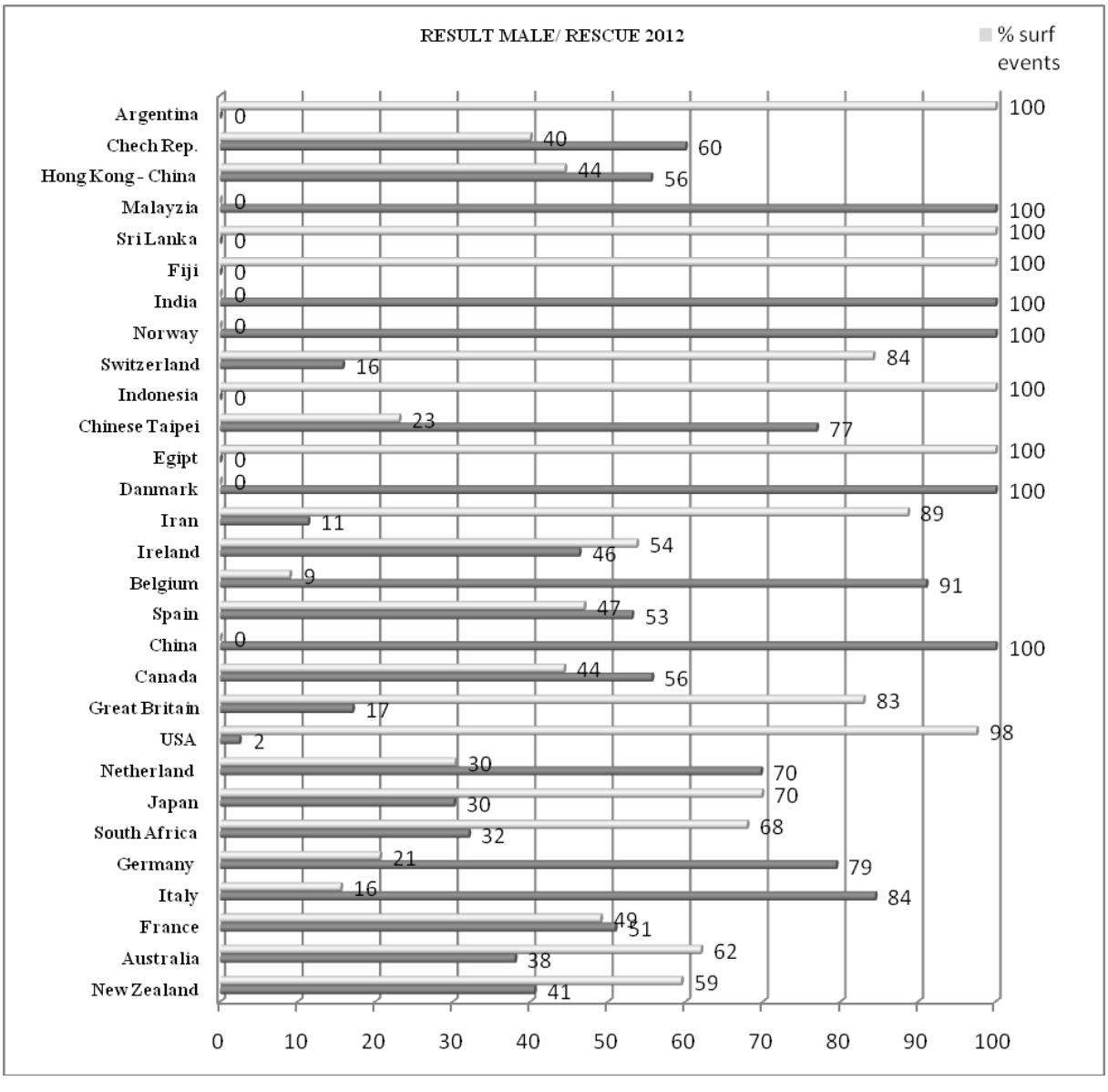

Fig. 4

Here (at fig. 4), as the analysis of Rescue series 2010, shows that there is a clear trend in the half of the countries to have earned points only in pool or surf event.

This gives us reason to believe that the existing rules has the potential for a relatively good general classification through specialized training of athletes in certain disciplines.

RECOMMENDATIONS:

Following the traditions of the past and won seven world titles in lifesaving up to now Bulgaria is represented at the Rescue Series, mainly from swimming competitors, proven in swimming state championships in our country.

By merging the two existing international lifesaving organizations into one - ILS and incorporation of large number of surf events, shows that the existing practice for selection of lifesaving athletes in Bulgaria is not sufficiently effective.

Under ISL competitive rulebook the teams participating in the World Championships can be presented

by maximum 12 competitors - 6 male and female. More than 2 representatives from country cannot participate in each individual event. This allows the selection of athletes to be varied in order to achieve better results in the various disciplines from the World championships program.

Set of recommendations intended to improve the country's ranking in future participation in World Championships.

- To include athletes from other sports in the preparation of competitors who intend to take part in ongoing control competition for determination the composition of the team for Rescue Series.

For instance:

The sport canoeing the athletes not just have a good paddling skills but also have good swimming and running training, which can help to the team to achieve a higher position in most surf events. The inclusion of such competitors will help the team to get a higher position in the disciplines - Beach sprint, Beach flags, Surf ski race, Board race, Beach relay, Ocean relay. Also they can successfully engage in pool events as Line throw and Simulated emergency rescue response.

- On the other hand, in order to keep the original idea of this sport, we believe that it is necessary ILS to take steps for changing the competition rules that will provide complex training of athletes. This could be achieved by requiring all athletes to participate at least on two pool disciplines and so on surf.

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METHODOLOGICAL CLASSIFICATION OF EXERCISE OF BEAM

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Keywords: beam, velocity gradient, methodical classification, multi-training

INTRODUCTION

In the process of the multiannual training in artistic gymnastics increased the reliability and the stability of performance of the different gymnastic exercises connections of them and competitive combinations [6]. The beam is a type of gymnastics all around that symbolizes the accuracy and elegance of motor actions of a small footprint. Many authors state that apparatus as a "checkpoint" for successful performance in the different competitions [4, 5, 6]. Research shows that mistakes in training and badly used motor habits beam are responsible for reduction of the stability and reliability of performance [1, 3, 7]. The conducted research of the state of the system of training of Bulgarian gymnasts of the balance beam showed, that the digested material volume of this device for different age groups progressively decreased [8]. Reason for this, according to the author is the reduced requirements in the first racing age - nine years. Development of the balance is most intense in the period 7-10 years [2], we therefore consider that finding objective criteria for determining the sequence of exercises to study in this sensitive period will optimize training. The displayed methodical classification of mixed parallel bars and vault on the basis of objective kinematic criterion - a velocity gradient, led us to look for this dependence and the appliance beam [9, 10].

Therefore the aim of our study is to establish its importance for creating a learning algorithm in multi-aspect and the beam. For this purpose, we set the following tasks:

- To make kinematic analysis of basic exercises of a beam from different structural groups with various difficulty.
- To find velocity gradient and to compare and analyze the obtained results for the different exercises.
- To offer methodological classification based on the velocity gradient in multi-aspect.

METHODOLOGY

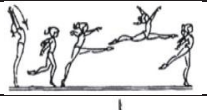
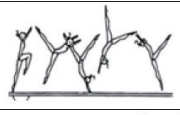
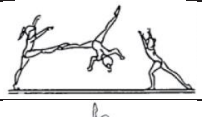
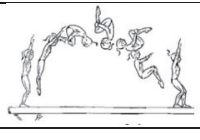
For the realization of our study we used the following methods: kinematic analysis, comparative analysis of the kinematic parameters, statistical methods. Were examined gymnastic jumps, handspring fwd, free aerial exercises, salto fwd and bwd performed at the European Gymnastics Championship - women in 2014.

ANALYSIS OF RESULTS

Was made a kinematic analysis of different structural exercises from groups with varying difficulty, but basic for the beam. It has been found, and the gradient of their velocity, or the time required to reach top speed in the base part of study movement. Interesting results received different from the other two research apparatuses - uneven bars and vault. Of **table 1** presents the values of the velocity gradient of the basic exercises - those with the lowest difficulty, by the structural group -gymnastic jumps, handspring fwd, free aerial exercises, salto fwd and bwd. Received results show that the split leap fwd from difficulty group "A" – the lowest according to the international rules of gymnastics has gradient 9.75 m/s2, and free aerial cartwheel group "D" it has the value 6.75 m/s2. The gradient of the velocity of a handspring fwd difficulty B is 9 m/s2. The analysis of these figures shows that the established correlation of mixed parallel bars and vault between magnitude of the gradient and difficulty of the exercises

from different structural groups do not confirmed to the beam. This we believe has its logical explanation of the different biomechanical characteristics of exercises from different structural groups. The split leap creating greater horizontal velocity due to the specifics of the movement. This is the reason for the higher a velocity gradient. The lack of turning around any axis of the body and the lower complexity of coordinating the movement makes it easier to maintain balance, which leads to a small difficulty of implementation rules according to the judgment. Similar is the situation with other basic exercises for different structural groups. Indicative value of the gradient of pen-side scrolling – 6.75 complexity of group "D and group "B" flips and a value of 9 m/s2 (**Fig. 1**). In the first exercise is rotating around two axes - lateral and transverse, and in the second the movement is around one. Both require optimal horizontal speed for the successful execution of the exercise. Analyzing the results, we can say that there is no link between the difficulty on the one hand and the time to reach maximum speed on the other in exercises from different structural groups.

Table 1. Basic exercises from different groups on balance beam

Exercise	Фигура	Group of difficulty	Gradient (m/s^2)
Split leap fwd		A	9,75
Handspring fwd		B	9
Flic-flac with step-out		B	9,75
Salto bwd tucked		C	7,5
Free (aerial) cartwheel		D	6,75
Salto fwd tucked		D	12,75

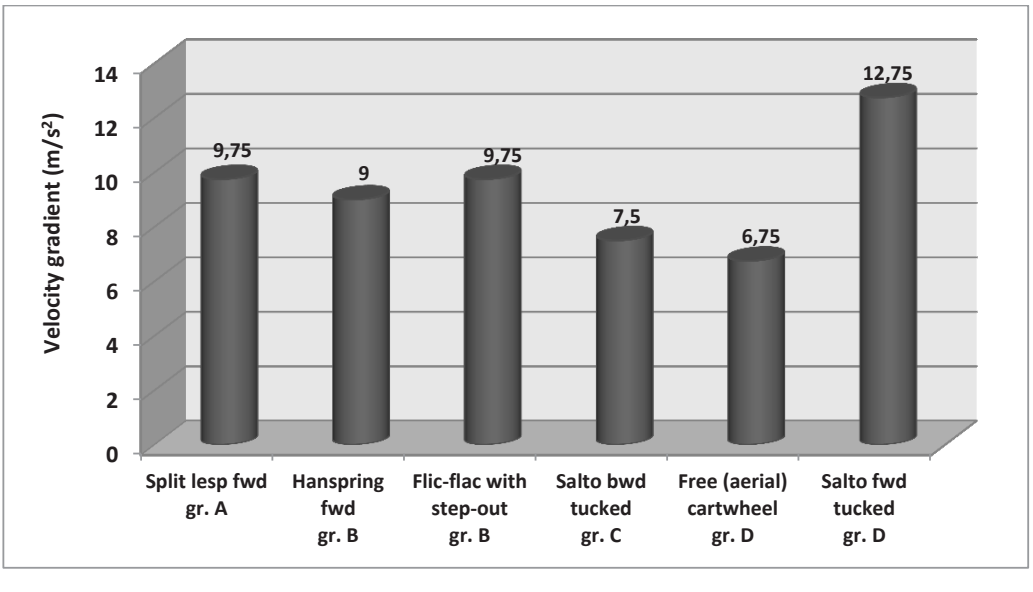


Fig. 1. Velocity gradient of the basic exercises on balance beam

Table 2. Velocity gradient of the gymnastic jumps on balance beam

Group exercises	Name	Group of difficulty	V max (m/s)	t (sec)	Gradient (m/s^2)
Gymnastic jumps	Split leap fwd	A	1,95	0,20	9,75
	Switch leap	C	2,20	0,20	11
	Switch leap with ½ turn (180º)	D	3,75	0,20	18,75

Table 3. Velocity gradient of the acrobatic exercises on balance beam

Group exercises	Name	Group of difficulty	V max (m/s)	t (sec)	Gradient (m/s^2)
Handsprings	Handspring fwd	B	1,80	0,20	9
	Flic-flac with step-out	B	1,95	0,20	9,75
	Round-off in connection with any exercise	B	2,95	0,20	14,75
Free aerial exercises	Free (aerial) cartwheel	D	1,35	0,20	6,75
	Free (aerial) walkover fwd	D	1,95	0,20	9,75
	Salto swd tucked	D	2,40	0,20	12
Salto bwd	Salto bwd tucked	C	1,5	0,20	7,5
	Salto bwd stretched step-out	C	1,95	0,20	9,75
	Salto bwd stretched with legs together	E	2,65	0,20	13,25
Salto fwd	Salto fwd tucked	D	2,55	0,20	12,75
	Salto fwd piked	E	3,80	0,20	19

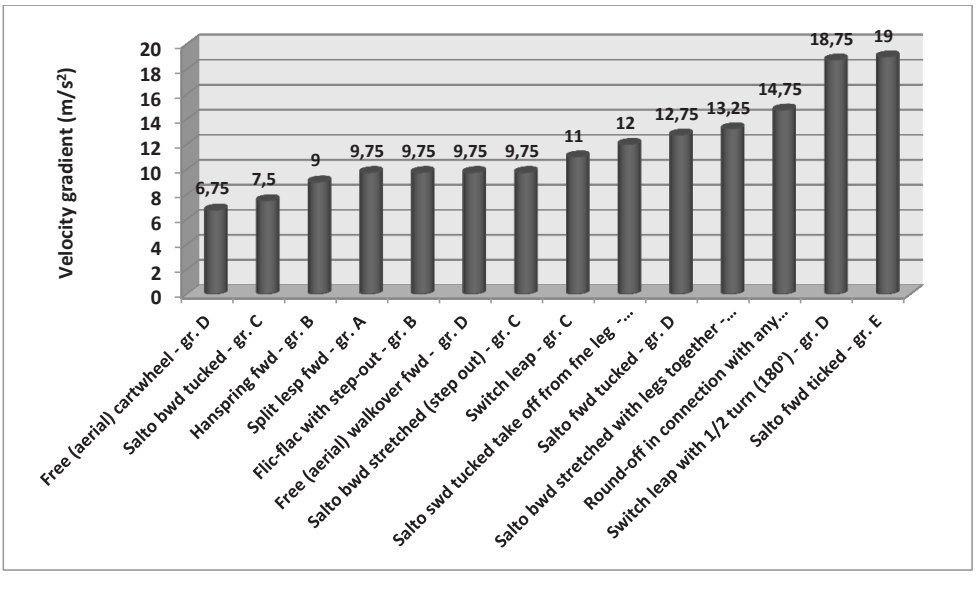


Fig. 2. Velocity gradient of the exercises on balance beam

Table 4. Methodological classification exercises of the different groups on balance beam

Stages / Group exercises	Initial training		Early specialization		Sports improvement		
	5-6 years	**6-7 years**	**8-9 years**	**9-10 years**	**10 years**	**11 years**	**12 years**
Gymnastic jumps		Split leap fwd	Switch leap		Switch leap with ½ turn (180º)		
Handsprings			Handspring fwd Flic-flac with step-out	Round-off			
Free aerial exercises				Free (aerial) cartwheel	Free (aerial) walkover fwd	Salto swd tucked	
Salto bwd				Salto bwd tucked	Salto bwd stretched step-out	Salto bwd stretched with legs together	
Salto fwd						Salto fwd tucked	Salto fwd piked

The situation is different in values of the gradient of velocity and the difficulty of the exercises from the different groups bringing together similar character of movements. In structural group jumps (**table.2**) are presented three exercises – basic and two with constructive difficulty. It is clear that the established dependence of vault and uneven bars mixed confirmed here. A large amount of movement in the base part increases the velocity gradient, so the values obtained are directly proportional to the difficulty. No different is the ratio in other structural groups – gymnastic jumps, handspring fwd, free aerial exercises, salto fwd and bwd (**table.3**). We note that despite the difficulty of the exercise, when performed in conjunction, it increases the gradient, which is logical. So the group of acrobatics flights, round off gradient is 14.75 m/s2, although with difficulty "B". This value is greater than the tested exercises. Interesting is the fact that the gradient of the salto bwd stretched with difficulties "E" in acrobatic series does not reach such values. The highest recorded was 13.65 m/s2. The reason for obtained results is that the round off is the first exercise and the creates greater speed is necessary for the performance of the series.

Figure 2 shows the sequence of exercises based on the gradient of the velocity. As already found it did not meet the methodological consistency of training in multi-aspect. That's why we prepared this classification exercise, but structural groups (**tabl.4**).

CONCLUTIONS

The analysis allowed us to draw the following conclusions:

1. The time to reach maximum speed - velocity gradient of a beam depends primarily on the type of exercise.
2. The gradient of velocity can be objective criterion for establishing the classification of methodological exercises in this unit only in the individual structural groups.

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EYOF 2013 POMMEL HORSE FEATURED ELEMENTS AND THEIR COMMITMENT TO BASIC EXERCISES

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***Keywords**: gymnastics, pommel horse, basic exercises*

INTRODUCTION

In order to increase the level of technical preparation of gymnasts, a comprehensive study of the motive process is necessary, as well as obtaining new knowledge in this field.

Sport development system contains a multitude of components, while the sport results are indicator of preparation efficiency. It is well known that the high level of technical preparation is crucial for reaching high sport achievements. Increasing technical skills is one of the main goals of everyday training process. Technical preparation is considered one of the most significant divisions of sport preparation.

Target research, relevant to the different aspects of motive act, is needed to solve practical tasks and to highlight sport technique.

The purpose of this research is to observe and analyze the gymnastics routines of the participants in EYOF 2013**.**

To reach this goal, the following **tasks** must be resolved:

1. To observe the pommel horse routines of all 84 participants in the European Youth Olympic Festival that has taken place in 2013.

2. To analyze these routines and to establish a connection between the performed elements and basic pommel horse exercises

3. To draw conclusions and to give due recommendations.

METHODOLOGY

The mastering of basic pommel horse exercises is prerequisite for the correct and in time study of other more complicated exercises. We are focusing not only on the pommels, but on the study of cross circle, cross circle between pommels, rearways cross circle, as well as cross circle on one pommel. To achieve that we observed the participants and their pommel horse routines at the European Olympic Festival in Utrecht, Netherlands in 2013.

RESULTS

Having in mind the conducted observation we can conclude that:

From second element group, i.e. circles, flairs , with and without spindles and handstands, from all 84 participants only 2 or 2.4 % have performed spindle in cross support, which is a very low percentage because of the element intricacy (**figure 1**). It corresponds to cross and rearway cross circle.

From 84 participants eleven have performed „Magyar" (pommel- pommel), the element is from third element group – travels in side and cross support, and is of "C" group difficulty. This element corresponds to cross, rearway cross and cross circle on one pommel which we study (**figure 2**).

The element „Magyar" (travel in cross supprt) is from the same group and 46 out of 84 participants have performed it. It is of „D" group difficulty, and corresponds to all basic exercises that we study (**figure 3**).

Two more participants, meaning 48 out of 84 have performed the element „Sivado" (travel in rearway cross supprt), which is also from the same third group and of „D" group difficulty. This element corresponds to all exercises that we study (figure 4).

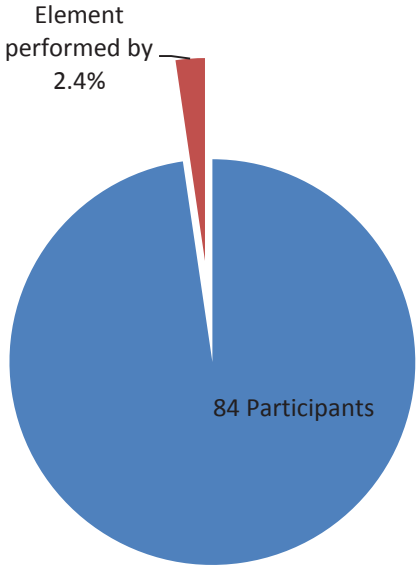

Figure 1. Percentage ratio of who performed group 2 element spindle

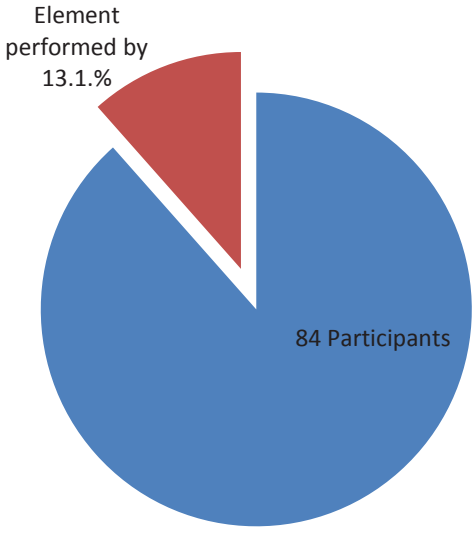

Figure 2. Percentage ratio of who performed group 3 element „Magya

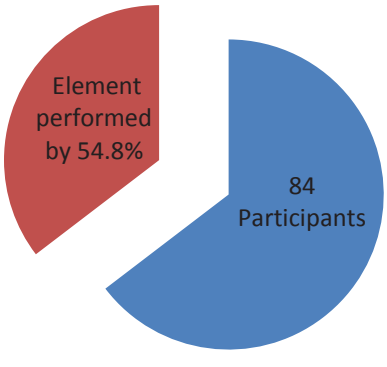

Figure 3. Percentage ratio of who performed group 3 element „Magyar“

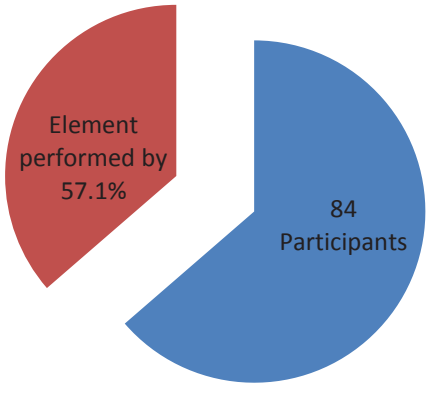

Figure 4. Percentage ratio of who performed group 3 element „Sivado“

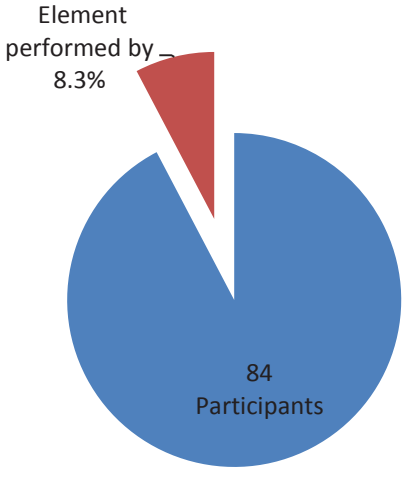

Figure 5. Percentage ratio of who performed group 4 element combination „ D“

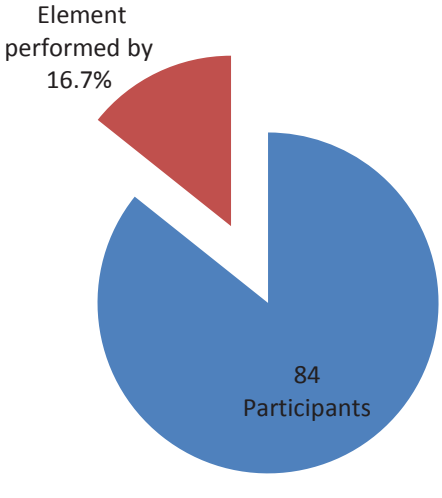

Figure 6. Percentage ratio of who performed group 4 element combination „ D“

According to us, these three elements from third group are the groundwork of pommel horse mastering because they contain all basic pommel horse exercises that we study here.

The fourth group includes kehr and wende swings on hors`s neck, body and pommels on horse, as well as circle on one pommel , „Stokli“ (circle in one pommel with ¼ turn) and their combinations. The following elements, observed by us, are exactly from that group.

The first element is a combination of circles and/or „Stokli“ and „Russian“ wendeswing. Its difficulty is of “D” group and is performed only by 7 out of 84 (Figure 5).

The combination of circles and „ Stoklis“ is from the same group. It can be of „D” or „E” difficulty and it depends on the number circles or „ Stoklis“ that are included. Element of „D“ difficulty is performed by total 14 participants or 16.7% out of 84 participants (figure 6).

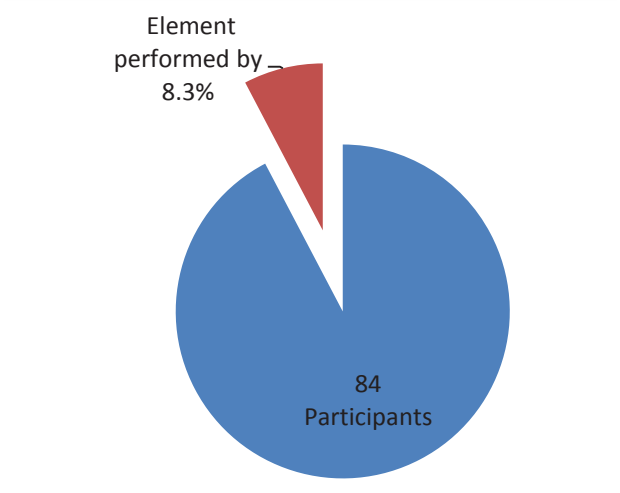

Figure 7. Percentage ratio of who performed group 4 element combination „ E“

Only 7 participants or 8.3% out of 84 participants have performed elements of “E“ difficulty (figure 7).

All group four elements correspond to basic exercise cross circle on one pommel that we study here.

CONCLUSIONS

From the conducted analysis, we have established that in all 84 pommel horse routines the participants have performed at least one of the examined basic exercises.

The mastering of those basic exercises and the application of respective strength preparation during the training process may lead to better results

For proficiency in the exercises mentioned above, we recommend the usage of auxiliary apparatus (gymnastic mushroom, short horses with or without pommels and simulation devices) to begin way back at early childhood age by including those apparatus in gymnastics national championships.

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ANALYSIS OF HURDLE CLEARANCE STRIDE TECHNICAL WEAKNESSES AT THE BEGGING AND IN THE END OF RACE DISTANCE IN THE DISCIPLINE 110 M HURDLE RUNNING

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Key words: *110 m hurdle running, men, hurdle clearance analysis*

INTRODUCTION

The 110 m hurdles discipline for men is characterize by all athletics specialists as one of the most difficult both in technical and physical aspects in the athletics competition program.

The main difference from all other track events is the specific hurdle clearance stride. In the discipline the hurdler must clear 10 hurdles (height 106,7 centimeters). From the start line to the first hurdle the distance is 13,72 meters and elite hurdlers run this part of the race on 7 or 8 running strides. The distance between the hurdles is 9,14 meters and it is covered by the athlete on 3 running strides and the fourth stride is the specific hurdle clearance stride. From the last 10th hurdle to the finish line the hurdlers must run in total 14,02 meters to finish the race.

In this discipline, there are no favorites for winning the heat or the final race. This is so because athletics history remembers many story of athletes favored by the specialists and the crowd to win, but they push hurdle (or several hurdles), disrupt their three stride running rhythm, many times they fell down and do not finish at all. We can summarize that 110 m hurdle running for men is very spectacular and risky discipline.

METHODOLOGY

The purpose of this study is to reveal the weaknesses of hurdle clearance stride of 110 m hurdlers in different parts of the race distance. Respondents are all hurdlers men – participated in the Bulgarian National Championship outdoors 2014. We analyzed specially taken videos during the National Athletics Championships 2014. All videos were analyzed separately, and conclusions of the most common mistakes are made. The video camera takes videos with 240 frames per seconds. The video data was analyzed with the help of computer configuration and special software: DartFish Connect version 4.5.2.0 and Kinovea 0.8.15.

In the following research are included all hurdlers, participated in the National outdoor championships men in the discipline 110 m hurdles – in total 9 hurdlers. During the competition race all athletes were recorded by camera situated near the hurdle.

In total we use 23 indexes reveling hurdlers technique. (see Table 1).

RESULTS

In view of the objective of the study we must note that during the video recording of the races wind speed was around -1 m/sec. All athletes included in the study finished successfully the race.

Table 1 presents all included in the study indexes (in total 23). They are registered both on clearing first and ninth hurdle. Thus, the data presents individual characteristics of the hurdle clearance stride. – basic element in the hurdle running.

Indexes included in section A (the take – off, braking phase) present one of most important elements in hurdle clearance – the approach before the hurdle. The main task of this element and the other following is to save vertical speed. The touch down angle of take – off braking phase varies between 61 and 79

degrees for the first hurdle and 58 and 73 degrees for the ninth hurdle. Almost all of the athlete need to perfect this fact due to the place they touch the ground and body posture. Also the braking phase both in 1st and 9th hurdle should be minimized and from there we will save more vertical speed.

B indexes give us some information about the take – off phase vertical position. We find here the following tendency – the support knee angle during body vertical position is around 140 – 150 degrees on the 1st hurdle and around 130 – 140 degrees on the 9th.

Table 1. Research data

Research data

signature	index	unit	Milen Vulkanov (15,08 sec.)		Tsvetomir Kirov (15,47 sec.)		Martin Iliev (15,94 sec.)		Aleksandar Aleksandrov (15,96 sec.)		Velko Nikolov (16,16 sec.)		Venelin Tsonev (16,37 sec.)		Emil Georgiev (16,77 sec.)		Yordan Ivanov (17,42 sec.)		Aleksandar Nikolov (17,45 sec.)	
	Rhytmik units		1st hurdle	9th hurdle	1st hurdle	9th hurdle	1st hurdle	9th hurdle	1st hurdle	9th hurdle	1st hurdle	9th hurdle	1st hurdle	9th hurdle	1st hurdle	9th hurdle	1st hurdle	9th hurdle	1st hurdle	9th hurdle
A	Take - off (braking phase)																			
A.1.	Braking phase time (from touching the ground to the vertical position)	sec.	0,023	0,023	0,032	0,027	0,032	0,032	0,023	0,032	0,036	0,050	0,041	0,027	0,036	0,041	0,046	0,046	0,041	0,050
A.2.	Touch down angled during take - off (braking phase)	degrees	79	73	65	67	62	63	68	70	69	55	69	62	67	66	60	55	61	58
A.3.	Body incline durning take - off (braking phase)	degrees	97	84	74	83	79	81	87	71	81	86	101	85	79	83	92	82	83	83
A.4	CM to foot distance (braking phase)	cm	38	28	36	34	41	37	29	35	31	46	46	47	57	31	42	35	39	44
A.5.	Support knee angle when touching the support (braking phase)	degrees	162	158	151	159	145	153	160	165	150	144	160	138	158	150	150	136	164	146
B	Take - off (vertical position)																			
B.1.	Support knee angle during body vertical position	degrees	153	132	152	139	127	142	154	124	146	134	128	121	142	137	136	140	140	133
B.2.	Body incline durning body vertical position	degrees	97	88	77	77	68	80	80	84	82	78	93	86	74	81	79	85	83	79
C	Take - off (propulsion phase)																			
C.1.	Push - off angle (take - off propulsion phase)	degrees	61	62	66	63	64	65	63	65	65	69	75	64	70	65	66	70	72	68
C.2.	Take - off distance	cm	241	220	207	210	213	246	210	197	198	249	200	222	199	175	194	193	183	210
C.3.	Take - off propulsion phase contact time	sec.	0,046	0,050	0,050	0,059	0,036	0,046	0,041	0,055	0,046	0,050	0,066	0,050	0,036	0,046	0,055	0,064	0,055	0,055
C.4.	Attacking leg knee angle on take - off (propulsion phase)	degrees	83	104	100	81	84	88	67	88	97	112	90	95	69	82	79	113	110	109
A.1.+C.3.	Total contact time (take - off propulsion phase)	sec.	0,0690	0,073	0,082	0,086	0,068	0,078	0,064	0,087	0,082	0,1	0,107	0,077	0,072	0,087	0,101	0,11	0,096	0,105
D	Flight phase																			
D.1.	Flight time	sec.	0,211	0,216	0,184	0,188	0,225	0,243	0,225	0,230	0,202	0,243	0,489	0,262	0,202	0,239	0,257	0,257	0,248	0,294
D.2.	Attacking leg knee angle when foot reaches the hurdle	degrees	163	146	160	133	160	150	159	154	139	122	164	157	151	143	128	117	99	105
D.3.	Body incline on pelvis maximal height over hurdle	degrees	53	51	38	45	58	42	48	46	49	54	29	47	47	53	59	50	60	54
E	Landing (braking phase)																			
E.1.	Touch down angle	degrees	81	76	73	77	79	74	80	84	81	89	72	76	79	88	77	75	75	76
E.2.	CM to foot distance	cm	23	27	28	30	18	30	15	16	9	11	30	22	20	7	23	34	25	27
E.3.	Landing distance	cm	138	138	112	99	155	139	151	147	117	163	170	135	115	98	188	168	194	183
E.4.	Body incline at touch down (braking phase)	degrees	75	60	55	52	70	74	75	69	70	77	84	82	60	62	76	75	75	68
E.5.	Contact time - Landing braking phase	sec.	0,014	0,014	0,009	0,013	0,009	0,013	0,009	0,013	0,009	0,013	0,099	0,018	0,009	0,013	0,018	0,023	0,023	0,013
E.6.	Contact time - Landing propulsion phase	sec.	0,014	0,014	0,060	0,064	0,055	0,059	0,046	0,050	0,059	0,059	0,099	0,059	0,050	0,055	0,050	0,064	0,050	0,064
F	Landing (propulsion phase)																			
F.1.	Push - off angle (Landing - propulsion phase)	degrees	53	54	62	55	51	52	58	56	58	49	52	50	68	56	59	51	59	57
G	Hurdle clearence																			
G	Hurdle clearence length	cm	379	358	319	309	368	385	361	344	315	412	370	357	314	271	382	361	377	393

For analyzing the take – off propulsion phase we use 4 indexes. The push off angle varies between 60 and 70 degrees. The value for the fastest hurdlers is closer to 60 degrees. The values between 1st and 9th hurdle are very small. The take – off distance is different for every hurdler. But it reveals the lack of technical preparation – some of the hurdlers attacking distance is around 2 meters or less. This means that they do not run the hurdle, but jump it. This way they are losing horizontal speed.

Index A.1.+C3 presents the total contact time before hurdle clearance and here the shortest time means less horizontal speed loose.

The flight time phase is analyzed with the help of three indexes. The most interesting here index is the flight time. Only with one athlete, we see flight time faster than 0,200 sec. This fact reveals is the hurdlers performance level.

The landing phase braking is analyzed with the help of 6 indexes. The one revealing the most excellence of landing after the hurdle is the touch down angle, and the other important are CM to foot distance, landing distance and other. The landing distance varies between 112 and 194 cm. But again we have to note that we speak about athlete from Bulgaria with results between 14,5 and 16 sec. The contact phase is shorter compared to the one before clearing the hurdle.

The propulsion phase after the hurdle is presented by only one index The data for the first hurdle has higher values compared to the ninth hurdle.

The hurdle clearance stride ranges between 315 cm – 379 cm for the first hurdle and 271 cm – 412 cm. Most hurdlers clear the hurdles for 350 cm.

Table 2 presets data variance analysis. This information helps is summarize all analyzed indexes.

Table 2. Research data variance analysis

Research data variance analysis

signiture	*index*	*unit*	1st hurdle			9th hurdle		
	Rhytmik units		Xmin	Xmax	Average	Xmin	Xmax	Average
A	**Take - off (braking phase)**							
A.1.	Braking phase time (from touching the ground to the vertical position)	sec.	0,023	0,050	0,0344	0,023	0,050	0,036
A.2.	Touch down angled during take - off (braking phase)	degrees	60	73	66,667	55	73	63,222
A.3.	Body incline durning take - off (braking phase)	degrees	74	86	85,889	71	86	82,000
A.4	CM to foot distance (braking phase)	cm	29	47	39,889	28	47	37,444
A.5.	Support knee angle when touching the support (braking phase)	degrees	145	165	155,556	136	165	149,889
B	**Take - off (vertical position)**							
B.1.	Support knee angle during body vertical position	degrees	127	142	142,000	121	142	133,556
B.2.	Body incline durning body vertical position	degrees	68	88	81,444	77	88	82,000
C	**Take - off (propulsion phase)**							
C.1.	Push - off angle (take - off propulsion phase)	degrees	61	70	66,889	62	70	65,667
C.2.	Take - off distance	cm	183	249	205,000	175	249	213,556
C.3.	Take - off propulsion phase contact time	sec.	0,036	0,064	0,048	0,046	0,064	0,053
C.4.	Attacking leg knee angle on take - off (propulsion phase)	degrees	67	113	86,556	81	113	96,889
A.1.+C.3.	Total contact time (take - off propulsion phase)	sec.	0,064	0,11	0,082	0,073	0,11	0,089
D	**Flight phase**							
D.1.	Flight time	sec.	0,184	0,294	0,249	0,188	0,294	0,241
D.2.	Attacking leg knee angle when foot reaches the hurdle	degrees	99	157	147,000	105	157	136,333
D.3.	Body incline on pelvis maximal height over hurdle	degrees	29	54	49,000	42	54	49,111
E	**Landing (braking phase)**							
E.1.	Touch down angle	degrees	72	89	77,444	74	89	79,444
E.2.	CM to foot distance	cm	9	34	21,222	7	34	22,667
E.3.	Landing distance	cm	112	183	148,889	96	183	140,889
E.4.	Body incline at touch down (braking phase)	degrees	55	82	71,111	52	82	68,778
E.5.	Contact time - Landing braking phase	sec.	0,009	0,023	0,022	0,013	0,023	0,015
E.6.	Contact time - Landing propulsion phase	sec.	0,0138	0,064	0,054	0,0138	0,064	0,054
F	**Landing (propulsion phase)**							
F.1.	Push - off angle (Landing - propulsion phase)	degrees	51	57	57,778	49	57	53,333
G	**Hurdle clearence**							
G	Hurdle clearence length	cm	314	412	353,8888889	271	412	354,44444

From it we can mark several mistakes that athletes make. During the take – off phase almost all the hurdles lose horizontal speed before they leave the ground. Also we see that the contact times (incl. all periods) reveal that lack of speed in front of the hurdle. The take of angle shows that almost all athletes (excluding the fastest) are attacking the hurdles jumping – this leads to great loss of horizontal speed. This tendency continues during the landing period. It is hard for the hurdlers to save the horizontal speed and continue the acceleration.

DISCUSSION AND CONCLUSIONS

First of all we must highlight that all conclusion and results are valid for athletes with results between 14.5 s and 16,0 s.

Picture 1. Video camera Casio Exilim EX-ZR300 mounted on a tripod Slik 500G on 9th hurdle.

The results of the following study will help both theory and practice. With the help of this study, we can establish the technical level of contemporary hurdler runners in Bulgaria. In addition, the results obtained from the analysis will be useful as a corrective to hurdle clearance stride in the begging and in the end of the race distance.

For deeper analysis of hurdling technique greater number of athletes must be analyzed.

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ANTHROPOMETRICAL CHARACTERISTICS OF SHOT PUT THROWERS

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Key words: *anthropometry, shot put, height, weight, body mass index;*

INTRODUCTION

Shot put discipline has certain requirements for athletes' anthropometric characteristics. In many cases the anthropometric characteristic is s precondition for high sport results in the discipline, in some it has crucial influence. For example, sometimes athletes with unenviable height and weight are not able to develop the motor potential (both physical and technical) in order to achieve high sport results.

Shot put is a discipline with a long history and a permanent place in the modern athletics program. It is part of every major competition program – National, Regional, European, World or Olympic level.

METHODOLOGY

In the following study we examine the anthropometric characteristic of the 67 from the top 80 of all-time shot put throwers in the world (as of 31.12.2012). We examine the following indexes: sport results (SR), height (H), weight (W) and Body Mass Index (BMI).

RESULTS

Observing the world elite shot put throwers we found relatively homogeneous data in anthropometry. Top results were achieved by athletes with enviable physique – both height and weight. However, the specific data will be the best indicator presenting what should be the contemporary shot put thrower.

In our case the sport results is a starting point for tracking changes in anthropometric characteristics and their derivatives.

Table 1 presents the data from the variance analysis of research indexes. The table presents the following information: average value (X), highest (max) and lowest (low) value, standard error (Mx), standard deviation (S), the coefficients of kurtosis (Ex) and skewness (Ax), range (R) and the variance (V%) coefficients.

Table 1. Research data variance analysis

	X	±Mx	S	Ex	As	R	Min	Max	V%
Sport result	21.68	0.07	0.59	-0.20	0.73	2.4	20.72	23.12	2.71
Height	192.12	0.72	5.88	-0.50	0.21	25	183	208	3.06
Weight	125.78	1.18	9.64	-0.47	0.16	43	105	148	7.66
BMI	34.15	0.37	3.05	-0.37	0.34	13.74	27.78	41.52	8.94

The average value of the sport result is 21.68 meters – it reveals the qualification level of examined throwers.

The range (R) presents the data sample span – 2.40 meters.

The variance coefficient (V%) shows us extremely strong homogeneity for each of the studied indexes.

Figure 1 summarizes the distribution of the examined cases in height.

The average height of the examined 67 world elite shot put throwers is 192.12 cm. The shortest throw-

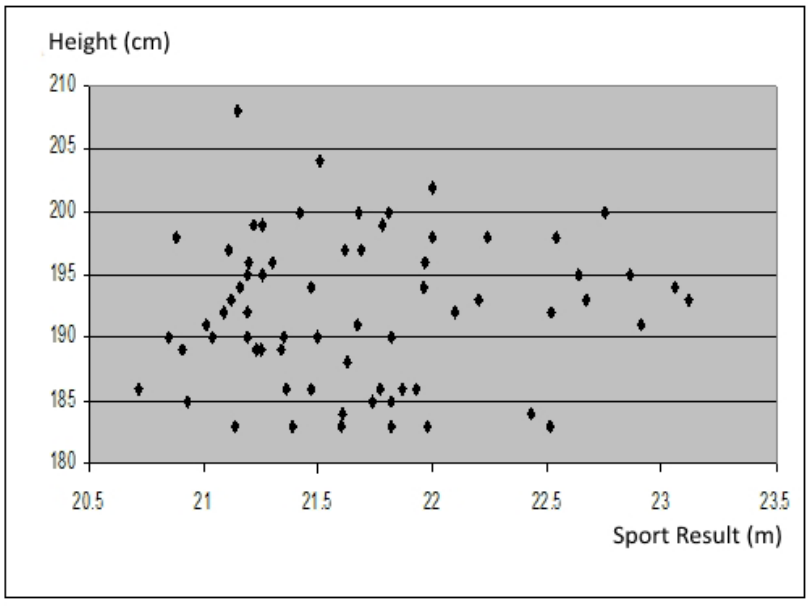

Figure 1. Distribution of cases – height.

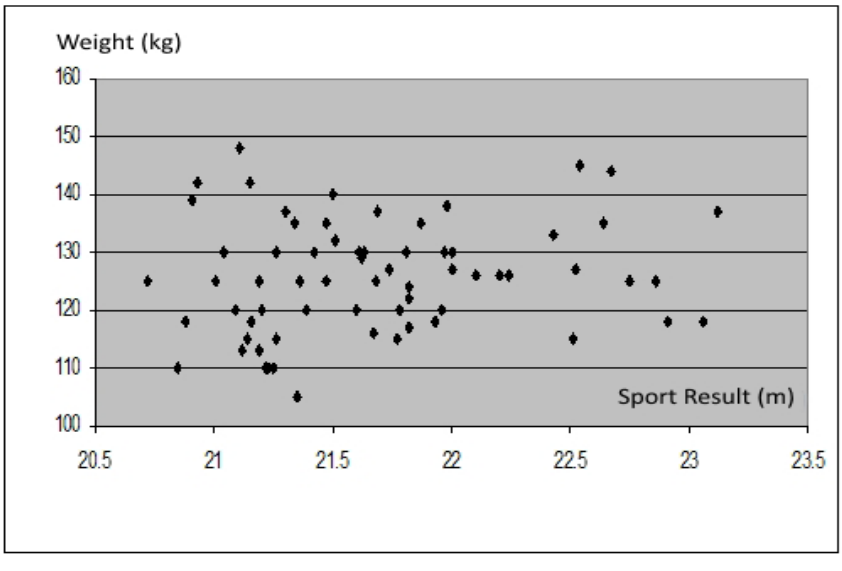

Figure 2. Distribution of cases – weight.

Table 2. Research data correlation indexes

	Sport Result	Height	Weight	BMI
Result	1.00			
Height	0.06	1.00		
Weight	0.16	0.20	1.00	
BMI	0.09	-0.52	0.73	1.00

er is A. Nelson with his 183 cm height and personal best result of 22.51 meters. The tallest thrower is Carsten Stolz with 208 cm height and personal best of 21.15 meters. From this data we can note that shot put throwers are significantly higher than average male.

We did not found any definite trend of height change depending on the sport result.

Figure 2 shows the distribution of the examined cases in weight. The average weight of all included in the study throwers is 125.78 kg. The heaviest examined thrower is K Toth (PB – 22.67 m) with 144 kg.

The lightest is R. Semkyu (PB – 21.35 m) with only 105 kg. Here we found significantly higher values compared to average men.

Body Mass Index (BMI) shows significantly higher results than the conventional standards – the average BMI value is 34.15 (see Table 1 and Figure 3). Closest to the latter is Kl. Gormer (PB – 21.22 m) with BMI 27.78. On the other hand the thrower with highest BMI is Gr. Tafralis (PB – 21.98 m) with BMI 41.19. (See Figure 3)

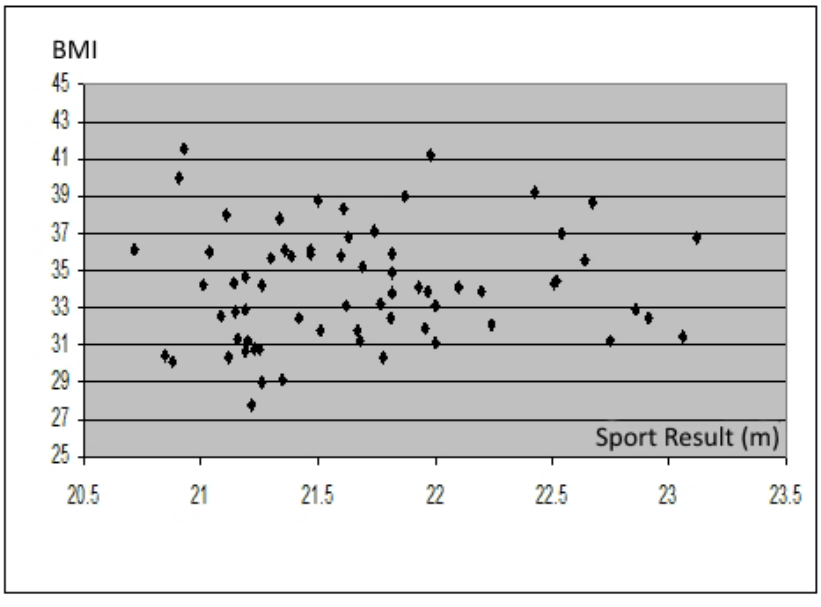

Figure 3. Distribution of cases – Body Mass Index (BMI).

Table 2 presents the correlation analysis of research data. From the table is obvious that there is no significant correlation between the sport results and other examined indexes.

Table 3 shows the data regarding the top 10 all – time shot put throwers.

Overall the anthropometry of world elite shot put throwers is characterized by the lack of significant correlation between the sport result and the following anthropometric index: height, weight and Body Mass Index.

Table 3.Anthropometry of the top 10 all – time shot put throwers.

№	*Result (m)*	*Height (cm)*	*Weight (kg)*	*BMI*	*name*
1.	23.12	193	137	36.82	Randy Barnes
2.	23.06	194	118	31.39	Ulf Timmermann
3.	22.91	191	118	32.42	Alessandro Andrei
4.	22.75	200	125	31.25	Brian Oldfield
5.	22.86	195	125	32.89	Werner Gunthor
6.	22.67	193	144	38.71	Kevin Toth
7.	22.64	195	135	35.53	Udo Beyer
8.	22.54	198	145	36.99	Christian Cantwell
9.	22.52	192	127	34.42	John Brenner
10.	22.51	183	115	34.33	Adam Nelson

DISCUSSION AND CONCLUSIONS

As a summary, we can mark the following anthropometric parameters valid for modern time world elite shot put throwers:

Height – ranges between 190 cm and 200 cm.

Weight – ranges between 120 kg and 130 kg.

Body Mass Index – ranges between 30 and 35.

In all of these three indexes, the results of world elite shot put throwers significantly exceed the generally accepted standard values for normal anthropometric development of men from all parts of the world.

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TRACKING OF ANTHROPOMETRIC PARAMETERS OF ALPINE SKIERS IN THE PERIOD SINCE 1995 UNTIL 2014

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Slalom and Giant Slalom are a complex coordination of actions, involving consecutive right and left turns in the time frame of 1-2 minuets. In order to complete the motor action, one must be in perfect physical condition for skiing. The perfect skiing condition is reflected in two types of muscle work - overcoming force in the first part of the turn (curve) as well as edging the skis at the end of the previous turn until the beginning of the next turn, and immediate indentation mode of muscle work management. There is a direct dependent correlation with the skiers musculature. Our goal was to research the dynamics of the development of the basic anthropometric parameters of the elite alpine skiers representing the Bulgarian national teams in the period 1995-2014. This is an informative analysis showing the relationship (connection, correlation) between muscle mass, active body mass and lean tight circumference and the sports results. There is no direct impact (correlation, dependence) between hight, weight and body fat.

Despite the highly competitive nature of more than 100 athletes, the end result in the Ski Alpine Discipline is relative. The real picture of the sports level of the individual competitor is clearly seen in the FIS ranking list, with close to 10 000 male and 8 000 female athletes competing. This is the reason we are satisfied with the placement of the Bulgarian skiers. This allows us to look into the connection between the anthropometric parameters.

Our goal was to trace (research) the elite skiers anthropometric development dynamics. These athletes were Bulgarian national team members in the period 1995-2014.

METHODOLOGY

Antropometry is the study of human body measurement of use in anthropological classification and comparison. It is a method of researching physical development through measurements in the human body. 12 alpine skiers were the subject of our study. They were tested 150 times in the period of 1995-2014. The following measurements were taken under consideration:

- Height standing up in cm
- Stretching in cm
- Weight in kg
- Body fat measurement in kg and %, utilizing regression equation of skin folds, Parizkova, J.
- Muscle mass in kg and %
- Active body mass in kg

Thigh circumference measured in cm

Linear measurement of the body and circumferences of the upper extremities were taken while standing up. Lower extremity circumferences were taken with legs spread, standing upright. For the measurement of the subcutaneous adipose connective tissue thickness (skinfolds) we used only the right half with vertical approach.

Using Microsoft Excel the results were organized and summarized.

ANALYSIS OF THE RESULTS

Analyzing the sports results and the experts personal analysis we ranked the skier participants in the study.

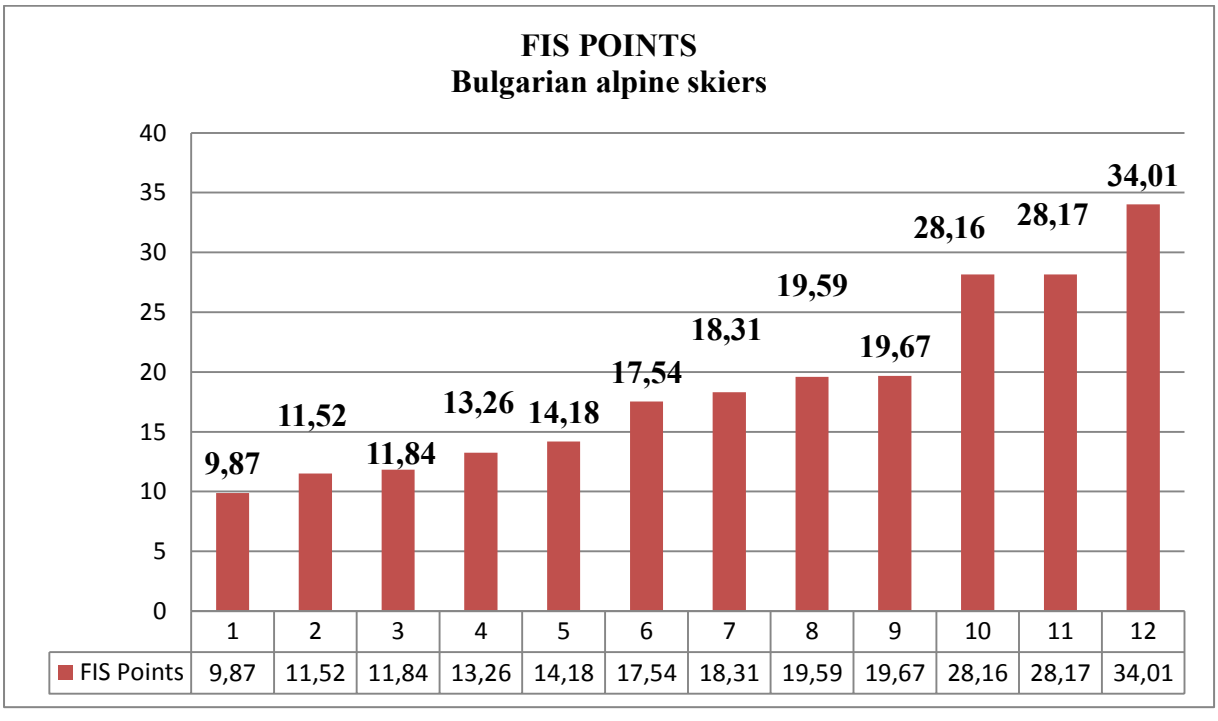

Figure 1. Shows the competitors placement based on their achievements

.We focused our attention on 12 skiers who fall in the category of real good competitors – Figure 1 (2).

The results in this table are in the Slalom. Slalom is a traditionally strong discipline for the Bulgarian Skiers and these results are only a portion of their achievements.

The world elite skiers are in the top 10 FIS points. In this group there is one Bulgarian. Competitors № 2,3 follow with minimal difference of 11 FIS points, same as competitor

№ 4,5 with 14 FIS points. The elite Bulgarian skiers participants in the Olympics, World Cups and World Championships definitely fall in this group. A second group of competitors with 17-20 points are the competitors that compliment the nationals in the last 10 years. Technical and material insufficiency prevented them from getting into the first group. Young competitors with proven skills fall in the 3rd category with 30 points. The studied Bulgarian Slalom skiers have potentially great chances within the 30 points limits.These Bulgarian Slalomists have very high results, which allowed us to use them as an accurate sample in comparing the anthropometric results in relation to the sports results. We will analyze the anthropometrics in the following order:

MUSCLE MASS

The muscle mass is a fundamental anthropometric parameter that plays key role in the sports result (3). High parameters of muscle mass is essential in the agility in the Slalom in the time frame of 1 min and speed of 50-60 km/h. It is imperative that the muscle mass is adequate to the specific load and in overcoming the rhythmic repetitive retreating cycle of muscle work.

Figure 2

Figure 2 represents the results of elite skiers' muscle mass criteria. It is obvious that it is in the 45.0%-53.5% range. The study showed that the average muscle mass of the Bulgarian Slalomists is 48.8%. The first group of competitors occupy the whole range, starting at 47%. The best representatives № 1 and № 2 hold close parameters of 49.1% and 47.1%. The rest of the slalomists in the first group are as follow : competitor № 3 - 51.8%, № 4 - 53.4% and № 5 - 51.9%. The average muscle mass of the first group of slalomists is 50.6%. Competitors № 6, 7, 8 and 9 represent the second group. Their average muscle mass is 46.6% in the range of 43.5% - 49.1%

Competitors № 10, 11 and 12 represent the third group with average muscle mass of of 48.3% in the range of 40.5% - 50.3%.

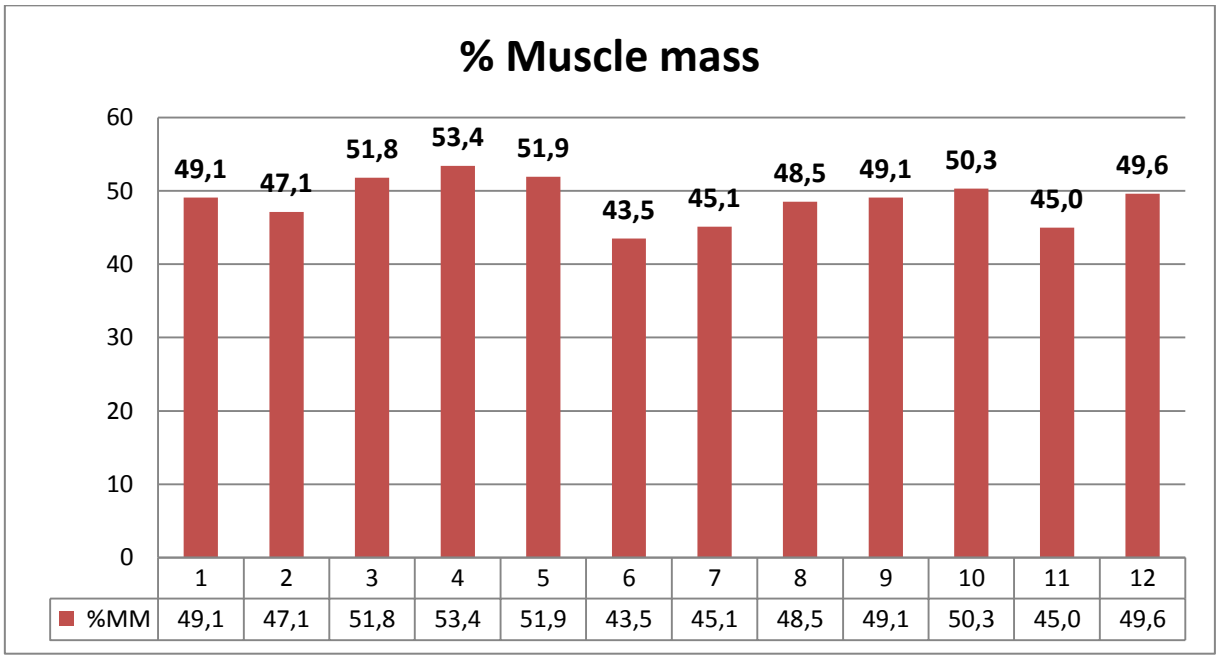

Figure 2

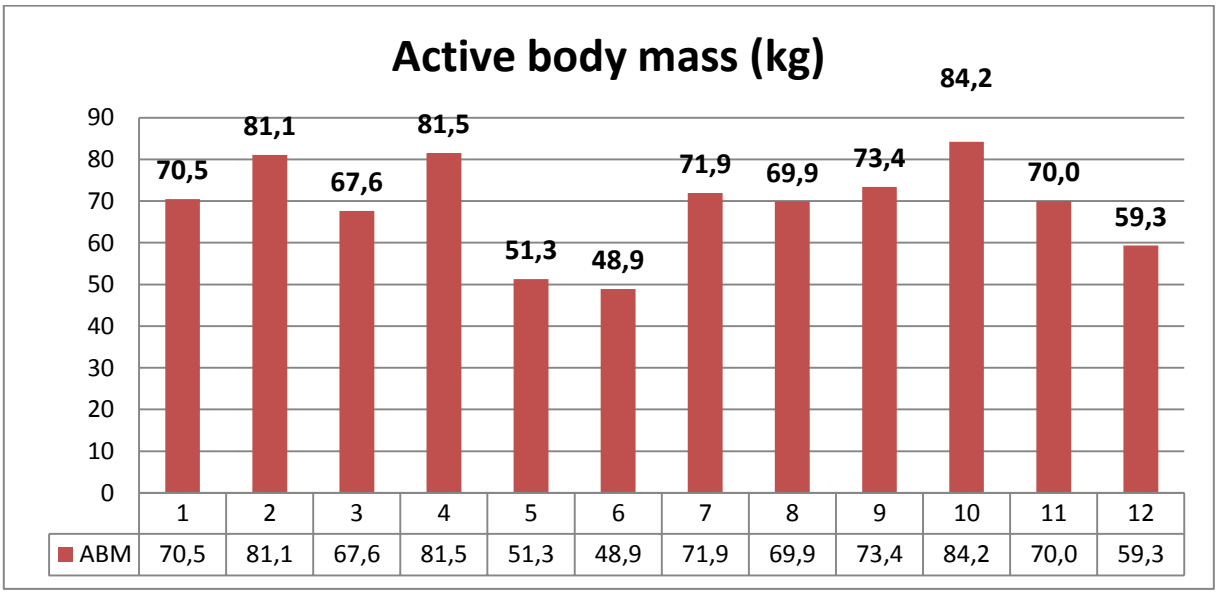

Figure 3

ACTIVE BODY MASS

Active body mass consists of all non fat tissues, the internal organs, liquids etc.

Figure 3The Slalomists' active body mass results in the first group had an average value of 70.4 kg in the range of 51.3 kg - 81.5 kg is shown in the Figure 3. Competitors № 6, 7, 8 and 9 with and average body mass of 66.0 kg in the range of 48.9 kg - 73.4 kg comprise the second group. Competitors № 10,11 and 12 have and average active body mass of 71.1 kg in the range of 59.3 kg - 84.2 kg and fall in the third GROUP.

THIGH MUSCLE CIRCUMFERENCE

Thigh muscle circumference was measured as the total circumference of the thigh minus the subcutaneous adipose tissue.

Figure 4 shows all the results from the conducted anthropometric measurement studies of the elite Bulgarian ski slalomists. The first group consists of competitors № 1, 2, 3, 4 and 5. Their average net thigh muscle circumference is 58.1 cm in the range of 51.9 cm - 62.1 cm. The second's group average net thigh muscle circumference is 54.5 cm in the range of 45.0 cm - 59.4 cm. Competitors № 6, 7, 8 and 9 are in this group (#2). And the last group three - competitors №10, 11 and 12, have an average net thigh muscle circumference of 57.9 cm in the range of 54.9 cm - 63.7 cm.

CONCLUSIONS:

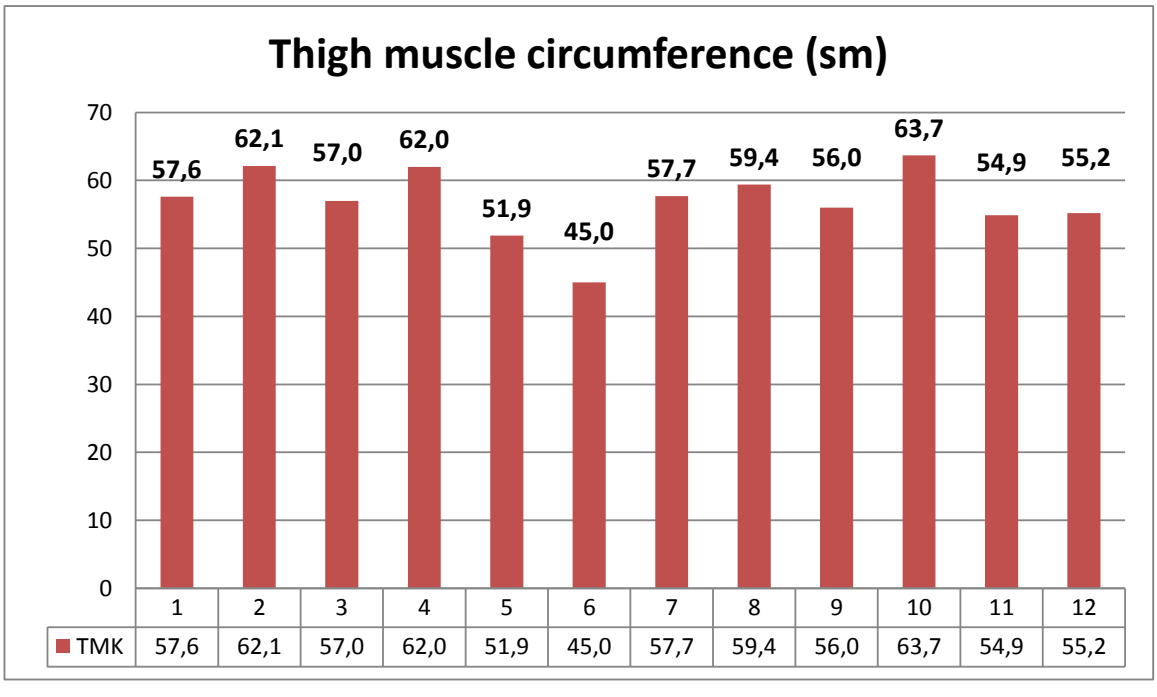

Figure 4

1. This is an informative analysis showing the correlation between the indicative muscle mass, active body mass and net thigh muscle circumference towards the sports result. There is no direct correlation between height, weight and body fat and sports achievement.
2. We recommend an average 50.6% of muscle mass as the desired goal for the skier slalomists - this is the average muscle mass of the best Bulgarian slalomists.
3. Alpine slalomists have an average body mass of 70 kg
4. The recommended net thigh muscle circumference for the slalomists is 57.8 cm.

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DETERMINATION AND COMPARISON OF THE ENERGETIC WORK ZONE DURING THE COMPETITIVE INDIVIDUAL ROUTINE IN RHYTHMIC AND COMPETITIVE ROUTINE IN AESTHETIC GROUP GYMNASTICS

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Key words: Gymnastics; Routine; HR; La; Recovery

INTRODUCTION

Rhythmic gymnastics and aesthetic group gymnastics are the only two female sports where femininity is prospering. Looking at the dawn of gymnastics, dating back 2 centuries ago we find the ideas of Jean-Georges Noverre, François Delsarte, and Rudolf Bode for expressiveness through the body. It is believed that Peter Ling has developed their concepts into the Swedish gymnastics system [1]. Both sports claim same history and we can assume that the beginning was mutual. The main differences between individual rhythmic and aesthetic group gymnastics are the duration of the competitive routine, the requirements in the Code of Points and the number of participants [2]. Nevertheless based on kinematics and dynamics both sports are identical but comparison of the loading of the routines and the caused reaction of the body is of great interest.

The **aim** of this study is to determine and compare the regime of work during a routine in both gymnastics disciplines in preparative and competitive periods of preparation.

METHODS

12 high level rhythmic gymnasts (age 15,8 ± 2,2) and 12 high level aesthetic group gymnasts (age 16 ± 2,3) took part in this investigation. The subjects were asked to perform their competitive routine in normal training conditions. The physiological changes of the gymnasts were followed by measuring HR and blood lactate. Heart rate was recorded during the routine and followed up to the 9th minute of the recovery period by POLAR RCX3. A drop of blood was taken as sample from the fingertip to assess average peak blood lactate concentration using an Accutrend Plus Roche. Lactate was taken before and on the 3rd, 5th and the 9th min during the recovery period. Before the start of the testing (routine) girls performed a full warm up. After the completion of the test the subjects were given a passive recovery period of 9 min.

Statistics

Descriptive statistics were used to characterize the physiological demand of the routines in rhythmic and aesthetic group gymnastics. Values were mean, minimum (min) and maximal (max) value of the group, range (R), standard deviation (SD) and variation (V%). Parametric Test was applied – Student's t-test for two independent samples, to determine the significant differences between rhythmic gymnasts and aesthetic gymnasts. Also Student's paired t-test was used to identify any differences within the groups between the preparation and the competitive periods. The level of significance of $p \leq 0.05$ was adopted in all cases.

RESULTS

HR values reached at the end of a competitive routine in rhythmic gymnastics are 194,1 b/min in preparatory period and 188,1 b/min in competitive period. There is a significant difference between the two periods which means that there was improvement in their fitness level of preparation and the reaction of the cardiovascular system to the same load. In aesthetic group gymnastics the results are – 190,4 and 186,1 b/min respectively for preparation and for competitive period. They also showed better result (significant difference $\alpha - 0.008$) in the second period with 4 b/min less than the first period.

Table 1.

Descriptive statistics of the achieved HR at the end of a routine performance in RG and AGG				
	RG prep. period	AGG prep. period	RG comp. period	AGG comp. period
mean (SD)	**194,1** (±4,2)	**190,4** (±3,2)	**188,1** (±4,0)	**186,1** (±7,2)
min	187,0	186,0	181,0	179,0
max	200,0	196,0	194,0	202,0
range	13,00	10,00	13,00	23,00
T test independent	α – 0.024 *		no significant difference	
paired T test	**RG** prep. to comp. period α – 0.004 **		**AGG** prep. to comp. period α – 0.008 **	
* p ≤ 0.05/ ** p ≤ 0.01				

Table 2. Dynamic of the HR during a routine in rhythmic and aesthetic group gymnastics

	Rhythmic Gymnastics			Aesthetic Group Gymnastics		
time	**preparation period**	**competitive period**	**R**	**preparation period**	**competitive period**	**R**
00:00	146,7	132,9 *	**13,8**	138,8	126,4	**12,4**
00:15	160,8	152,5	**8,3**	156,3	146,1	**10,2**
00:30	176,9	173,1	**3,8**	169,0	157,5	**11,5**
00:45	185,8	180,5 *	**5,3**	177,6	167,5 *	**10,1**
01:00	189,5	184,5 *	**5,1**	182,8	173,7 *	**9,1**
01:15	191,5	186,1 *	**5,4**	184,1	179,2 *	**4,9**
01:30	194,1	188,1 **	**6,0**	185,9	181,2 *	**4,7**
01:45	-	-		187,5	183,1 *	**4,4**
02:00	-	-		187,0	184,1 *	**2,9**
02:15	-	-		188,7	184,6 **	**4,1**
02:30	-	-		190,4	186,1 **	**4,3**

*p ≤ 0,05 significant difference/ **p ≤ 0,01 significant difference

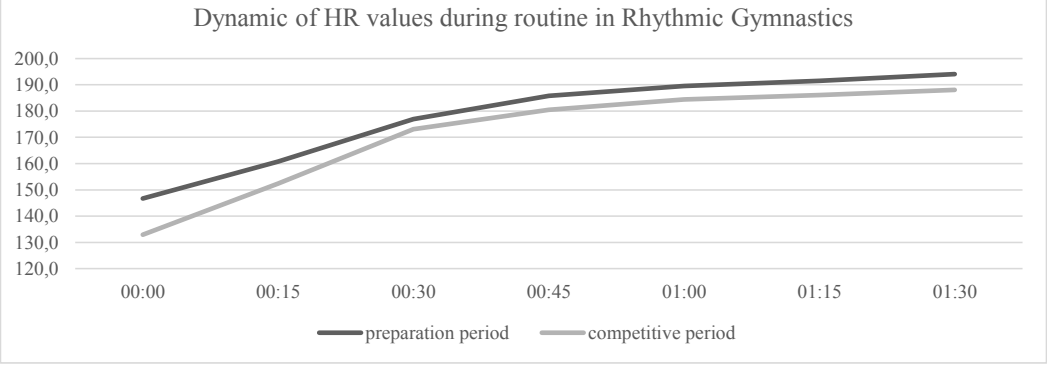

Fig. 1

Looking at the dynamics of the HR during rhythmic gymnastics routine it is noticeable that during the first 30 sec of the load there is a quick kick off where the HR values go up. The zone above 180 b/min, in both periods (preparation and competitive), is already reached at the 45 sec margin of the load. The following 2/3 of the routine is extremely demanding towards the cardiovascular system. The term "steady state" is not applicable due to the very short amount of time for the loading, but there is definitely a

plateau with the values slightly raised with 10 or 8 b/min (depending of the period) for the last 60 sec of the routine. Furthermore the difference between the periods is significant after the first 45 sec of the routine. The improvement of the fitness level is as expected – the same load causing less stress for the gymnasts' body in the competition period (between 5-6 b/min less than in the preparation period). At Graphic 1 the tendency of the improvement can be seen clearly – starting from the beginning and lasting until the end of the routine.

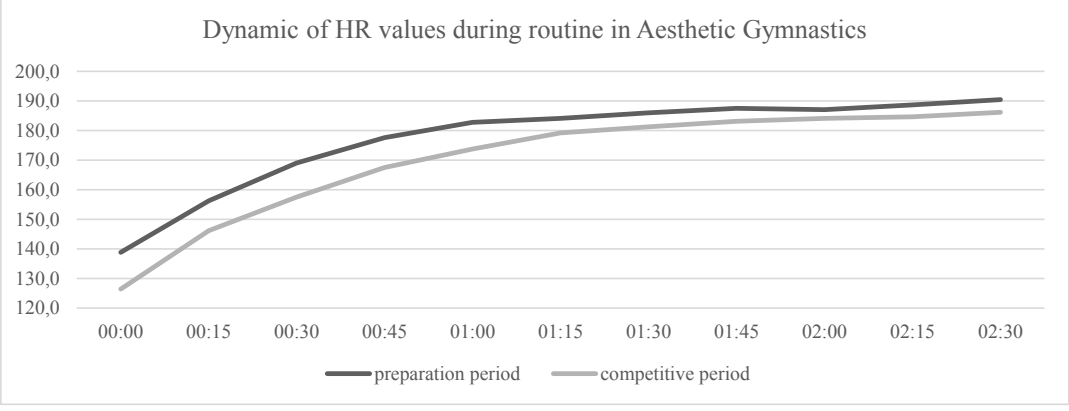

Fig. 2

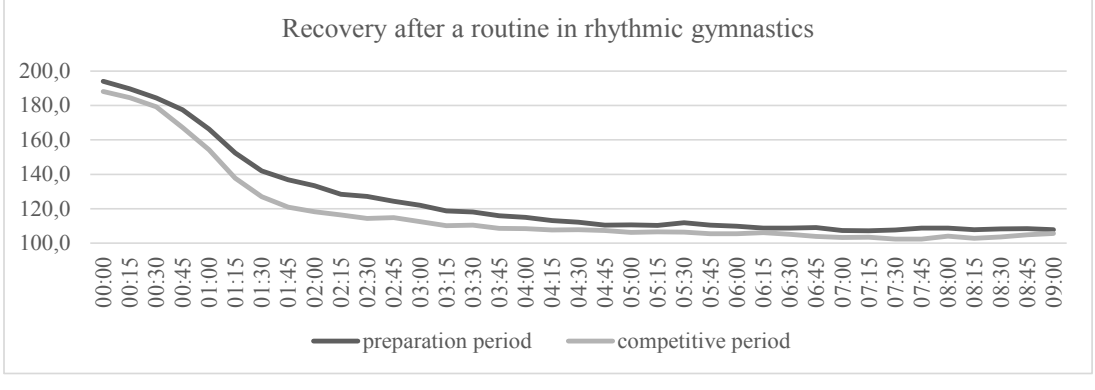

Fig. 3

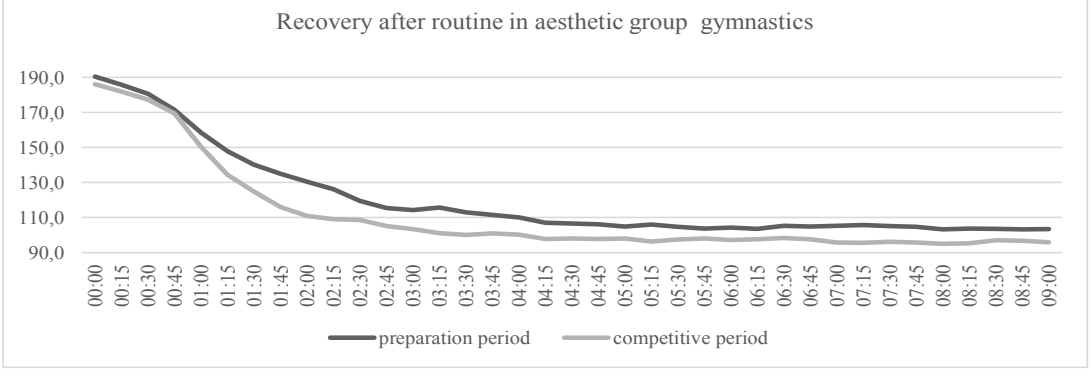

Fig. 4

The zone above 180 b/min in aesthetic group gymnastics routine is reached at the end of the first minute after the start of the load (in preparation period) and on the 1,30 minute in the competitive period. The body reaction to the load during the competitive period is better (around 4 b/min less) with statistical significant difference from the 45 sec of the start of the routine and it stays like this until the end with α – 0,01.

The gymnasts were given a passive recovery for 9 min. As a recovering point we set up the values beneath 120 b/min. This HR is reached around 3,15 min and 2 min in preparation and competitive periods

respectively after a rhythmic gymnastics routine. This zone is reached earlier in aesthetic gymnastics – on the 2,30 and 1,45 min after the load. The values become absolutely stable and do not change after the 4th minute of the recovery period for both discipline in the preparation period. In the competitive period steady state of the recovery is achieved on the 3rd min for RG and AGG.

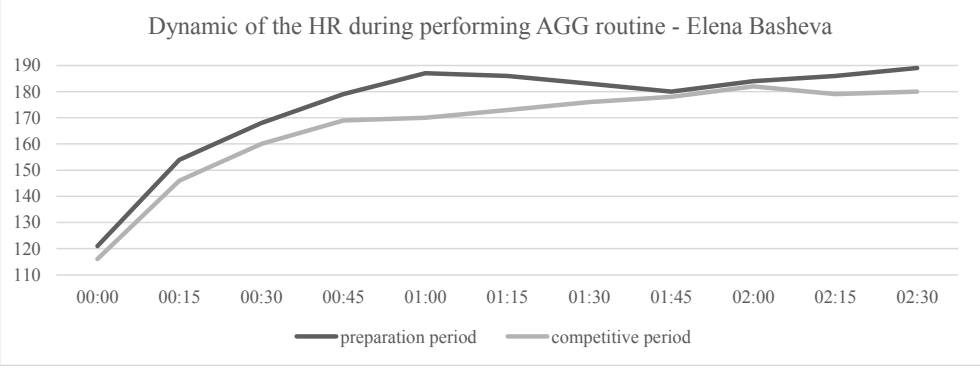

Fig. 5

Table 3.

Descriptive statistics of blood La concentration after routine performance in RG and AGG				
	RG prep. period	AGG prep. period	RG comp. period	AGG comp. period
mean (SD)	8,4 (± 2,5)	8,9 (± 2,6)	7,2 (± 2,2)	8,1 (± 2,2)
min	4,8	4,7	5,0	5,2
max	12,8	13,9	11,7	10,7
range	8,0	9,2	6,7	5,5
* p ≤ 0.05/ ** p ≤ 0.01				

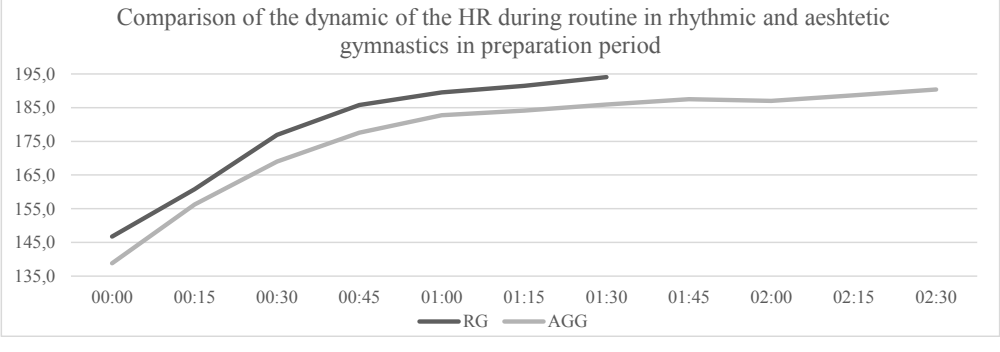

Fig. 6.

In RG the difference between the two periods is significantly proven until the 4th min of the recovery. HR values in competitive period are 5 to 15 b/min lower than the preparation one. In AGG the significant difference is found on the 1,45 to 3,30 min (10 to 19 b/min lower) and at the last two minutes of the recovery in the competitive period.

In the preparation period during the 9 min recovery period HR of the rhythmic gymnasts remain higher than the aesthetic gymnasts although the only two significant differences are found: on the 3:00 min and on the 5,30 min. In the competitive period such difference exists between the 4th and the 5th minute. During the first two minutes HR recovery is identical for both sports but consequently aesthetic group gymnasts recover quicker.

Blood lactate concentration do not show any difference between the groups and between the prepara-

tion and competitive period. In the first period the average values are 8,4 and 8,9 mmol/l for rhythmic and aesthetic gymnasts but in the competitive period there is some improvement and the values go down to 7,2 and 8,1 mmol/l. Lowest individual value measured are 4,7 mmol/l and the highest reached - 13,9 mmol/l. Peak values of the blood lactate are achieved mostly (60% of the cases) on the 3 minute of the recovery period after completing the competitive routine and the rest of the girls have their anaerobic metabolism later - on the 5 minute.

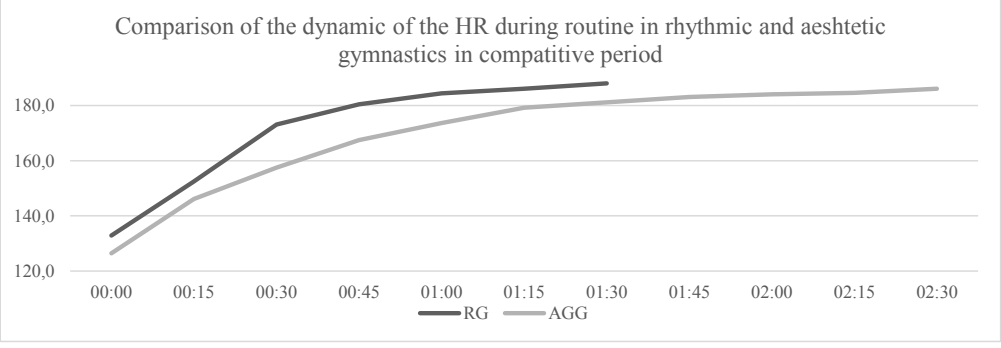

Fig. 7

DISCUSSION

Jemni (2006) says "High performance gymnasts required a very high HR during a very short time". HR values after a gymnastics routine reported in the literature are: 179.49 ± 10.39 b/min – artistic gymnastics [6]; 182 to 187 b/min for different age groups in rhythmic gymnastics [3]; 188,7 b/min in aesthetic group gymnastics [4]. Looking at the values in the present study of the two disciplines in the preparation period (RG – 194,1 b/min compare to AGG – 190,4 b/min) the difference is significant. In previous data where a comparison between individual and a group routine has been performed (only in rhythmic gymnastics) the results are also in favour of the individual gymnasts with 8 b/min [3].

It is interesting how a shorter program (1,30 min) in rhythmic gymnastics causes higher reaction in the cardiovascular system compared to a longer routine in aesthetic gymnastics (2,45 min). There could be a few explanations: 1. longer time of the load leads to a lesser ability to work at a very high HR; 2. RG has bigger (more intensive) load compared to AGG; 3. rhythmic gymnasts perform with greater efforts and motivation compared to the gymnasts from AGG. However the result is higher in the competitive period again although it is lacking a statistical difference – the RG girls have higher values at the end of the routine. Rhythmic gymnasts have improved their fitness level more than the aesthetic gymnasts and in the competitive period the significant difference between the disciplines is vanished.

To explain better the character of the load it is necessary to explore the dynamic of the HR during the routines from the start to its end. If we look at the individual HR values of each routine we will see that in aesthetic gymnastics not always (especially in preparation period) the case is to have the peak values at the end of the routine. Sometimes there are two peaks – around the first half of the routine and at the end of it (see fig. 5). However in the competitive period such variation of the HR during the load is not so typical. In rhythmic, on the other hand, the HR peak is always at the end of the 1,30 min routine. As a reason for those small variations of the HR curve during aesthetic group routine we could suggest the lower fitness level of the gymnasts in the preparation period. It is a means of compensating for not being able to perform for 2,30 min.

Comparing the HR curves during a routine in rhythmic and aesthetic group gymnastics we can summarized that: HR values are significantly different from the 30 sec to the end of the routine (RG has higher values); for shorter time RG routine provokes higher HR of the gymnasts; the zone of 180 b/min is achieved earlier – after the first 30 sec from the start of the routine compared to the aesthetic where the zone is reached on the 60 or 90 sec. For those reasons we can make the suggestion that rhythmic gymnastics is more intensive and demanding compared to the aesthetic.

Previously reported data of the blood La concentration after performing a routine in rhythmic gymnastics is quite similar and varies between 4 to 13-14 mmol/l [3; 5; 9]. Some of the extreme values reported from individual gymnast (Bulgarian national team) are 20 mmol/l [9]. The only publication on that topic found in the literature about aesthetic group gymnastics presents results between 4 to 9,1 mmol/l [4]. Even in other gymnastics disciplines, such as artistics, the blood lactate after a floor routine is an average between 5 to 7,5 mmol/l [7; 8]. For the short duration the intensity of the routines has great influence on the gymnast's body systems. It is hard to believe that behind the elegance there is a demanding anaerobic regime of work.

Conclusions

Loading of the competitive program in rhythmic and aesthetic group gymnastics can be described as anaerobic and highly demanding. The results show that the anaerobic glycolytic regime of work is the dominant one.

Based on the HR dynamics during the routine in rhythmic and aesthetic group gymnastics we can conclude that physiological requirements are higher for the individual athletes from RG compared to the aesthetic group gymnasts.

Both disciplines show differences and improvement from preparatory to competitive period in the tested parameters. HR monitoring and blood lactate concentration are fairly accessible tools for measuring the current physical level of the gymnasts in field conditions.

The working zones during a routine in RG and AGG are divided in two: zone of quick replay of the cardiovascular system and zone of anaerobic work (HR above 180 b/min; La around 8 mmol/l). Rhythmic gymnasts stay in the first zone around 30 sec and the rest of the load (1 min) is carried out in zone two. It takes aesthetic group gymnasts longer to reach zone two (up to 1 min or 1,30 min depend of the period.

Recovery from a routine in rhythmic gymnastics takes from 2 (competitive period) to 3 min (preparation period) depend on the period of preparation. In aesthetic group gymnastics the time is quite similar – 1,45 in the competitive period and 2,30 in the preparation period. The conclusion is based on the time needed to reach the zone under 120 b/min.

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RESEARCH STUDY ON DIFFICULTY OF MOUNTAIN RUNNING TRACKS

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Based on certain sport-technical, sport-pedagogical and physiological criteria a variety of track conditions is determined where the mountain running races are held on.

In order to sort out this diversity in hierarchical order according to the difficulty of tracks and trails presented in mountain running events, the opinions of coaches and athletes in this discipline have been a point of this research.

Based on the survey on expert and subjective evaluations of the difficulty degree of the terrain, a classification has been made, reflecting the degree of difficulty of the terrain in performing the mountain runs.

The aim of the study was to establish a methodology for determining the degree of difficulty of the routes for mountain running.

The tasks of the stAdy are:

1. Study of information sources.
2. Conducting a survey on expert and subjective assessments of the degree of difficulty of the terrain in performing mountain running.
3. Creating an integrated system for determining the difficulty of the routes.
4. Formulation of conclusions.

The object of our study is the characteristics of the profile of the routes for mountain running.

Its subject is a variety of indicators revealing characteristics of the tracks.

Contingent of the study are 18 routes of State, Balkan and European Mountain Running Championships in two versions - ''up-hill running'' and ''up and down hill running ''

The methodology of the study includes:

GPS-topography, establishing the elevation profile of the tracks.

Videometria and computer analysis to establish the basic kinematic characteristics of mountain running on inclines of up and down in a range from 0 to 24 degrees.

Questionnaire study - the opinion of 42 mountain running athletes was examined - giving a subjective assessment and of 10 coaches – giving an expert assessment of the three main criteria which determine the difficulty of the routes. Including - variants of the competition, diversity of terrain and surfaces and of different types of running used to overcome the tracks.

Criteria determining the difficulty of the routes in mountain running:

Criterion (A) - zones according to altitude, where the final of the trail is located:

(Zones are determined according to the rules for conducting sports competitions for Mountain Running)

Table 1. Coefficients of difficulties based on altitude of location of the final of the track.

Zones	Altitude of the final	Coefficient of difficulty
First Zone	From 0 to 300 meters	1
Second Zone	From 300 to 600 meters	2
Third Zone	From 600 to 900 meters	3
Fourth Zone	From 900 to 1200 meters	4
Fifth Zone	From 1200 to 1500 meters	5
Sixth Zone	From 1500 to 1800 meters	6
Seventh Zone	From 1800 to 2100 meters	7
Eight Zone	From 2100 to 2400 meters	8
Ninth Zone	From 2400 to 2700 meters	9
Tenth Zone	From 2700 to 3000 meters	10

T

Criterion (B) - Areas according to the aggregate displacement of the track:

(Zones are defined based on the sports rules and are differentiated according to the age and gender group, and the options for the competition held)

Table 2. Odds of difficulty of the displacement of the tracks.

Zones	Total amount of ascent in meters												Coefficient of difficulty
	Up races						Up and down races						
	Men	Women	Junior men	Junior women	Boys	Girls	Men	Women	Junior men	Junior women	Boys	Girls	
First	960	640	640	320	400	240	480	350	350	150	225	130	1
Second	1020	680	680	340	420	260	530	380	380	160	240	145	2
Third	1080	720	720	360	440	270	580	410	410	170	255	160	3
Fourth	1140	760	760	380	460	280	630	440	440	180	270	175	4
Fifth	1190	790	790	390	490	290	680	470	470	200	285	190	5
Sixth	1210	810	810	410	510	310	730	500	500	220	300	200	6
Seventh	1260	840	840	420	540	320	780	520	520	240	315	210	7
Eight	1320	880	880	440	560	330	830	540	540	260	330	220	8
Ninth	1380	920	920	460	580	340	870	560	560	280	345	230	9
Tenth	1440	960	960	480	600	360	900	580	580	300	360	240	10

ANALYSIS OF THE RESULTS FROM THE SURVEY:

1. Analysis of the degree of difficulty of the options - trails for mountain running.

The results from the surveyed coaches bring the greatest difficulty to the option of "Tour with two or more ascents and descents '', while data from the competitors point that the most difficult option is ''Only up-hill running'' - Figure 1. The research data from the combination of the coaches' and racers' surveys on the criterion - a variant of the competition led to contradictory results, whose unique integration into the model to determine the degree of difficulty of the route proved impossible. Therefore, to determine the factors for that criterion we use data only from athletes' questionnaires.

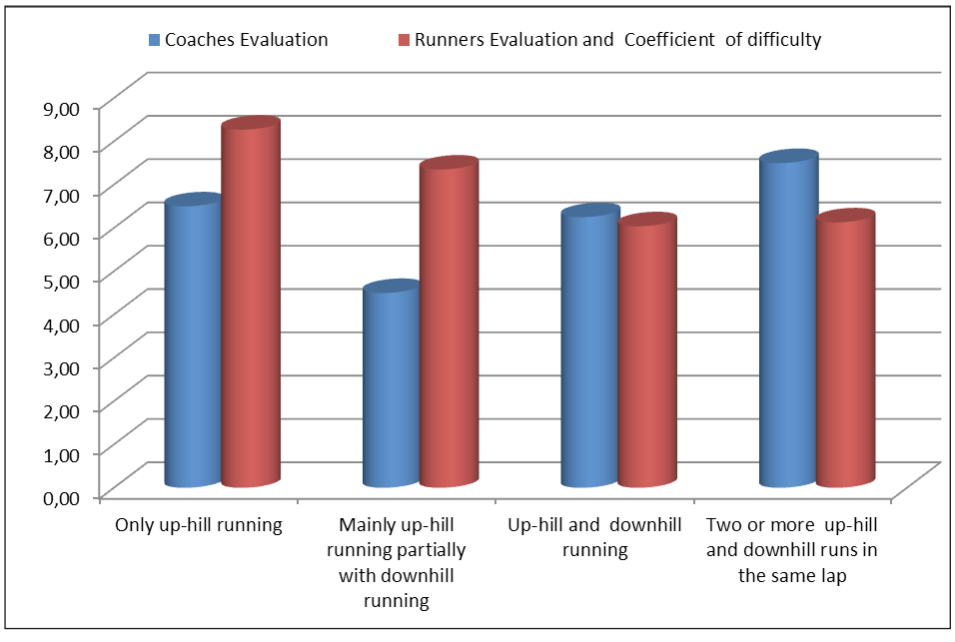

Figure 1. Graph of the degree of difficulty of the options - trails for mountain running.

Criterion (C) - according to the version of the route of the track.

Table 3. Odds of difficulty of the routes for mountain running set by the evaluations of competitors.

Track Options	Coaches Evaluation	Runners Evaluation and Coefficient of difficulty
Only up-hill running	6.5	8.27
Mainly up-hill running partially with downhill running	4.5	7.35
Up-hill and downhill running	6.25	6.04
Two or more up-hill and downhill runs in the same lap	7.5	6.13

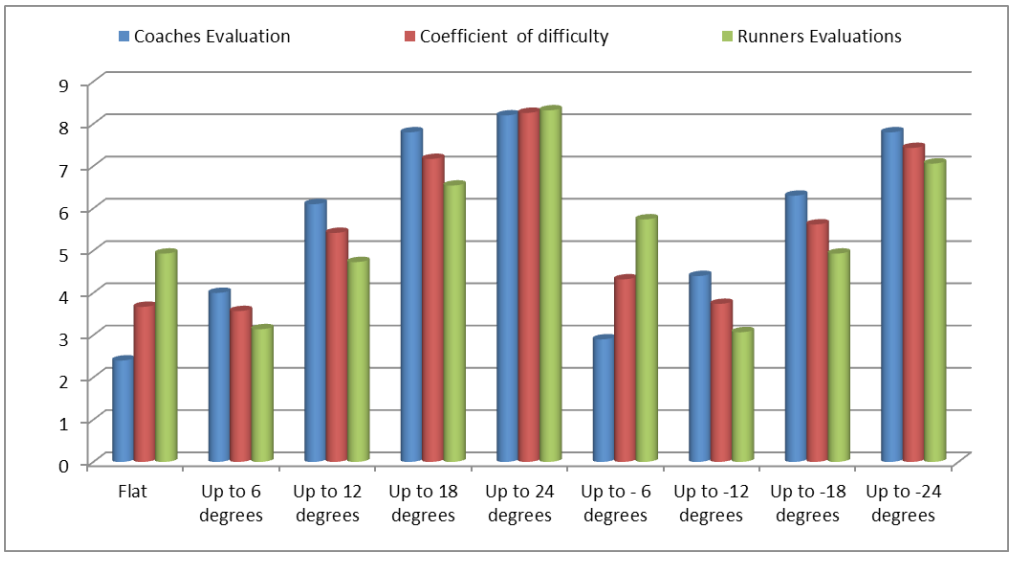

Figure 2: Graph of the difficulty of running depending on the slope

2. Analysis of the difficulty of running depending on the slope inclination degree

Data from the coaches shows that the degree of difficulty of running correlates with the increase of

inclination of the slope. The highest degree of difficulty is in climbing the highest inclination of 24 degrees - **Fig. 2.** Then comes downhill largest slope to -24 degrees. A surprising result is received from the contestants - relatively high grades of difficulty of runs to the flat and down the small slope to -6 degrees. In general, coaches and runners agree on the difficulty of running along different types of slopes.

Criterion (D) - according to the types of running used in techniques for overcoming the track.

Table 4. Odds of difficulty of the race types defined as an average of the coaches' and athletes' evaluations.

Types of Running	Coaches Evaluation	Runners Evaluations	Coefficient of difficulty
Flat Running	2.4	4.93	3.67
Uphill running on a small slope trail with up to 6 degrees gradient	4	3.14	3.57
Uphill running on a medium slope trail with gradient between 6 and 12 degrees	6.1	4.73	5.42
Uphill running on a big slope trail with gradient between 12 and 18 degrees	7.8	6.54	7.17
Extreme uphill running with gradient between 18 and 24 degrees	8.2	8.32	8.26
Downhill running on a small slope trail up to -6 degrees gradient	2.9	5.74	4.32
Downhill running on a medium type of slope trail with gradient between -6 and -12 degrees	4.4	3.07	3.74
Downhill running on a big slope trail with gradient between -12 and -18 degrees	6.3	4.93	5.62
Extreme downhill running on a slope trail with gradient between -18 and -24 degrees.	7.8	7.06	7.43

3. Analysis of the degree of difficulty of the various types of coverings

The survey shows that the most difficult pavements are mud, screes, snow and side slopes, followed by rocky road and cobbles - Fig.3. Asphalt is defined as the easiest pavement, then - the dirt road, grass and trail. It is noteworthy that the runners show a relatively low value of difficulty of the rocky road pavement

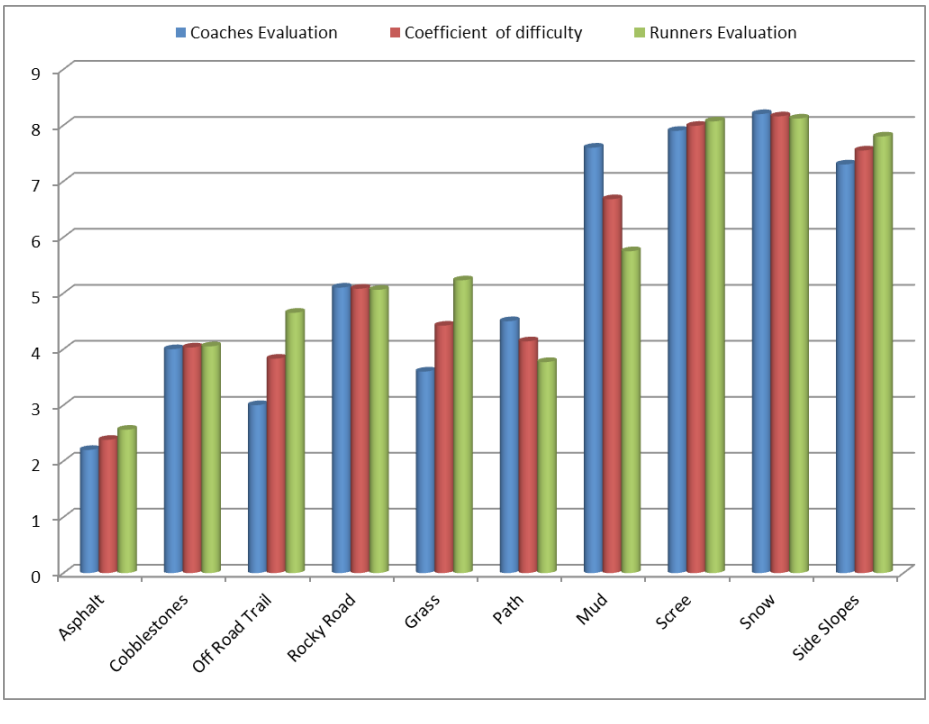

Figure 3. Graph of the degree of difficulty of the various types of track surfaces.

and dirt.

Criterion (E) – according to the different types of ground of the track:

Table 5. Odds of difficulty of pavements set as an average from the coaches' and athletes' evaluations.

Different Types of Ground	Coaches Evaluation	Runners Evaluation	Coefficient of difficulty
Asphalt	2.2	2.56	2.38
Cobblestones	4	4.05	4.03
Off Road Trail	3	4.65	3.83
Rocky Road	5.1	5.06	5.08
Grass	3.6	5.23	4.42
Path	4.5	3.77	4.14
Mud	7.6	5.75	6.68
Scree	7.9	8.07	7.99
Snow	8.2	8.12	8.16
Side Slopes	7.3	7.80	7.55

Considering the findings and the small number of respondents – coaches, we deepened the research on racers' profiles.

A study was done on statistically significant relationships between a type of track, pavement type and slope. Averages were examined by gender and category, standard deviations, standard distributions, medians and fashions, as well as opportunities to anticipate the difficulty in the Fisher formula.

An attempt was made to derive aggregated coefficients which were useful, but it was impossible for them to be used in the model - the object of this report. Correlation coefficients showed no statistically significant causal relationships.

Convergences were calculated between the three main groups of indicators, such as those between form and surface slope of the track and interesting and strong relationships were found. Due to the nature of the survey, few of them seem irrational, but given the overall strength of the coefficients it was decided to use them without further amendments.

These dependencies can be used (after "normalization", we bringing them to a comparable scale by multiplying by 10), as coefficients in the final formula for determining the difficulty of the routes.

Criterion (F) – convergences between types of flooring and the slope of the track.

Table 6. Coefficients of difficulty based on kovaransi between the types of coverings and the gradients of the slope of the track.

Coefficient of difficulty	Types of Running Depending on the degrees of the elevation of the track								
	Flat	Up to 6 degrees	Up to 12 degrees	Up to 18 degrees	Up to 24 degrees	Up to - 6 degrees	Up to -12 degrees	Up to -18 degrees	Up to -24 degrees
Asphalt	-7.8	-9.8	-9.3	-0.8	-6.8	10	7.4	6.6	7.6
Cobblestones	-0.4	2	1.7	5.3	-3.1	11.3	13.8	8.8	4
Off Road Trail	13.7	14.9	7	3.4	-3.6	7.9	17	21.1	19
Rocky Road	-11	-7.2	-5.2	-0.3	-1.7	10.6	11.8	12.6	11
Grass	1.1	0.2	-8.9	-4.7	-5.3	6.1	-4.2	3.1	5
Path	1.3	4.5	-2.1	-4.7	-2.3	4.5	5.7	10.6	11.4
Mud	-11.1	-7.2	-9.4	-0.3	3.8	5.3	-0.5	-4	-10.5
Scree	-4.8	-2.5	-1.1	0.2	-2.3	7.7	8.5	5.8	3.8
Snow	-6.9	-6.4	-3.7	-2.8	1.6	3.8	1.4	-11.3	-9.8

Side Slopes	-7.5	-2.8	-1.2	-1.3	4.9	11.5	11.6	6.3	6.4

CONCLUSIONS

The prepared classification represents an integral system for determining the degree of difficulty of the routes and enables the creation of categorization of the available routes for mountain running.

The Preview Categories of difficulty of the routes for mountain running - (G) can be derived by an algorithm in which (A) is the altitude at which the final track is located, (B) is the aggregate displacement of the track, (C) is the option for the competition, (D) is the ratio of the different types of running in overcoming the track, (D) is the ratio of different types of track surfaces, (E) is convergences between the pavement type and the slope of the track: (A + B + C + D + E + F) : 5 = G

LITERATURE:

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APPLICATION OF THE CONTRASTING APPROACH TO THE DEVELOPMENT OF THE FLEXIBILITY IN THE LESSON OF BULGARIAN FOLK DANCE

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Key words: *flexibility, contrasting approach, training methods, traditional methods, folk dances*

INTRODUCTION

Flexibility is a physical quality that depends on the amplitude of the movements in the various motor activities. In the theory of sports training, the share of research related to its study is relatively small. In this sense, new scientific quest in this direction are relevant and necessary. The main idea of this paper is to examine the effect of the implementation of a training methodology for development of the flexibility, built on the foundation of the contrast approach. We believe that the use of impacts for development of flexibility, which are organized on the principles of the contrast by the folk dance performance, will lead to better results in the flexibilisation of the students. The contrast like a phenomenon has been studied by a number of specialists who have applied the principles of the contrast in the training process [1-3].

The aim of this study was to determine the effect of applying the principles of the contrast in the training process with exercises for development of the flexibility together with movements of the Bulgarian folk dances.

In this connection were decided the following *tasks:*

1. Was made a complex of exercises for development of the flexibility to the joints of spine, hips and shoulders.
2. Was created a training algorithm for contrasting application of the exercises for flexibility with dance moves.
3. Proving the effect from application of the contrasting approach by usage of the flexibility exercises and dance elements was realized by pedagogical experiment.
4. The collected data was statistically processed, analyzed and summarized.
5. On the basis of the obtained results were made theoretical findings and methodological recommendations.

METHODOLOGY

Subject of this study is the flexibility. Object of study is a new training method for development of the flexibility that is realized in terms of the contrast in the lesson of folk dances. Contingent of the study are 50 students from National Sport Academy “V. Levski”. We examined the amplitude of the movement in the three joints. Was used the following research methods: pedagogical observation, testing, expert evaluation, statistical methods, analytical and synthetic method.

The new methodology for flexibility include the contrast approach that is implemented in terms of the lesson by Bulgarian folk dance and include flexibility exercises with dance moves and fragments. Thus create favorable physiological conditions in joints of performers. This allows the exercises for flexibility to be realized by amplitude movements and less effort.

The proposed new training methodology consists of five static stretching exercises. They are aimed at the spine, hip and shoulder joints. The exercises was performed in definite sequence after the completion of a dance. In the lesson the training work is realized by several rounds of dance moves and flexibility exercises. The traditional method includes the same exercises that are performed at the end of

the preparatory part of the lesson in several approaches. Dosage of the flexibility work in both groups is the same. The duration is 20-30 minutes. Training sessions are held once a week in the learning process of folk dances in the National Sport Academy.

To experiment the proposed new method for influencing the development of the flexibility was realized a pedagogical experiment. Used an experimental design which involves the formation of two groups - experimental and control. Each of them consists of 25 people. The experimental group worked to development the flexibility on the proposed new methodology, and control in the traditional way. The condition of the examined features is measured twice - at the beginning of implementation of the new methodology (first study) and after three month period that we consider sufficient to cause changes in the development of the flexibility (second study).

Tests were carried out with the test battery consisting of three tests:

- Depth of the tilt standing on a gymnastic bench (cm);
- Side splits (cm);
- Transverse circle with a stick (the ratio between the width of the shoulder girdle and the distance between the hands in cm).

RESULTS

The data collected from two surveys conducted with the experimental and control group were statistically processed. Was made a variance analysis. The results there are shown in Tables №1, 2, 3 and 4.

Table 1 . Variance analysis of the results of the first study of EG.

INDICATORS	n	Xmin	Xmax	R	$\bar{X}$	S	V	As	Ex
Depth of tilt	25	-6,00	25,00	31,00	13,16	3,54	26,89	-1,16	0,85
Side split	25	5,00	43,00	38,00	29,52	7,21	24,42	-1,17	0,52
Circle with a stick	25	0,19	2,39	2,20	1,63	0,41	25,15	-1,04	0,60

Table 2. Variance analysis of the results of the second study of EG.

INDICATORS	n	Xmin	Xmax	R	$\bar{X}$	S	V	As	Ex
Depth of tilt	25	1,00	28,00	27,00	15,96	4,2	26,37	-0,56	0,74
Side split	25	4,00	41,00	37,00	26,44	5,81	21,97	-0,86	0,32
Circle with a stick	25	0,10	2,61	2,51	1,60	0,45	28,13	-0,74	0,85

Table. 3. Variance analysis of the results of the first study of CG.

INDICATORS	n	Xmin	Xmax	R	`C	S	V	As	Ex
Depth of tilt	25	-23,00	26,00	49,00	12,88	1,01	7,86	-0,88	0,86
Side split	25	0,00	35,00	35,00	25,60	1,89	7,42	-0,76	0,62
Circle with a stick	25	0,63	1,95	1,32	1,41	0,38	26,95	-0,62	-0,56

Table.4. Variance analysis of the results of the second study of CG.

INDICATORS	n	Xmin	Xmax	R	`C	S	V	As	Ex
Depth of tilt	25	-15,00	25,00	40,00	13,80	0,897	6,50	-1,03	0,73
Side split	25	0,00	40,00	40,00	25,80	2,34	9,08	-0,91	0,13
Circle with a stick	25	0,67	2,39	1,72	1,42	0,39	27,46	0,16	0,44

It is noteworthy that one third of the variables in the samples are homogeneous, and the remaining two thirds - approximately homogeneous. There is a normal distribution for all variables. This allowed for proving our hypothesis to be used t-Student criterion for independent samples. Proving the growth in each of the two groups was realized by using the t-Student criterion for dependent samples.

Table 5. Comparison of the results of the first and second study of EG and CG.

Indicator / Group	I study		II study		$d = \overline{X}_2 - \overline{X}_1$	$d\% = \frac{\overline{X}_2 - \overline{X}_1}{\overline{X}_1}.100$	Screening criteria	P(%)
	$\overline{X}_1$	S_1	$\overline{X}_2$	S_2				
Experimental	13,16	3,54	15,96	4,2	2,8	20,59	-6,79	100
	29,52	7,21	26,44	5,81	-3,08	-10,43	4,54	100
	1,63	0,41	1,60	0,45	-0,03	-1,84	1,03	68,6
Control	12,88	1,01	13,80	0,897	0,92	7,14	-2,7	98,7
	25,60	1,89	25,80	2,34	0,2	0,78	4,44	100
	1,41	0,38	1,42	0,39	0,01	0,71	-0,11	8,8
$d = \overline{X}_e - \overline{X}_k$	0,28		2,16		1,88			
	3,92		0,64		-2,88			
	0,22		0,18		-0,02			
Screening criteria	2,41 2,13 2,01		2,59 2,23 1,4		5,12 3,85 1,93			
P(%)	97,1		98,1		100			
	96,5		96,8		100			
	95		83,2		91,2			

DISCUSSION

The data processing of the pedagogical experiment (table №5) allows to determine the effect of the applied impacts in each of the two groups and between them. This is accomplished by multiple comparisons.

On first place was established the statistical significance of differences between EG and CG in first study. The data (fig. №1 and table №5) shows that the two groups are similar in initial achievements. In the second and third indicator CG has a slightly better performance than EG. The statistical significance of the variables is guaranteed with a probability respectively 97.1%, 96.5% and 95.0%. This means that we can continue further comparing of the effectiveness of two methods.

On second place was established the statistical significance of differences between groups in second study and on this basis are formed conclusions about differences between the effect of the two impacts. The data (fig. 2 and table №5) shows that the difference in growth of the first parameter (depth of tilt) in the second study is 2.16 cm with guaranteed probability 98.1% in favor of EG. The same difference in the first study was 0.28 cm with a guaranteed probability of 97%. The difference in the growth at the other two variables (side splits and circle with a stick) in the second study was 0.64 cm and 0.18 units with guaranteed probability respectively of 96.8% and 83.2%. It is in favor of KG. In the first study its values were respectively 3.92 cm and 0.22 units. Guaranteed probability is 96.5% and 95%. This means that despite the best starting performance about the second and third indicator in CG, as a result of the

impact of the new methodology, advances in EG in the second study were improved and the difference was significantly reduced. The results obtained were statistically significant only in the first and second indicator. It should be noted that increasing the score of the second and third indicator (side splits and a circle with a stick) was associated with decreases in the values of variables. The statistical significance of the third variable is with a low guaranteed probability. That is why, it can be concluded that the data on the flexibility of the shoulder joints were not statistically significant.

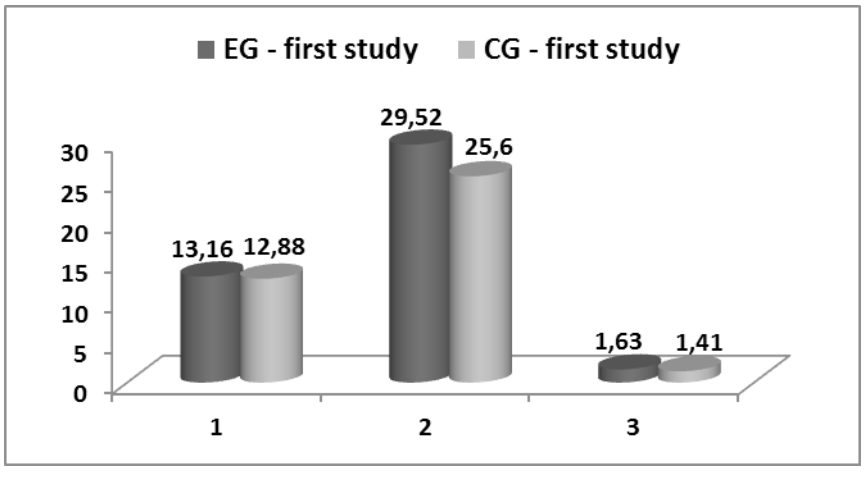

Fig. 1. Mean results of the three tests in the both groups from the first study.

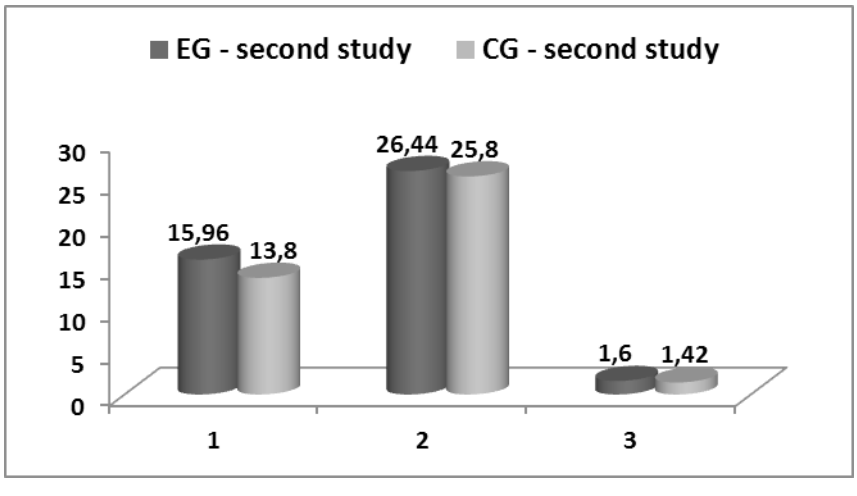

Fig. 2. Mean results of the three tests in the both groups from the second study

On third place was compared the growth in the experimental group and was defined its statistical significance. The data shows (table №5) that the most significant progress in this group was realized in the parameter "depth of tilt" (20.59%) with 100% guaranteed probability. On second place are results of the side splits (-10.43%) with guaranteed probability 100%. The lowest rate was found in the test „transverse circle with a stick" (-1.84%) with guaranteed probability 68.6%. The statistical significance of the three variables shows that reliable can be considered only result in the first two tests – „depth of tilt" and „side splits".

On fourth place, similarly was monitored changes in the control group. The growth rate of the three variables is respectively 7.14%, 0.78% and 0.71% with a statistical significance with guaranteed probability of 98.7%, 100% and 8.8% . The data suggests that growth in this group of investigated parameters was significantly lower. The proportion between them is similar to that of the EG. For reliable we can only accept the result of the first two tests.

On fifth place was made a comparison of growth (de and dk) of the results of the two groups and was found a statistical significance of differences between them. This comparison is most important factor for the differences in the effect of the impact in the experimental and control group.

The hypothesis of increased efficiency of training impacts applied by the EG is confirmed by comparison of the growths of the two groups. The growth in the three indicators in EG (de) was respectively 2.8 cm, -3.08 cm - 0.03 units. Positive growth in CG (dk) is present only in the result of the first test - 0.92 cm. The growth of the results in second and third test is negative - 0.2 cm and 0.01 units. The difference of 1.88 cm, -2.88 cm and -0.02 units is statistically significant only in the first two indicators, because only they are supported by guaranteed probability of 100%. The result of the third indicator was statistically unreliable because the guaranteed probability is only 91.2%.

ONCLUSIONS:

From the analysis of the collected data and their statistical treatment can make the following conclusions:

1. Established statistical significance of the results in the two groups can be concluded that statistically significant only those of the first two tests - depth of tilt and side splits. We believe that it is natural and conditioned by the contrast effect which is concentrated primarily on the lower limbs.

2. The survey data show that growth in experimental group after the second study is significantly higher than in CG. The results of the test „depth of the tilt“ make an impression with over 20% growth.

3. Comparison of the growth of the two groups clearly demonstrates that the hypothesis of the greater efficiency of the new training methods in terms of two parameters (depth of the tilt and side splits) is correct.

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MORPHOLOGIGAL CHARACTERISTICS OF PROFESSIONAL SHOTOKAN KARATE ATHLETES AS A FORM OF SPECIFIC ADAPTATION

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Key words: *Shotokan Karate, Anthropometrical Characteristics*

Systematic activities in a particular sport lead to specific changes in the morphological characteristics and body composition as an expression of adaptation due to increased demands of the training and competition process, therefore morphological stud ies in sport will be an integrated part of all studies concerning the training process and related biological processes, using the acquired results to predict sports performance in pro athletes.

Requirements of martial arts and karate in particular, lead to specific changes in body composition and somatotype in Shotokan Karate competitors – a factor representing both an advantage in their performance and creating predispositions for specific injuries.

The body mass composition (BMC) is one of the basic morphological characteristics of men. Interests in changes of BMC dates from the mid 19th century in the works of Bischoff and Dursy in 1863, von Liebig and Volkmann (1874), Schwann (1843) (as quoted by Dimitrova D. (2004) and Martin A. (1965)) performed anatomic and analytical studies on cadaveric material [1, 3, 8, 10]. Modern methods such as double-ray absorptiometry (DEHA - Dual Energy X-Ray Absorptionmetry), ultrasound, MRI, bioelectrical impedance. allow for a detailed and unobtrusive study of the characteristics in the development of BMC and its components [3]. The ability to detect correlations between the different indicators will be conducive to the selection of the most promising players, skills and abilities from the coaching staff and the change in desired or harmful qualities in an athlete over time- as represented by the conclusions of Zareva I. Gikova M. and Tishinov O. [2], and the related to them possibilities of progress or risks for injuries in the particular discipline. We set the objectives of this study as to:

1. Disclosure of different factors in anthropometric characteristics and body composition in the study group of elite Shotokan Karate athletes compared to their sports experience.
2. Through specific measurement equipment and methods followed by a performance analysis, to find the most significant dependencies, as viewed by an athletic and educational perspective.

METHODS AND METHODOLOGY OF THE STUDY

Derived indicators of body composition (body mass (BM), muscle mass (ABM or MM), body mass index (BMI), body fat (BF) , index of fat around the internal organs (VF), physical condition assessment (Phys), bone mass (Bone), basic metabolism and metabolic age) identified with a Tanita body composition analyzer scale BC-533 using skin bioimpedance (impedance measurement scale of 20-2000ohms, with an accuracy of 6 ohms, frequency up to 50 kHz and 500 μ A current). Bioelectric impedance analysis (BIA) is a noninvasive, inexpensive and portable method mainly used for the analysis of body composition over the past decade. Bioelectrical impedance analysis (BIA) does not measure the composition of the body directly, using the fact that the body consist both of intracellular and extracellular fluids, able to conduct electricity. Imperceptible, safe, low frequency current flows through those intra- and extra-cellular fluids and, using two parameters: the whole body impedance and reactance, and while the free of fat body mass consists essentially of water and electrolytes thus- is a better conductor of electricity relative to the fat tissue containing accordingly very little water. So this technique is essentially gives an index of the total water content (TWC), which is the electrical output

from the free of fat tissue mass. According to research of Martins K. and Monego E. BIA is a more accurate assessment technique of fat in the human body in optimal health (18-30% women 10-25% of men). TWC in literature varies in the range 45-65% of BM (45-60% women 50-65% men)) [3, 9, 10, 13] The active body weight (ABW) is about 70-90% of the weight of the individual in adulthood. A well developed ATM is a prerequisite for good physical condition and athlete's development. In sports we apply mostly the regressional equations of Martin A. and ass. (1990) which give fairly accurate information for determining the absolute quantity of muscle mass (AQMM) in men, but give higher values for females[8]. In our study the development of the muscles will be presented as a percentage of total body mass - muscle mass percentage (% MM) The percentage body fat (% FM) is the most commonly used and monitored indicator and representative for BMC. It shows the relative amount of body fat, allowing for continuous monitoring and tracking of this inactive (in terms of athletic performance) component. Most authors agree that in healthy yet untrained individuals the average body fat percentage is around 15-18% for men and 23-25% for women. According to literature sources rates of over 25% for men and 32% of women are considered an indicator of obesity [10,11,12]. According to J. Willmore. (1986), however, is right for the athletes to be separated into a specialized group, taking into account the simple fact that fat deposits are a negatively affecting performance factor, therefore grouping of : minimum vital fatty tissue store (men and women under 5 and 8%) optimal for athletes in general (12-18% male and 16-25% female), and even completely separate track-and-field athletes (where is a demand for active mass to be in the maximal range will further reduce the filling of fatty deposits) of 10-12% as minimum and 13-22% as maximum for males and females[16].

Body-Mass Index (BMI) is an indicator directly derived from the ratio between height and weight. It is usually an indicator that frame the normal body parameters with respect to the optimal weight for that height. Used for athletes, however, it detects abnormally high levels of BMI because of the greater amount of muscle mass, and not, as would be expected in the general population, of the greater quantity of fatty tissue. [3]. Based on literature the characteristics of karate athletes are mostly marked on the surface between BMI 20 and 30 kg/m^2 (from 22.9 to 31.0 kg/ m^2), with a fat content between 12.9 and 20.8% [13]. Using and comparing data for fencers of both sexes of Irutria A. Ramos J.(Spain) and Yagello M. (Poland) find that they established %FM variations between 9.6 and 12.2% for men and between 14.3 and 23.3% for women as with increasing age the percentage FM decreases [4, 6, 10,11]. The percentage of muscle mass for men is about 46-48% and 42-44% for women, which is well above the values for sport regularly (reference values for untrained men were 33.3%, and for women - from 24.3 to 30.3% MM [3, 10]. Such data give us a basis for comparison, indicating whether you will have a better physical development and combat condition in a karate athlete. According to Katic R. and Blazevic S. in karate competitors subcutaneous fat is ballast weight which is definitely speed restriction and causes adverse effects on the already burdened balance of energy processes in the body [7]. Muscle mass as a major component in the dimension of body mass, and as such is essential to contact fights with the opponent, and performing explosive and rapid movements in attack, defense or counterattack.[7]

Water content is determined by the Cole-Cole method [14], using the following equation:

$$\text{Water (kg)} = 2.584 + 0.379\ Ht2/RT + 0.168\ BM$$

where Ht is the height of the examined (cm), RT is resistance (Ω) in the circle, and BM body mass (kg)

Total bone mineral content (TBBMC) and bone mass (TBM) According to literature data [7] evaluating the overall mineral mass (TMM) 82.4% from which bone mass was extrapolated by measurement of body density and total body water. Tanita scale uses these data streams for incorporation in the groups according to gender and range [5].

Anthropometry: Leicester height ruler is used for measuring linear dimensions (cm) with a maximum height of 2.0 meters.

The study group included 22 participants experienced karate athletes , 16 men and 6 women in the age range 19-29 and 20-27 years old respectively. Divided into groups according to improvement: 9 the

highest degree of II and I dan, and 13 of 1-st to 7th kyu. Variance and correlation analysis of the results was made with the statistical software package SPSS v.19.

RESULTS AND ANALYSIS

Table 1 Anthropometric values for the experiment group:

Degree	Years of Practice	HIGHT (cm)	WEIGHT (Kg)	BMI	Water con-tent	FAT tissue (%)	VISCERAL fat	MUSCLE mass (Kg)	Phys condit	Bone matter mass (Kg)	Metabolic rate (Kcal)	Metab. AGE
X	12	166	71	24,4	59,8	16,0	2,0	57,7	5,5	3,0	1809	17,1
S	4,24	6,45	11,79	3,49	4,91	7,27	1,79	9,73	1,60	0,48	288,49	9,19
V	26%	4%	17%	12%	8%	73%	179%	16%	32%	15%	16%	77%
As	-0,84	-0,57	0,34	0,97	0,46	0,85	1,79	-0,72	0,39	-0,81	-0,47	2,01
Ex	0,78	-1,76	1,29	0,47	1,82	0,90	1,72	0,37	-0,42	0,55	0,75	3,67
Max	19	172	102	33	73	36	6	76	8	4	2434	46
Min	1	156	46	19	49	7	1	36	3	2	1155	12
R	18,00	16,00	55,50	13,60	24,20	29,10	5,00	40,30	5,00	2,00	1279,00	34,00

where:

X - average

S - mean square

V - coefficient of variation

As - asymmetry

Ex - excess

Max - maximum value in the study sample

Min - minimum value in the study sample

R span - the difference between the maximum and minimum values

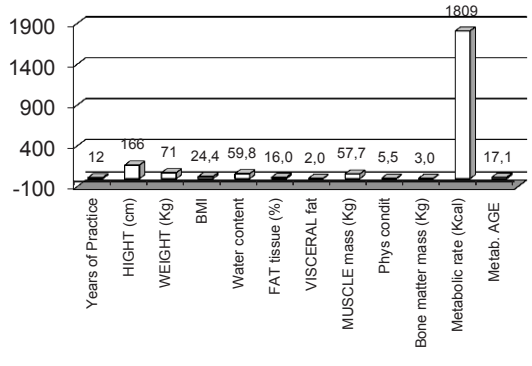

Fig. 1. Average values of anthropometric values

The comparison between the Polish and Bulgarian karate find similar levels of BMI (21 to 31), but at higher levels of body fat in the upper range (up to 24.4) for our athletes - possible limitation of maximum sport performance, but the background and a lower average height of 170.5 cm [5], even compared to the Bulgarian fencers (average 176 cm) [1]. It is noteworthy that a compact structure with small span-from the highest to the lowest athletes within 172-169sm, and representative values from muscle mass: compared with the average 58.4 for men and 42.5 kg-for women fencers , karatekas are marked between 62.6 and 44.8 kg respectively. These results confirm the observed by Katic and Blazic features in the structure of the athlete-karateka: high BMI with predominant component of active muscle mass and less fatty tissue. [7].

Table 2. Anthropometric parameters according to gender : Males

male	Years of Practice	HIGHT (cm)	WEIGHT (Kg)	BMI	Water content	FAT tissue (%)	VISCERAL fat	MUSCLE mass (Kg)	Phys condit	Bone matter mass (Kg)	Metabolic rate (Kcal)	Metab. AGE
X	11,5	170,5	74,7	24,6	61,5	13,0	2,0	62,6	5,4	3,3	1943,6	16,6
S	4,4	1,0	9,8	2,9	4,5	5,1	1,8	5,1	1,5	0,2	176,2	7,7
V	38%	1%	13%	12%	7%	39%	90%	8%	29%	8%	9%	46%
As	-0,77	0,00	1,53	0,86	1,19	0,22	1,97	0,49	0,34	0,72	1,00	1,55
Ex	1,51	-1,20	3,93	-0,04	2,12	-1,35	2,74	1,17	-0,74	1,45	2,30	0,78
Max	19	172	101,8	31	73	24,4	6	76	8	3,9	2434	32
Min	1	169	60,5	21	56,1	6,7	1	55,6	3	2,9	1718	12
R	18	3,0	41,3	10,0	16,9	17,7	5,0	20,4	5,0	1,0	716,0	20,0

Table 3. Anthropometric parameters according to gender : Females

female	Years of Practice	HIGHT (cm)	WEIGHT (Kg)	BMI	Water content	FAT tissue (%)	VISCERAL fat	MUSCLE mass (Kg)	Phys condit	Bone matter mass (Kg)	Metabolic rate (Kcal)	Metab. AGE
X	12,0	159,0	62,9	23,9	55,4	24,0	1,8	44,8	5,8	2,4	1449,0	18,7
S	4,2	3,0	13,8	5,0	3,6	6,4	2,0	6,8	1,9	0,4	216,7	13,5
V	35%	2%	22%	21%	6%	27%	111%	15%	33%	15%	15%	72%
As	-1,76	0,00	1,08	1,51	-1,54	1,45	2,45	0,09	-0,15	0,12	0,10	2,38
Ex	3,66	3,70	2,01	2,13	3,00	2,73	6,00	-1,46	-0,85	-1,37	-1,07	5,75
Max	16	162	87,2	33	59,1	35,8	6	53,1	8	2,8	1739	46
Min	4	156	46,3	19,4	48,8	17,9	1	35,7	3	1,9	1155	12
R	12	6	41	14	10	18	5	17	5	1	584	34

When comparing gender differences are found in the ratio of expected growth, muscle and bone mass in favor of male karate, and although unimpressive draw against BMI on average values, in the column of body fat it is clearly an advantage over women: averages of 13.1 against 24.4 kg, very different from the criterion for harmonious development in karatekas female (Max value of 87.6 kg and 38.6% body fat). Additionally, we pay attention to specifics within the group of male karate athletes with a high degree mark even better than average values - in BMI of 24.4 kg/m ^{2} is observed only 12.6 kg fat against 62,3 kg of muscle mass. We observe a significant equality between water content and water mass in men, giving highly optimized somatotype prerequisite for better sports performance, compared to females.

After statistical analysis, we find that male karate coefficient of variation defined as non-homogeneous sample (the percentage of variation in the range of 7 to 38.61%). Asymmetry and kurtosis respectively Eh ranging from -0.696 to 1.746 (at intervals of 1,803) = normal kurtosis, and Ace from -1.934 to 3.504 (0.927 in) skewed distribution with right arm extended to the Gaussian curve. It is noteworthy that in the group of women, according to the values of the coefficients of variation (from 6 to 35%), the group is inhomogeneous. The group excesses varying from - 1,755 to 2,449 (in trust for the group 1,803) = different from the normal distribution, while Ac is - 1.460 to 6.00 (with a confidence interval 0.927) = skewed distribution with right arm extended. The correlation analysis showed large dependencies between growth, muscle, bone mass and metabolism in major karatekas.

CONCLUSIONS

Drawn from our data analysis of anthropometric measurement conclusions lead to a clearer understanding of the factors shaping body composition in competitive karate and the development dynamics in the relation between practicing athlete and his chosen sport. Even more it enables us by long-term monitoring to design a modern, up-to-date model of sports specialization in karatekas, tailored and targeted to the requirements of the specific sport in order to successfully select high-class athletes. We can derive a purposeful trend in shaping of the karatekas physique in Bulgaria: the optimal structure and body composition, and our future goal will be the search and subsequent selection, of athletes with optimal height, controlled muscle mass and reduced fat depots.

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INTERRELATION BETWEEN THE SPORTS RESULT WITH MAIN FACTORS OF PERFORMANCE OF ELITE SPRINTERS

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Keywords: sprint, elite sprinters, main factors, correlation

INTRODUCTION

Many authors [1, 2, 3, 4, 5, 6, 7, 10, 15, 18] consider that the sports result in sprint running is directly related with the level of development of its main factors – start acceleration, maximum speed and speed endurance, although after a period of time it is necessary to make researches which can reveal again or ascertain the changes that are occurred in these regularities. Our knowledge about that area will help us to determine respective ways for developing the methodology of sports training related with the sprint running.

In this context the purpose of our study is to cooperate for optimization of the training process in sprint running by revealing the current trends in development of the individual factors of the sport result for elite men and women sprinters. When we accomplished this purpose we set the following tasks:

Systematization and studying the variability of the data characterized individual factors and the sports result for elite men and women sprinter;

Disclosing the correlation interrelations between factors and the result in 100 m sprint running of elite men and women sprinters.

Their solving is related with our expectations that in this way we can get an idea for specific influence of the main factors in relation with the current methodological aspect with the development of the two sexes.

METHODS

The whole study is realized through the following methods: analyzing of the specific literature; systemization and generalization of the kinematic data of the specialized video analysis; mathematical statistics methods for processing of the results - Analysis of variance (ANOVA) and correlation analysis.

For revealing the importance and the influence of every one of the three from the factors they must developed to their maximum level. A 100 m dash is accepted to be "classical" for that kind of study. When we are characterized the main factor of the sports result in sprint we used data from the official and certificated IAAF biomechanical laboratories. They cover the period of the last two World championships which took place from 2009 to 2013. We used data only from the finals because we want to be maximum accurate. This way we try to eliminate the certain deviation that comes from the first rounds where the elite sprinters run tactical. When we characterized the individual factors of the sports result we used the following sections from the 100 m. distance. We will use the following abbreviations further in the text:

Factor sprint acceleration ($\mathbf{V_a}$) – section 0-20 m;

Factor maximum speed ($\mathbf{V_{max}}$) – section 60-80 m;

Factor speed endurance ($\mathbf{V_r}$) – section 80-100m;

Sports result 100 m ($\mathbf{SR_{100\ m}}$)

We selected the sections for every factor in advance by conforming to the studies that analyses the dynamic of the speed on that kind of competitions [4, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17]. The total numbers of studied sprinters are 48 from both sexes.

DISCUSSION

The data from systematization of the indications that characterized main factors of the sports result in 100 m running for men and women are generalized and represented in (Table 1 and 2). We can see there that the sports result of the studied contingent male sprinters is in the limits of 9.58 – 10.34 s. The result of female sprinters is between 10.75 s and 11.16 s. These results are basis to define these athletes as elite sprinters.

Table 1. Variability of indicators that characterized factors of the sports result for 100 m sprint running – men

Statistical indicators	**Factors of the sports result and a sports result**			
	V_a	V_{max}	V_R	$SR_{100\ m}$
	(s)	(s)	(s)	(s)
Mean **(x)**	2,94	1,71	1,77	9,99
Standard Error (m_x)	0,01	0,01	0,01	0,03
Median (M_e)	2,93	1,71	1,77	9,98
Mode (M_o)	2,92	1,72	1,76	9,93
Standard Deviation **(S)**	0,04	0,04	0,06	0,19
Kurtosis (E_x)	0,58	0,60	0,68	0,30
Skewness (A_s)	0,63	-0,66	0,67	-0,22
Range **(R)**	0,17	0,16	0,26	0,76
Minimum (x_{min})	2,89	1,61	1,66	9,58
Maximum (x_{max})	3,06	1,77	1,92	10,34
Odds of variation **(V %)**	1,36	2,34	3,39	1,91

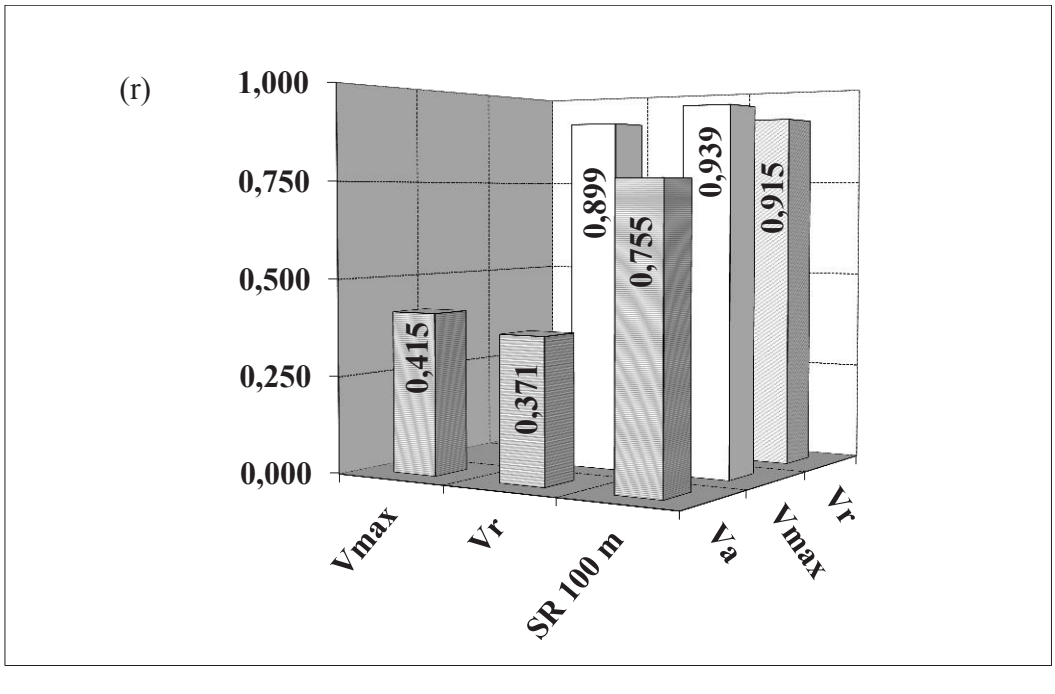

Fig. 1. Correlative values of interrelations between main factors of the sports result and the sports result in sprint running - men

From point of view of variability of the indicators characterized factors of sports result interest represent the values of coefficients of variation. Their generalized analysis shows that the values of the results from the both sexes are in the limits of V% (1.19 – 3.39 %). These values determine that the studied contingent sprinters as highly uniform and homogeneous. This means that the result and the conclusions related with them is expected to be correct and reliable.

Table №2 Variability of indicators that characterized factors of the sports result for 100 m sprint running – women

Table 2. Variability of indicators that characterized factors of the sports result for 100 m sprint running – women

Statistical indicators	**Factors of the sports result and a sports result**			
	V_a	V_{max}	V_R	$SR_{100\ m}$
	(s)	(s)	(s)	(s)
Mean **(x)**	3,13	1,92	1,98	10,93
Standard Error (m_x)	0,01	0,01	0,01	0,04
Median (M_e)	3,12	1,92	1,98	10,93
Mode (M_o)	3,11	1,90	1,99	11,05
Standard Deviation (**S**)	0,05	0,03	0,03	0,13
Kurtosis (E_x)	0,85	-0,17	-0,42	-0,72
Skewness (A_s)	0,65	-0,49	0,07	0,26
Range (**R**)	0,18	0,09	0,10	0,41
Minimum (x_{min})	3,06	1,86	1,93	10,75
Maximum (x_{max})	3,24	1,95	2,03	11,16
Odds of variation **(V%)**	1,59	1,56	1,52	1,19

The data from the ANOVA allow us to reveal the influence of every factor on the sports result. For this purpose we made correlation analysis of the factors of the sports result between themselves and also we made the same for their influence on the sports result. The values of the interrelations of sprinters (men and women) are shown respectively on (Fig. 1 and 2).

The analysis of the correlative values of the interrelations of the sports result with its main factors shows that the highest results are closely related with the factor maximum speed for male and female sprinter (V_{max}).That interrelation for men is very high significant (r=0.939). The same interrelation values for women is highly significant (r=0.850). These values reaffirm the leading role of this factor great result in sprint running.

The second factor by importance is different for men and women. Correlative values define speed endurance (V_r) as a second factor for sports result in men's sprint running with value r=0.915 which define level of significant as a very high. Second factor of importance for women sprinting is starts acceleration (V_a) with high level of significance (r=0.825). This data shows that there are some specific and difference in development of the second factor for both sexes. It s obvious for increasing the result men depends more on the factor speed endurance unlike women who depends on the factor sprint acceleration.

The findings for the differences between two sexes are the same fort the third factors. Figures shows that men's third factor by significance is starts acceleration (V_a) with high value of significance (r=0.755). Women's third factor is speed endurance (V_r) with high value of significance (r=0.733).

The analysis of the interrelations between main factors approved high significant of the factor maximum speed ($\mathbf{V}_{max}$) and the factor speed endurance ($\mathbf{V}_r$) for the both sexes. They are respectively for men (r=0.899) and for women (r=0.763). The data gives us a right to claim that higher values of ($\mathbf{V}_{max}$) will assure higher reserve of speed which will help for higher values of the factor ($\mathbf{V}_r$). This largely explains difference in interrelation of sports result for the second and the third factors for the both sexes.

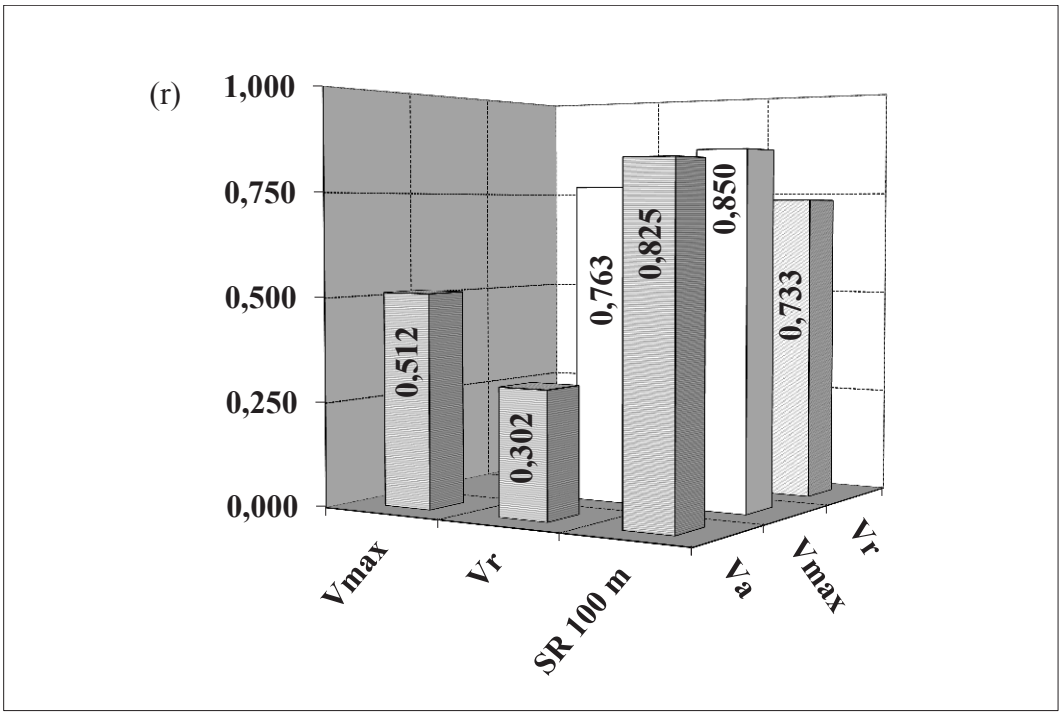

Fig. 2. Correlative values of interrelations between main factors of the sports result and the sports result in sprint running - women

The analysis of the interrelations between factors ($\mathbf{V}_a$) and ($\mathbf{V}_r$) shows moderate significance for both sexes respectively for men (r=0.371) and women (r=0.302). Men's interrelation is between factors ($\mathbf{V}_a$) and ($\mathbf{V}_{max}$) is different than that of the women. It is moderate by significance for men's (r=0.415) and significant for women (r=0.512).

Identified differences of significance for the main factors for both sexes probably are result of the existing constitutional and functional differences. Obviously this requires different approach for developing the main factors of the sport result for men and women sprinters.

CONCLUSIONS

The from the study is a basis to make the following conclusions and recommendations which will help for optimizing the strategy for development of the main factors of the sports result in sprint running.

Identified interrelations are basis to claim that:

- Main factor for both sexes is maximum speed;
- Second factor by significance for men is sprint endurance, whereas women's second factor by significance is start acceleration;
- Third factor by significance for men is sprint acceleration, whereas for women this is speed endurance;
- A reserve of speed is a precondition for realizing better values of the factor ($\mathbf{V}_r$).
- In conclusion we wish to recommend for constructing the strategy for developing the main factors of sports result to take into account the identified differences of the factors for both sexes.

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INFLUENCE OF THE COMPLEX WORKOUT BEACH VOLLEYBALL ON SPECIFIC PERFORMANCE COMPETITORS

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Key words: beach volleyball, training program, specific efficiency, pedagogical experiment

INTRODUCTION

Beach volleyball is relatively new on the Olympic stage. But in a short amount of time, it has increased its visibility and created its share of stars (www.fivb.org).

The popularity of beach volleyball is increasing, but it is a sport that is in the early stages of its development and it is necessary to introduce quality materials to support the development of players and coaches through practical advice (JONES, H., DALANHESE, D., 2011).

The sport of beach volleyball underwent serious changes after the 2000 Sydney Olympics. Previous to 2001, the sport was played using the 'side out' scoring format. Teams only scored points when they were serving, and matches consisted of one game to fifteen points where the victor had to win by two points. The sport is now played with a 'rally point' system where points are scored on every play, regardless of which team possesses the serve. The court dimensions also changed from a 9x18m court to a smaller 8x16m court. Researchers have explored the effect of different scoring systems and court dimensions in the sport (Kountouris & Laios, 2000, Kontourris et al. 2001, Giatsis 2003, Giastis & Tzetis 2003, Grgantov et al.2005, Kroger 2006).

The common findings show that decreasing the size of the court results in an increase of the match duration, and this changes the physiological requirements for this sport. Similarly, the change of the court size results in a change of the set of technical and tactic skills used by the players to achieve victory.

The basic requirements for beach-volleyball players are the same as those exercising for classic volleyball. No coincidence that many of the beach volleyball players have previously been trained in traditional volleyball. (В. Христова, 2012).

In terms of control and evaluation of the technical mastery it is necessary to find objective indicators to express both quantitatively and qualitatively the work done within the reported period and to assess the compliance degree between the work done and the realized effectiveness on the different competition elements (Ст. Димитров, 2010).

The features of the sport games activities in beach volleyball have increased demands on universal game preparation of athletes who should be well fed reception, attacking, blocking and play defense. You could say the main objective of preparing athletes in beach volleyball – it is versatility (В.В. Костюков, Ю.Б. Чесноков, А.В. Тимохин, 1996).

METHODOLOGY

Optimizing training in beach volleyball is a process inextricably linked with high requirements to achieve a win, and creating orderliness to enhance the effectiveness of educational training process.

The aim of this study is to determine how the complex training program applied by us influences the specific efficiency of the Bulgarian national youth beach volleyball team players (up to 22 years of age).

The tasks to be solved during the experiment are related to determining the following:

- The specific efficiency development level of the studied individuals;
- The changes in the observed indications as a result of the applied experimental interaction.

The object of this study is the beach volleyball training and competitive process.

The subject of this study is the specific efficiency of the beach volleyball players.

The contingent of the study are the Bulgarian national youth beach volleyball team players (up to 22 years of age).

The complex **methodology of the study** includes:

1. Investigation and analysis of information sources;
2. The sporting and pedagogical testing in order to establish the specific efficiency of beach volleyball players was conducted twice (before the beginning and after the end of the experiment); the testing included 14 indicators (**table 1)**.

Table 1. Sports pedagogical indicators

№	*Indicators*	units	Accuracy of the measurement	direction of increasing
1	Special speed	sec	0,01	-
2	Square running	sec	0,01	-
3	Block jump	cm	1	+
4	Spike jump	cm	1	+
5	Throwing a solid ball	m	0,1	+
6	Balance	sec	0,01	+
7	Set in target	num	1	+
8	Pass in target	num	1	+
9	Serve in target	num	1	+
10	Jump sreve in target	num	1	+
11	Spike attack in target – line	num	1	+
12	Shot attack in target – line	num	1	+
13	Spike attack in target – diagonally	num	1	+
14	Shot attack in target – diagonally	num	1	+

3. Sporting-pedagogical experiment – The experiment was conducted within the 2013 competitive season from May to August. Within the preparation work of the teams was used the developed special complex training program aimed at perfecting the game actions and interactions between the players which are specific for the beach volleyball. This program gives the opportunity to increase the level of all basic technical and tactic skills and to develop the physical skills which are specific for this game. The used training means consider the specifics of the players performance depending on the position that each one of them occupies within the team – back, forward or a universal player.

The developed specialized complex training porgram is comprised of 4 types of basic training means aimed at perfecting the game actions and interactions:

- ✓ Exercises aimed at perfecting the skills of ball play;
- ✓ Exercises aimed at perfecting the players actions within the system “Receive– Set – First attack“;
- ✓ Exercises aimed at perfecting the players actions within the system “Serve– Block – Defense – Counter-attack“;

Game exercises.

The training process was aimed at the participation of the teams in the National Bulgarian Men Beach Volleyball League and the European Youth Beach Volleyball Championship (players up to 22 years of age).

Table 2. Basic training indicators

№	Indicators	2013
1	Number of working weeks	16
2	Number of training days	78
3	Number of practices	78
4	Number of training hours	137
5	Number of competitive days	18
6	Number of rest days	16

The training plans (***table 2***) are comprised of separate sections containing: training practices, weekly microcycles, mesocycles and an annual macrocycle, which are inter-related and are aimed at the same goal – maximum improvement of the specific efficiency and the game efficiency of the beach volleyball players. The training load is distributed into six training practices during the week and each of them lasts between 90 and 120 minutes. Their volume and intensity take into consideration the sport preparation stage. The preparation of the players for the whole period is divided into 5 mesocycles (16 training weeks in total):

- ✓ Special basic – 3 weekly micro-cycles;
- ✓ Pre-competitive – 3 weekly micro-cycles;
- ✓ Competitive (early competitions) – 4 weekly micro-cycles;
- ✓ Interim – 2 weekly micro-cycles;
- ✓ Competitive (main competitions) – 4 weekly micro-cycles.

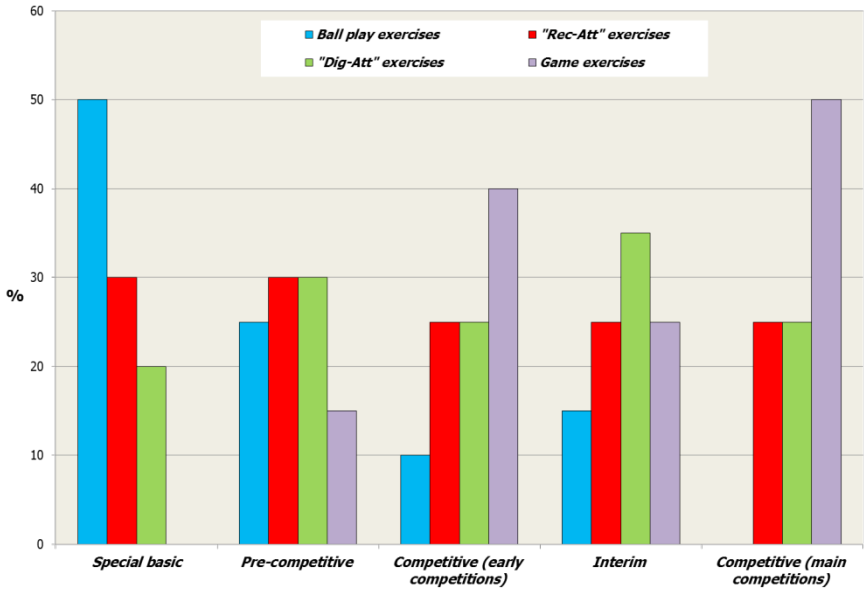

Fig. 1. Content of the technical and tactic preparation during different mesocycles

The defining factors of the structuring and the content of the training process are:

- ✓ The game activity peculiarities of beach volleyball;
- ✓ The fact that all beach volleyball players in Bulgaria also compete professionally in indoor volleyball;
- ✓ The special characteristics of the sports calendar.

Fig. 1 shows the content of the technical and tactic preparation and the distribution of the used training means.

The study results underwent ***mathematical and statistical*** processing through:

- ✓ Variation analysis;
- ✓ Comparative Student t-criteria for dependent samples, at a high guarantee probability Pt ≥ 95%.

RESULTS AND DISCUSSION

The initial part of this analysis is aimed at defining the mean values and the variance of the studied specific efficiency indications. For the upcoming interpretations of the results it is necessary to determine correctly the normality of the distribution and the homogeneity of the group. The distribution of the variables and the exposure of the value scattering is calculated by using the applied variation analysis.

Table 3 show the results achieved by the competitors at the beginning and after the end of the experiment. At the first testing the national teams players show approximately homogeneous results of the motor skills indicators and highly non-homogeneous results of the technical indicators.

Table 3. Test results before and after the experiment

	Indicators	N	$\bar{X}1$	S1	V1	$\bar{X}2$	S2	V2
1	Special speed	8	3,16	0,26	8,23	2,76	0,14	5,07
2	Square running	8	19,63	0,56	2,85	17,90	0,75	4,19
3	Block jump	8	51,50	9,21	17,88	59,25	8,75	14,77
4	Spike jump	8	66,00	5,66	8,58	74,88	7,97	10,64
5	Throwing a solid ball	8	9,48	1,05	11,08	11,65	1,21	10,39
6	Balance	8	3,53	1,45	41,08	4,60	0,99	21,52
7	Set in target	8	2,25	1,28	56,89	3,88	0,84	21,65
8	Pass in target	8	3,38	0,74	21,90	4,25	0,71	16,71
9	Serve in target	8	2,75	1,39	50,54	4,13	0,64	15,50
10	Jump sreve in target	8	2,00	0,76	38,00	3,63	0,52	14,33
11	Spike attack in target – line	8	2,50	1,07	42,80	3,25	0,89	27,38
12	Shot attack in target – line	8	2,00	0,93	46,50	3,63	0,52	14,33
13	Spike attack in target – diagonally	8	2,25	1,58	70,22	3,75	0,89	23,73
14	Shot attack in target – diagonally	8	2,50	0,93	37,20	3,75	0,71	18,93

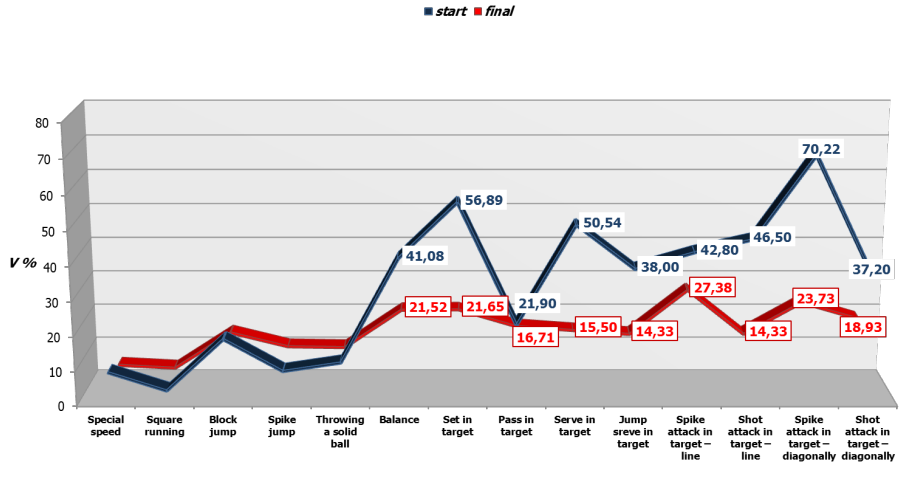

Fig. 2. Variance of indicators before and after the experiment

As a result of the sport and pedagogic work during the experiment, the second testing shows better achievements. The group shows highly homogeneous results and is approximately homogeneous in terms of all studied indicators **(Fig.2).**

However the improvements of the mean results don`t allow the elaboration of serious conclusions before checking the reliability of the differences between the players` results of the two testings.

The final results were registered after four months of permanent work. An analysis of the changes in the dynamics of the studied indicators which was influenced by the applied specialized complex training program was made.

Table 5. Reliability of the increase of motory skills indicators

	Indicators	n	Test I		Test II		d	d %	t	P(t)
			$\bar{X}1$	S1	$\bar{X}2$	S2				
1	Special speed	8	3,16	0,26	2,76	0,14	-0,40	-12,66	6,17	99,95
2	Square running	8	19,63	0,56	17,9	0,75	-1,73	-8,81	10,11	100,00
3	Block jump	8	51,50	9,21	59,25	8,75	7,75	15,05	6,76	99,97
4	Spike jump	8	66,00	5,66	74,88	7,97	8,88	13,45	7,57	99,99
5	Throwing a solid ball	8	9,48	1,05	11,65	1,21	2,17	22,89	3,53	99,04
6	Balance	8	3,53	1,45	4,6	0,99	1,07	30,31	4,45	99,70
7	Set in target	8	2,25	1,28	3,88	0,84	1,63	72,44	6,18	99,95
8	Pass in target	8	3,38	0,74	4,25	0,71	0,87	25,74	3,86	99,38
9	Serve in target	8	2,75	1,39	4,13	0,64	1,38	50,18	4,25	99,62
10	Jump sreve in target	8	2,00	0,76	3,63	0,52	1,63	81,50	6,18	99,95
11	Spike attack in target – line	8	2,50	1,07	3,25	0,89	0,75	30,00	2,05	92,04
12	Shot attack in target – line	8	2,00	0,93	3,63	0,52	1,63	81,50	6,18	99,95
13	Spike attack in target – diagonally	8	2,25	1,58	3,75	0,89	1,50	66,67	3,24	98,58
14	Shot attack in target – diagonally	8	2,50	0,93	3,75	0,71	1,25	50,00	5,00	99,84

The statistical reliability of the differences between the two testings was established (at the beginning and after the end of the experiment) by applying the comparative Student t-criteria for dependent samples at a high guarantee probability Pt≥95% and a critical value for the studied population t_{α}=2,37. ***Table 5*** presents the results obtained from the comparative analysis and ***Figures 3 and 4*** show the increase of the beach volleyball players` results in terms of evaluation indicators for the specific efficiency.

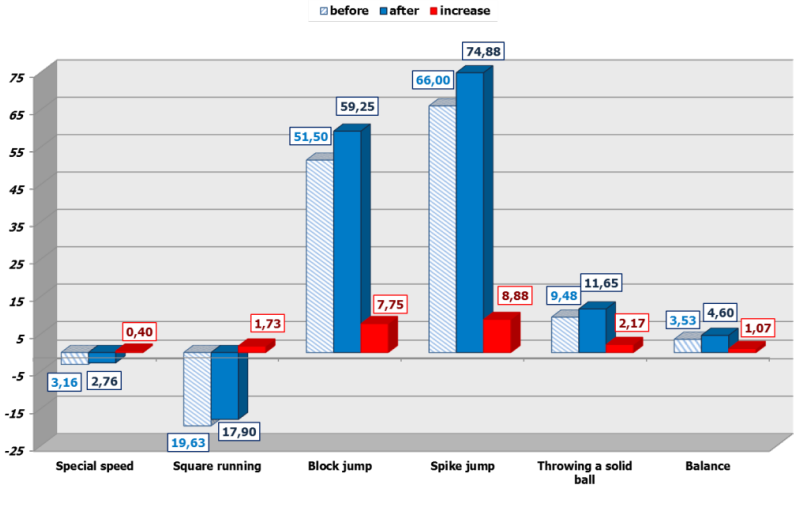

Fig. 3. Increase of the beach volleyball players` results in motor skills indicators

The impression is that the exercises applied during the training process of the national team volleyball players to perfect their game actions have significantly influenced the level of their motory skills.

There is a statistically valuable increase for all studied motor skills indicators. The empirical values of the comparative Student t-criteria for dependent samples vary from 3,53 to 10,11. All of them are with higher values than the critical value t_{α}=2,37. This proves that the established values for the results increase in terms of physical capabilities of the experimental group are reliable and supported with a guarantee probability which is close to Pt=100%.

As a result of the application of the specialized complex training program in the preparation of the experimental group beach volleyball players at the end of the studied period a significant increase of their motory skills is observed. Applying the means to improve the game actions have helped increase the special speed, the speed and strength endurance, the bursting strength of the upper and lower limbs and the players skills to maintain balance.

The results of the indicators giving us information about the dynamics of the technical and tactical skills of the volleyball players are presented on ***Fig.4***.

As we can see, as a result of the regular application of the special training exercises and the targeted work aimed at perfecting the beach volleyball specific technical and tactical skills and interactions, after the end of the experiment all studied indicators show better results. There is an improvement in the following players` skills:

- ✓ The serving– ground and jump serves;
- ✓ Passing with two hands – underhand and overhand;
- ✓ The two types of smashing the ball – in terms of strength and technique.

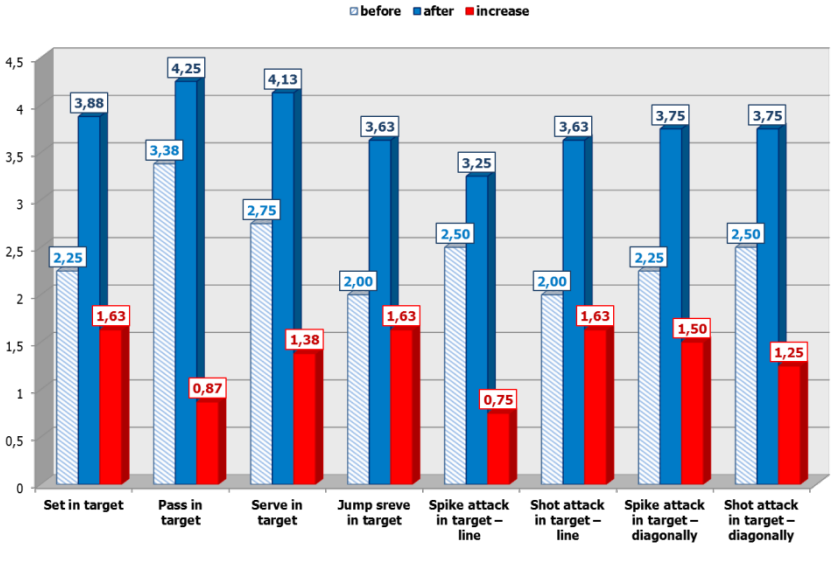

Fig. 4. Increase of the beach volleyball players` results in technical and tactical skills

The obtained results of the comparative Student t-criteria for dependent samples were compared to the critical sample value. ***Fig. 5*** shows that the t-criteria of the technical and tactical skills level indicators has values from 2,05 to 6,18.

This gives us reason to accept that the alternative hypothesis is the correct one, meaning that all changes resulted from the special influence of the complex training program applied for the preparation of the Bulgarian national youth beach volleyball team players (up to 22 years of age) are significant and supported by a high guarantee probability Pt> 95%. The application of this program has increased significantly the level of their skills in passing the ball with two hands – underhand and overhand, both smashing the ball on a straight line and diagonally and performing the serving.

The only exclusion is the “strength smashing of the ball on a straight line“ indicator, where the empirical

value (t_{11}=2,05) is lower than the critical one. The accuracy of the zero hypothesis here means that the resulting increase of the results after the end of the experiment can be defined as insignificant.

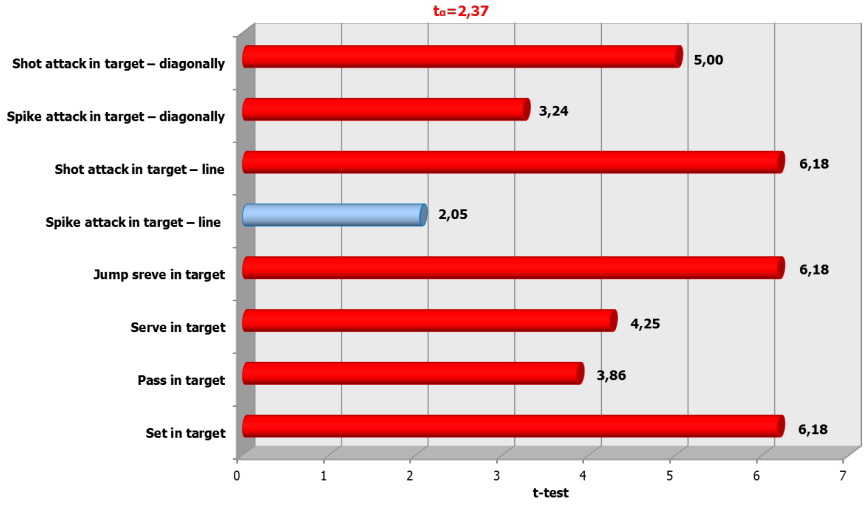

Fig. 5. T-test – technical and tactical skills indicators

CONCLUSIONS

1. At the beginning of the experiment the results of the national beach volleyball team players are homogeneous or approximately homogeneous in terms of the indications of their motor skills and strongly heterogeneous in terms of technical and tactic indicators.
2. The achievements of the beach volleyball players after the end of the experiment are stable and the studied individuals show homogeneous and approximately homogeneous results. All indicators of the specific volleyball skills have a medium variance.
3. After the end of the experiment the results of the studied specific efficiency indicators show a significant increase. As a result of the application of the training exercises and the targeted work, the specific speed of the players, their speed and strength endurance, the blasting power of the upper and lower limbs and their coordination abilities have increased.
4. The application of the specific complex training program within the preparation of the national beach volleyball team players has resulted in a significant improvement of their technical and tactic skills in performing the two hands passing – overhand and underhand, the serving – ground and jump serves and the smashing of the ball, in terms of strength and technique.
5. The calculation of the Student t-criteria for dependent samples proves the accuracy of the alternative hypothesis. We can confirm with a high guarantee probability that the targeted work by the means of the beach volleyball experimental training program will lead to positive changes in the specific efficiency of players.

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WEIGHTLIFTERS PREPARATION'S PERSONALIZATION

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Key words: weightlifters, preparation (training), qualification, individualization.

INTRODUCTION

Weightlifters preparation's personalization for sportsmen allows us to estimate level of their training and efficiency, as well as realizes necessary of adjusting training load and, in consequence, raising training effectiveness and sports results considerably, avoiding overwork and pathological shifts in human organism. Sport of highest achievement examines one of the experimental types of human's activity and is characterized by the next special features:

- exceptionally high strength during emulative struggle whish is increasing the density of sport results and claims growth of quality as well as stability and reliability of technique – tactic skills;
- moral and volitional preparation;
- sportsmen's steadiness to competitive activity;
- high-demanded level of special physical preparation (which is defining a necessity of searching of effective ways for perfection sport skills;
- achievements in sport physiology for maximum of volume and intensity in training load [3, 4, 5, 8].;

According to above-mentioned is understandable that the most actual problem is: to search variants for rational loads distribution in different orientation on relation to separate year stages with just one target - to achieve planned training effects as well as individual high quality athlete's preparation.

Individualization (personalization) gives us possibility to maintenance fundamental training's principals like:

- accessibility of training process adjustment;
- overwork escape;
- variation of training load intensity accordance to functional athlete's condition;

Without any individual information about athlete's motion function is not possible to provide guidance for training session. Improvement of administration system in training process on objectification knowledge base connected to competitive activity structure as well as individual athlete's preparation in recording general regularities of formation sport skills in elected kind of sport is one of the perspective directions in sport training [1, 2, 6, 8].

The main tasks in high-qualified weightlifters preparations according to improvement technical skills and functional facilities are:

- sport results up-grading;
- active sport period increasing;
- creating conditions to accompany creative attitude to training process.

Improvement of sport skills reserves and weightlifters' health conservation consist in using such training load, which is adequate to there (weightlifters) individual qualification level. Implementation of training loads in year cycle for weightlifters' preparation should be only based on individual complex control database because application such kind of facilities allows reveal urgent, current and cumulative effects as well as improves training process management on that base. Individual complex control applications, as well as comparative analysis of dependence between volume and intensity of indi-

vidual training load and consequence effect, then design of individual models for athlete's condition promote high results achievements and structural individual preparation objectification in competitive activity [4].

The main physical quality for weightlifter is strength. Comparison of individual results for each person with the model gives possibility to make conclusion about "high", "middle", "low" developmental level of the main strength parameters [9].

Indeed, the problem of individual preparation in weightlifting is not found full solution in specialized methodological literature. Just only some questions in pedagogical control were reflected as extremely important factor in training process management [7].

HYPOTHESIS FOR RESEARCH

The work hypothesis is about the application of individual process in preparation for high quality weightlifters, which allows optimizing their training loads due to timely received objective information as well as bringing in adjusted influence. In consequence it gives possibility to solve tasks more qualitative for further athlete's sport perfection.

According to above-mentioned, the **target** of research is to design the individual system of preparation for high-quality weightlifters. For achievement these targets there were used the followed **methods**:

- study and analysis of special methodological literature;
- summary of the best practice according to results of talks, verbal interviews, as well as questionnaire surveys from specialists in weightlifting (scientists, researchers, coaches);
- pedagogical observations in a period of training and weightlifters' competitions in large international events (Asia, Europe, World and Olympic Championships);
- analysis of documents for planning training process;
- analysis of practice Programmers for weightlifters' preparation, as well as athlete's training diaries and competitions Reports;
- pedagogical control testis;
- pedagogical experiment;
- generalization own practical experience in preparation (one of the author this article – I. Iliyna) for large International competitions, including XXIX Olympic Games in Pekin-2008, XXX Olympic Games in London-2012 and XXXI Olympic Games in Rio-de-Janeiro -2016;
- methods of mathematical statistics;

THE RESULT OF RESEARCH AND DISCUSSING OF IT.

Proceeding from the Results of research analysis and from my own practical experience, that is possible to state a fact, that high achievements in weightlifting are stimulus and motive force for further development. Weightlifters, who want to become high-quality athletes, should use the best system of preparation in their training process. The difference in training for high-quality weightlifters from less-quality athletes consists in a significant increase in the number of training and restoration facilities. A coach, an athlete and the doctor should constantly follow for the scientific development in given kind of sport and should learn methodological base (unfortunately, it is not done), as well as should use all of this in training process.

According to results of our questionnaire, all our respondents marked the necessity of individual preparation for improving sport skills for high-quality weightlifters.

Majority of asked (75,2%) think that the main content of weightlifters' preparation on the stage of sport improvement should be directed to perfect the strongest sides of their qualification with parallel tightening weak components of sport skills. The rest participants of the questionnaire were divided: 12, 9 % of respondents offered to improve just only strong sides of preparation on that phase, and 11,9% counted that it was necessary to tight athletes' weak qualities mainly. The majority respondents marked that the main attention should be given to physical (43,2%) and technical (38,5%) preparation on the stage of sport improvement. The smaller part of respondents give preference for theoretical

(10,1%) and psychical (6,7%) preparation.

Receiving testing information, for our opinion, is reflecting the real situation in weightlifting sport mostly. That situation presents key point in rate setting of training process for high-qualified weightlifters. The stress on physical and technical high-qualified athletes' preparation, for our opinion, is linked firstly with lack in technique training on initial preparation, and secondly, is connected with frequent participation in different competition.

According to inquiry amongst coaches and specialists in weightlifting sport we can make conclusion that the individual pedagogical control under athletes' preparation is carrying out, although there is not clear expressed system. Generally, two form of individual control are using: one is "phased" and another is "current", which are doing with different frequency. On different stages of preparation the primary direction of individual control after different sides of weightlifters' preparation is changing. Absence (on different reasons) of clear system of individual control after weightlifters' preparation and condition is becoming worse the efficiency of preparation process, considerably.

Receiving data from questionnaire poll also gives evidence that the main reason which puts obstacles in the way of qualitative realization of weightlifters training process is uncreative attitude coaches towards training process (54,4%). The smaller part of specialists (20,8%) said that absence of scientific and methodological approaches as well as theoretical base of exploration problem put obstacles in wide implementation individual training in practice. 14,6% responders count that the main reason why the material support is unsatisfactory, because of so many sportsmen in one group (6,9%). Coaches workload is another reason which puts obstacles in the way of better individualization in training process (3,2%). In the specialists' questionnaires were confirmed an enormous importance of individualization training as well as correction of training for high-qualified weightlifters.

Pedagogical supervision analyses revealed the level of condition of training for high-qualified weightlifters and also gave ways for training quality improving and their main motor training which takes the most time in training process. 46 protocols of observation show that training process on the stage of sport improvement for high-qualified weightlifters is characterized by the next two special features:

1. Facilities, methods and forms of training are using very closely to competition methods. Almost half of the training time (48,5%) is given to technical exercises (classical snatch; snatch from hung under lap; classical jerk; jerk from the chest from uprights;), and 27,2% is given to auxiliary exercises (jerk drifts; drafting jerk from platform; drafting impact from platform; drafting snatch and drafting jerk from plinth; pressing exercises). It is necessary to note that there were not observed any individualization.
2. It is observed on training sessions the divergence between goals and methods, which have been applied for taking decisions. That kind of divergence is linked with insufficient level of weightlifters' technical qualification. In consequence, all exercises are directed to improve technical parameters, which do not give proper results. From another side, an underestimate of weightlifters' individual preparation according to physical, technical and functional plans lead to incorrect dosage during training practice, as well as lead to exclusion from purposeful pulling–up weak sides of preparation. For the time of pedagogical research there were fixed only ten lessons, which were directed towards improvement of weightlifters' individual skills. Special features of that physical and technical preparation lessons was training process that operated with individual specialties recoding for each athlete, as a result, it helped to promote sport results.

According to observations, it is possible to declare that weightlifters' individual preparation should be done in following two kinds of training on the stage of sport improvement:

1. Individual training.
2. Independent training.

The analyses of the technical preparation for high-quality weightlifters by using of pedagogical observation allow finding a large number of mistakes in exercise pursuance like: classical jerk, weightlifting on chest and jerk, drafting jerk from platform, drafting snatch from platform. Worsening of technical element quality tells that fatigue is coming. It is result of insufficient functional athletes' preparation.

Also one of the reason inadequate levels of physical and technical functional high-quality weightlifters preparation can be, for our opinion, irrational planning for physical loads on training process, as well as control absent for level and effectiveness practice process.

Summarize on the pedagogical observation base of protocol analysis and timekeeping, it is possibly to say that on the sport improving individual stage of preparation for high quality weightlifters not enough attention is given, and purposeful coaching in direction to improve individual skills are not taken systematically. Coaching for high quality weightlifters are spending according to general plan mostly. It is revealed underestimate of individual preparation in the process of choosing train exercises and load batching. Coaching individualization is operated by improving fall qualities mostly. Purposeful coaching for improving strong qualities of preparation is not enough existed.

Analyzing competition activities indicators of experimental pedagogical group we can speak about quite large changes according to quality of coaching activity for weightlifters (tables 1 and 2). Up to the end of the main experimental stage in comparison with the start we can confirm that "control subjects" from experimental group are improving their technical results (P<0,001) - statistical reliably. Comparative analysis of initial and final results for competitive activity is certified that the most trustworthy changes happened in the following indicators: in the classical jerk duration (P<0,001); in maximal speed lifting weights on chest (P<0,001).

Table 1. Biomechanics indicators ($\bar{x}$) in competition exercises before experiment (n=22).

Indicators	Competitive classical exercises.					
	Classical jerk			Weightlifting on chest		
	Fortunate attempt	Unfortunate attempt	P	Fortunate attempt	Unfortunate attempt	P
Vmax, c	0,62	0,70	<0,05	0,45	0,38	<0,05
$t_{move,c}$	0,61	0,30	<0,05	0,36	0,91	<0,05
$t_{max,c}$	0,32	0,60	<0,05	0,51	0,68	<0,05
Note - - $_{Vmax,c}$ – maximum speed; $t_{move,c}$ – lengths of moving; $t_{max,c}$ – lengths of progress maximum speed.						

Qualitative improving competitive activity indexes for weightlifters are possible to explain by control for that kind activity, especially for effectiveness, and it allows carrying in directed correcting influence in the process of technical preparation. Proceeding from the competitive activity results which were received on preliminary research stage, we applied exercises like on competition in a training process. The results of comparative experiment confirmed training process efficiency in organization and management system for high-qualified weightlifters by force of individualization their training on the base objective presented data complex control for qualification level and condition.

Offering from us system of individualization preparation for weightlifters allows improving athletes' technique considerably, as well as carry in corrections in sport training process and make follow **summury**:

Table 2. Biomechanics indicators ($\bar{x}$) in competition exercises after experiment (n=22).

Indicators	Competitive classical exercises.					
	Classical jerk			Weightlifting on chest		
	Fortunate attempt	Unfortunate attempt	P	Fortunate attempt	Unfortunate attempt	P
Vmax, c	0,51	0,70	<0,05	0,43	0,38	<0,001
$t_{move,c}$	0,45	0,60	<0,001	0,35	0,92	>0,05
$t_{max,c}$	0,33	0,30	>0,05	0,42	0,6	<0,05
Note - - $_{Vmax,c}$ – maximum speed; $t_{move,c}$ – lengths of moving; $t_{max,c}$ – lengths of progress maximum speed.						

1. In the capacity of evaluation criteria for individual technical weightlifters preparation the most

informative point is maximal speed of weightlifting and time parameters (duration of knees bringing and final acceleration).

2. Revelation and analysis factors influenced on trains' effectiveness for weightlifters which allow individualizing regimes and consequently improving competitions results.
3. Research reveals considerable variability for application exercises linked to each athlete's individual feature as well as demanding individual approach to train's content and methods in different weight categories.

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MONITORING OF PHYSIOLOGICAL PARAMETERS DURING ALPINE TREK IN DAMODAR HYMAL - HIMALAYAS

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***Keywords**: pulse, oxygen saturation, energy consumption, altitude, temperature, mountain trekking, Himalayas.*

Alpine trekking gained popularity with the development of tourism as a product in recent years. Trekking represents a multi-day walking to nearly 5500 meters above sea level, and is practiced in the higher mountain ranges such as Karakoram, Himalayas, Andes. One of its main goals is to cross the mountain ridges and reach base camp peaks at an altitude of over six thousand meters. Physical load during trekking is related to adaptation to low barometric pressure of oxygen in the air. Most altitude treks take place from 1000 to 5000 m above the see level. This report traced and analyzed the changes of some physiological parameters, pulse, oxygen saturation, and energy consumption related to altitude. The survey was done during the Chaco peak expedition. The mount is 6704 meters above the see level high and is located in Damodar Hima Massif on the border with Tibet. In 2001, the area was open to visitors.

The aim of the study was to trace the said limits of reaching any of the physiological parameters related to energy consumption, pulse, and oxygen saturation, related to altitude during the exercise.

The following tasks were set for achieving the goal:

1. Physical load duration during the transition.
2. Total energy consumption during the exercise.
3. Pulse frequency and energy consumption comparison during the exercise, in line with the change in altitude.
4. Saturation study during the ascent.

The subjects are seven climbers, who participated in the expedition to the Chaco peak in the array Damodar Hima - Tibet.

The report examines the physiological indicators as pulse frequency and saturation, which are directly related to adaptation.

METHODS OF STUDY:

1. Theoretical analysis and summarizing.
2. Pedagogical supervision and expert evaluation.

3 Variation analysis.

ANALYSIS OF THE RESULTS:

The physical load duration in the high trek routes comply with the opportunities for camping and making a gradual climb for better acclimatization. Figure 1 indicates the places where participants slept in parallel with the change in altitude climbing.

Open valleys and lack of tall vegetation, as well as intense sunshine after Meta – 3571 meters above sea level high, proved to be a problem on later departure on the route. Departure at 7:00 am and arrival at 12:30-13:00 in the next camp appeared to be the most adequate timing for the trek.

Physical load duration was around 5 hours the first day, characterized by a large linear distance and small displacement of the climb. The largest displacement was the transition from Koto - 2640 to Meta 3571 - with a climb of 980 meters, which went for 5 hours. The maximum ascent speed was 10 meters per minute; the average speed for the entire route of the trek was 8 meters per minute.

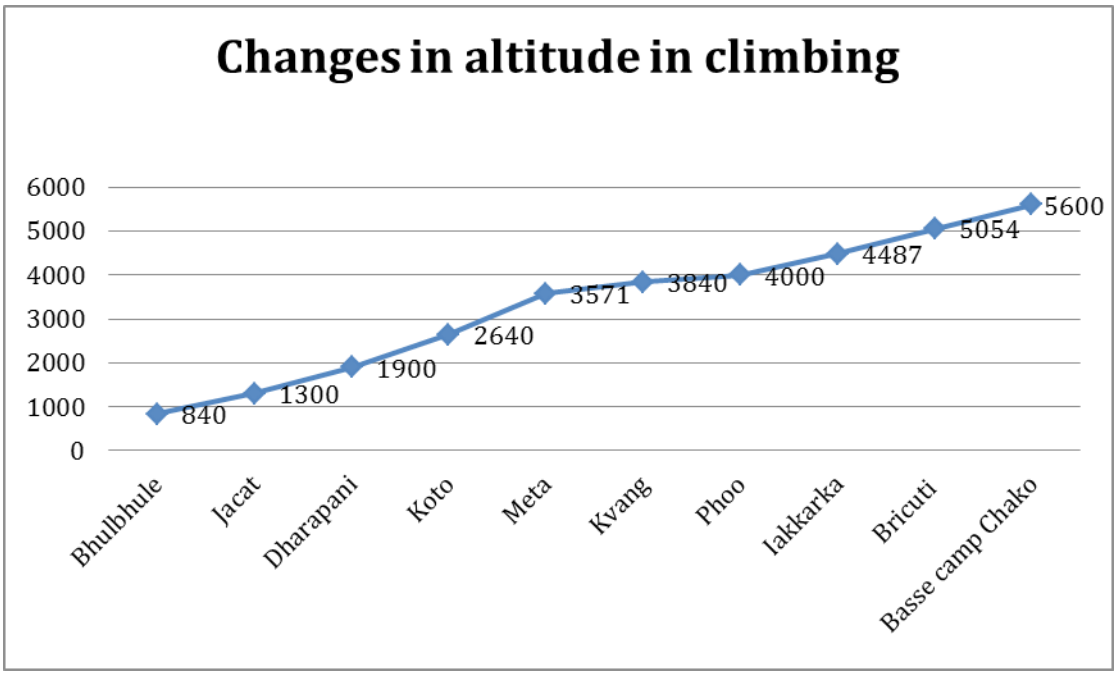

Figure 1. Changes in altitude in climbing

Table 1. Physical load in hours and the sum of ascent and descent during the trek between the destinations.

Day	Ascent	**Altitude**	**Loading in hours**	**Elevation ↑**	**Elevation ↓**
1	Bhulbhule - Jacat	840-1300	5	460	
2	Jacat - Dharapani	1300-1900	3.44	895	332
3	Dharapani - Koto	1900-2640	3.22	905	224
4	Koto - Meta	2640-3571	5	980	100
5	Meta-Kvang	3571-3840	2.45	599	377
6	Kvang-Phoo	3840-4000	2.2	452	244
7	Phoo-Iakkarka	4000-4487	2.46	822	403
8	Iakkarka-Bricuti	4487-5054	2.14	715	168
9	Bricuti-Basse camp Chako	5054-5600	4.58	775	170
	Преход -спускане				
1	Bricuti-Phoo				
2	Phoo-Meta	4000-3571	4.31	341	573
3	Meta-Koto-Chame	3571-2700	3.18	422	1349
4	Chame-Tal	2700-1700	4.07	422	1333
5	Tal-Bhulbhule	1700-840	2.33	302	872

During the descent, camping places were not the same as during the ascent. The descent displacement is much higher and speed is also logically higher, reaching values of 11 to 16 meters per minute.

During the trekking routes a task to track the total energy consumption during exercise was set. The record of the total energy consumption was performed using the “Suunto t 6c” and the analysis program “Training Manager”.

The minimal Kcal reached was 1114. They were reached on the day with the lowest displacement overcome of the climb. The maximum Kcal was 3340. They were achieved in the day we the largest altitude of 5600 meters was reached.

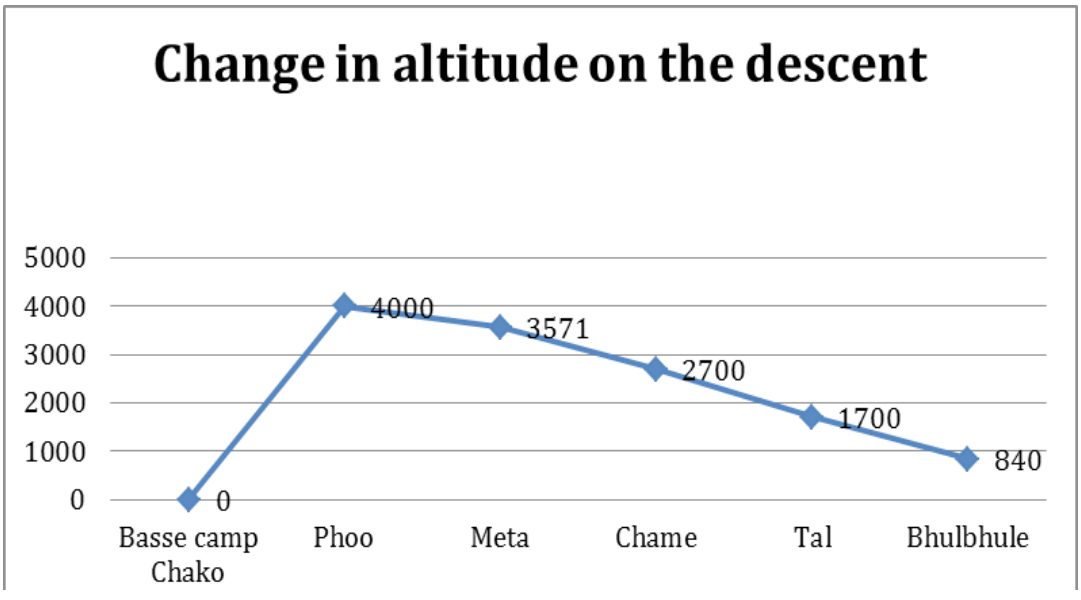

Fig.2. Change in altitude on the descent

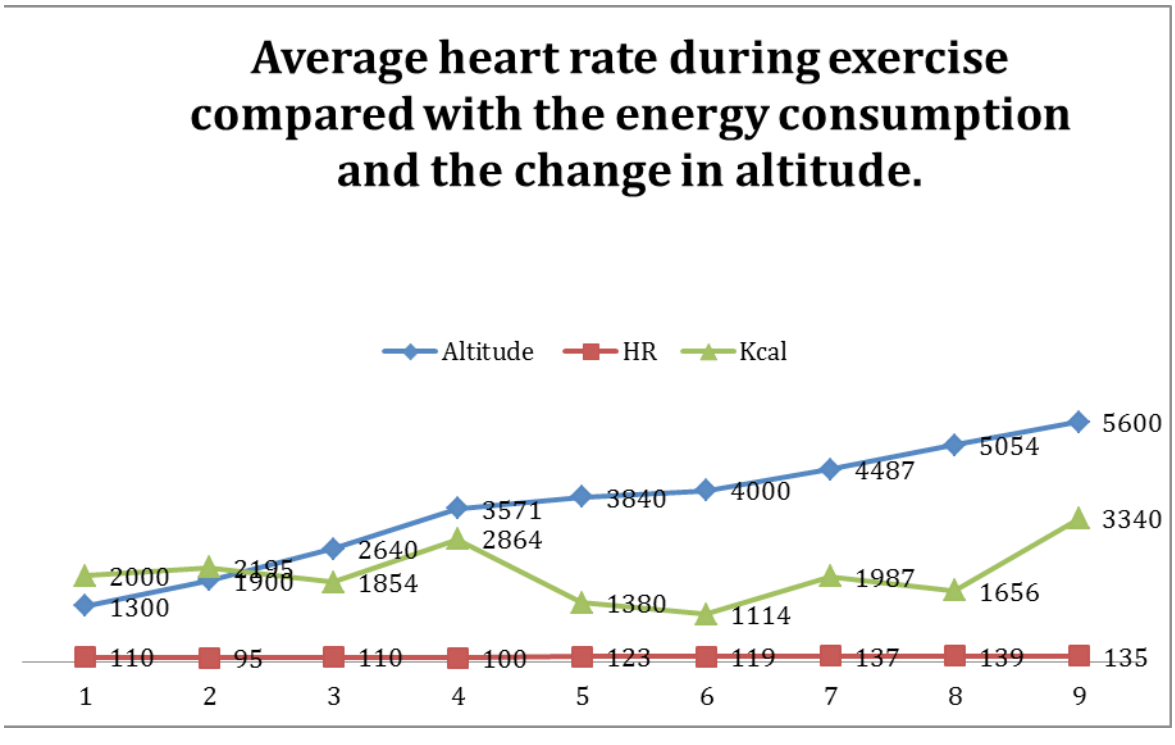

Fig.3. Energy consumption related to altitude and displacement during the ascent

The third analyzed task is the average pulse rate compared to the altitude and energy consumption while moving. The maximum pulse rate was 180 and the minimum - 160 beats per minute. With the rise of the altitude the values of the pulse rate are increasing, which is a normal adaptive response of the organism. The burning of a large amount of calories is not associated with an increase of the altitude.

The saturation study during the organism adaptation in alpine conditions is a prerequisite for monitoring the acclimatization. Each of the participants' saturation was traced during the trek, using a pulse oximeter. Figure 6 presents the average results related to altitude. The gradual decrease in saturation from 98 to 1300 m to 85 to 5600 meters above sea level without abrupt changes from 4 to 5 units shows that transitions and activities are well balanced and provide a smooth acclimatization climb.

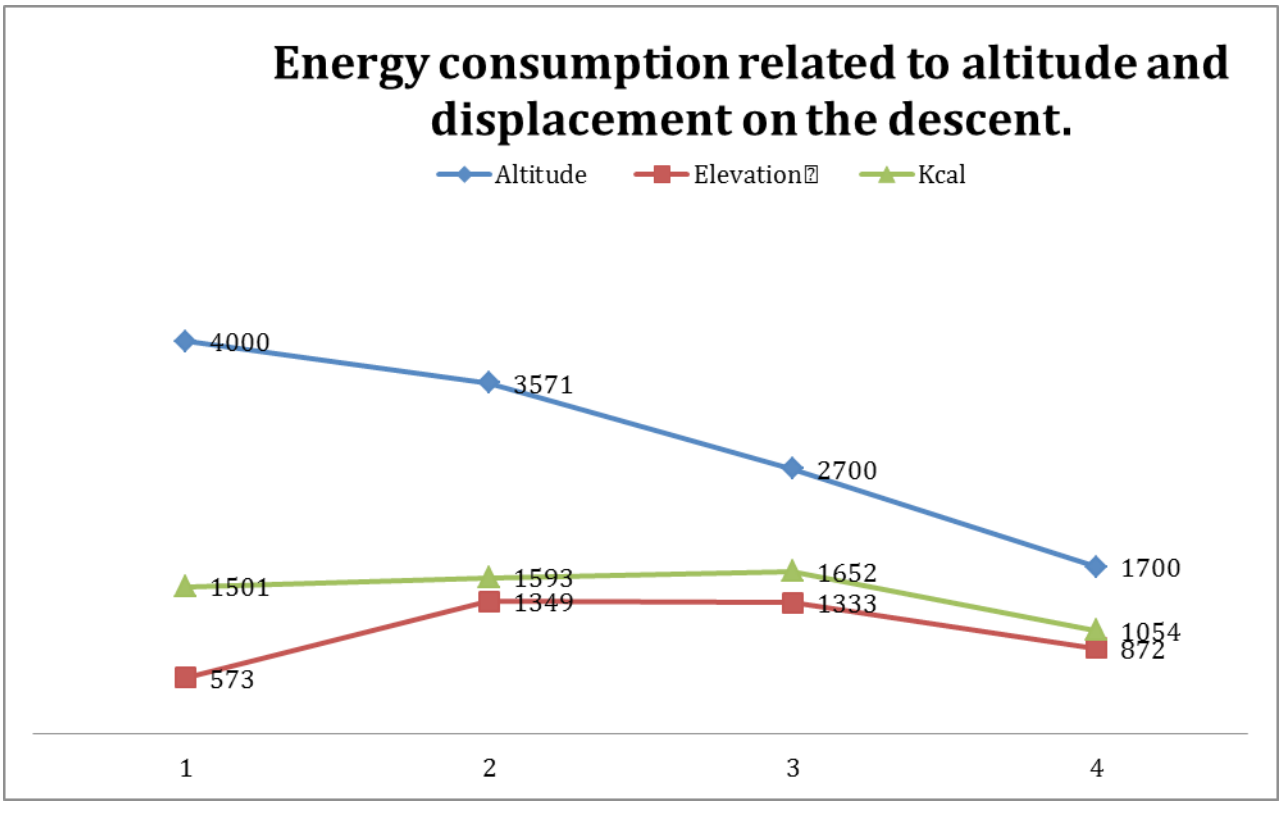

Fig.4. Energy consumption related to altitude and displacement on the descent.

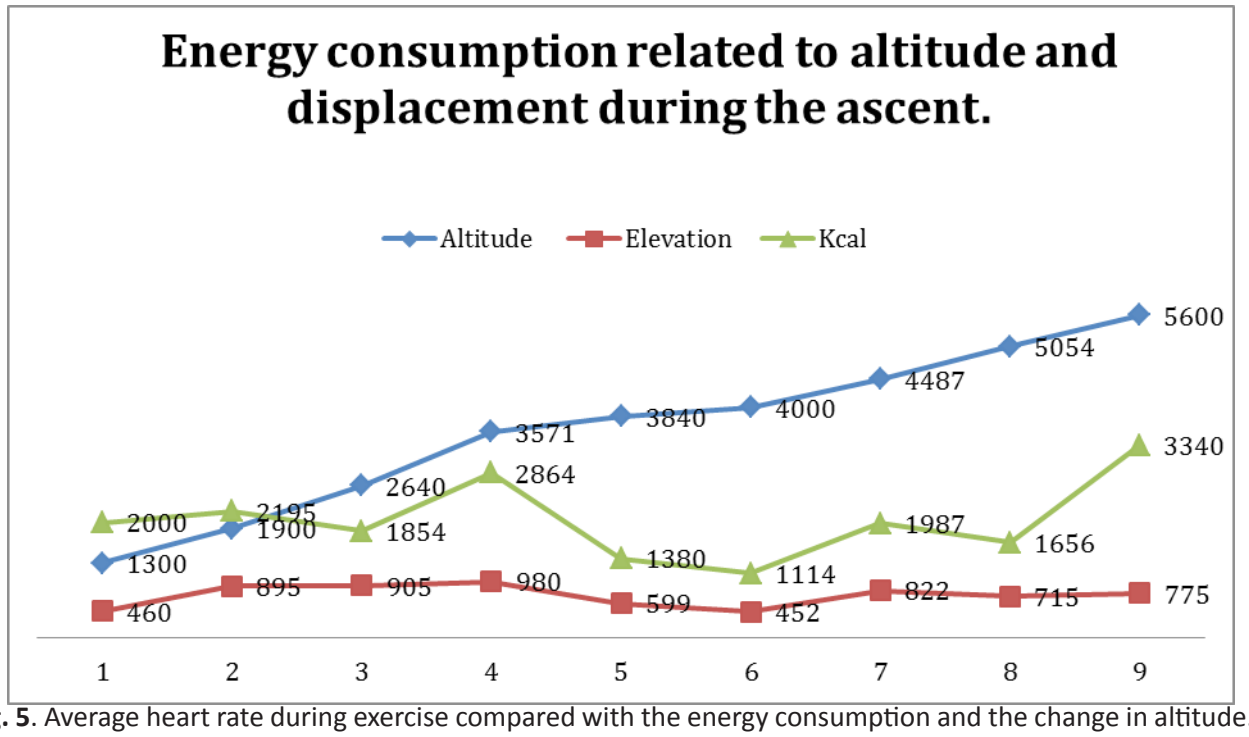

Fig. 5. Average heart rate during exercise compared with the energy consumption and the change in altitude. ..

Conclusions:

• The duration of the physical load must be adapted to participants training and the route. The treks have a maximum duration of 5 hours and a maximum displacement of 980 m, 4 days of the trek route.

• Energy consumption during treks is in the range of 1500 kcal on days with smaller physical loads and up to 3,000 kcal in the days of climbing at high altitude. Pulse rate increases proportionally with altitude.

• Saturation follow up reported normal to altitude values, which was a good indicator for proper acclimatization during the trek.

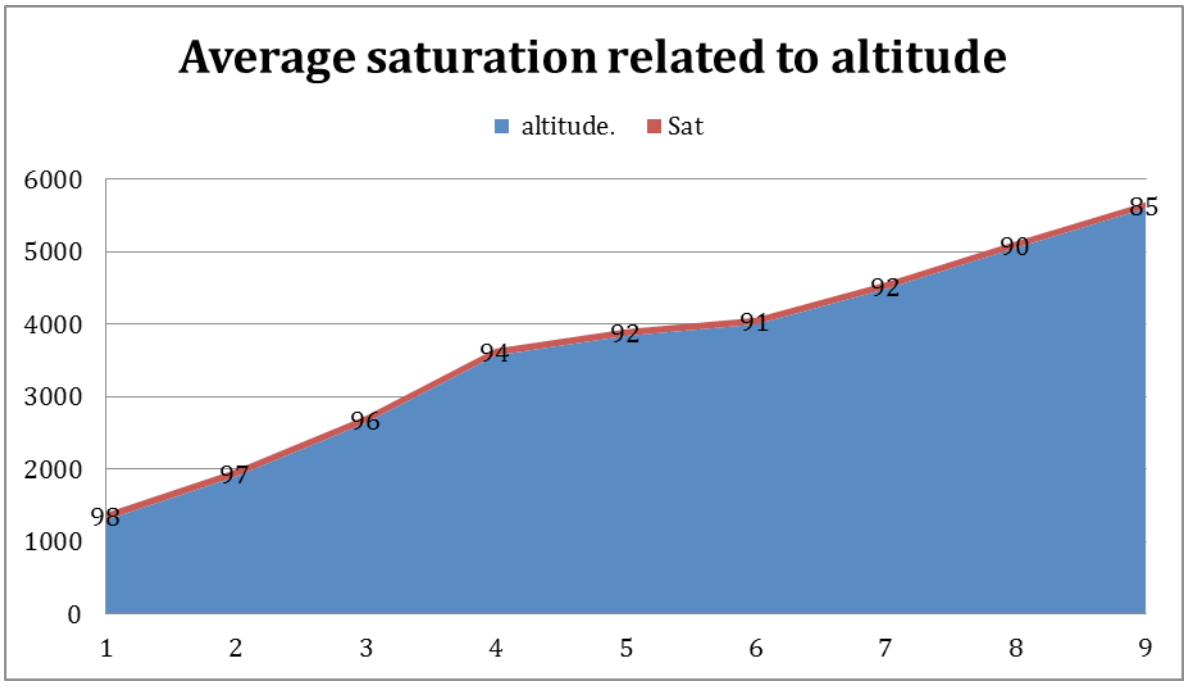

Fig.6. Average saturation related to altitude

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CHANGES INTO KINEMATIC CHARACTERISTICS OF THE ROWING STROKE DURING DIFFERENT STROKE RATE

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Keywords: *kinematic characteristics, rowing stroke, technique, stroke rate, rhythm*

INTRODUCTION

The rowing is cyclical sport, applied on the border between the water and the air. The rower is sitting backwards of the moving direction over moving seat. He doesn't have a stable mainstay in any moments of the moving. All of these negative factors have made the proper rowing technique extremely important for the successful race performance. Stable kinematic and dynamic structure of the rowing stroke is a reason for equalization of the dates of the athletes. To find reliable differences in the technical performance, advanced tools and methods for analysis must be used. The analysis of the dynamic characteristics is the most popular in the practice work to describe the moving of the rower's body. These characteristics changes themselves with changing of the stroke rate and define performance level of the athletes. The aim of that study is to describe the type and the level of the kinematic characteristic changes in rowing with different stroke rate.

METHODS

For describing of the kinematic characteristic changes in rowing, for athletes from Bulgarian National Team were tested. They have filmed with HD video camera during rowing with different stroke rate. It was defined from 18 SPM with 4SPM step (18SPM, 22SPM, 26SPM). The video file has been analyzed with "Dartfish Pro Suite". For the study needs, three strokes on every stroke rate have analyzed. The average results of these strokes has been used or the aim of the study. The follow indicators have been used:

Spatial characteristics: foreleg angle, trunk angle on catch, knee angle, trunk angle in the middle stroke, trunk angle at the release, trunk angle during legs moving, handles path, seat path.

Temporal characteristics: time of rowing stroke, time for driving phase, time for recovery phase, stroke rate, rhythm, time for catch, time to perpendicular, time after perpendicular, end waste, time for moving shoulders, time to moving slide.

The received results have shown as charts for better viewing.

RESULTS:

Table 1 shows anthropometric and spatial indicators of the athletes. The body position in the special for rowing technique points and moving are shown.

This table shows the big correlation between lower leg angle in the catch and athlete height. The taller rowers don't need of long sliding to realize big stroke amplitude. During catch their joins are in better position to realize more power during drive phase.

Table 2 shows temporal parameters of rowing with different stroke rate.

The results show big reduction of time for the stroke with increasing of stroke rate. That follows to reducing the time for each different phase of the stroke. But that reducing is not equal for all of them. The ratio between driving phase and recovery (rhythm) shows these differences.

Table 1.

Name	Stroke rate	Height	Weight	Age	α lower leg	α trunk	α knee	α body of the middle	α body at the end	α body at the moment of leg's moving	Length of slide moving	Length of handlle moving
K.V.	18SPM	197	92	23	12,0	-28,8	138,9	0,8	15,9	-10,5	52,7	146,7
	22SPM	197	92	23	13,3	-28,8	142,9	2,1	15,7	-9,2	53,0	131,7
	26SPM	197	92	23	14,6	-27,8	142,9	3,5	15,0	-6,3	52,3	129,3
V.V.	18SPM	183	74,5	25	-0,1	-28,4	140,9	8,8	38,1	8,4	58,7	139,0
	22SPM	183	74,5	25	-0,1	-29,9	143,8	10,8	40,2	9,3	56,7	138,3
	26SPM	183	74,5	25	-1,0	-29,8	146,8	10,0	44,0	18,6	58,5	139,5
Z.K.	18SPM	181	73	26	-10,4	-33,6	139,2	6,8	35,6	1,8	60,0	142,5
	22SPM	181	73	26	-10,5	-33,3	139,1	4,8	37,6	9,4	61,5	145,0
	26SPM	181	73	26	-9,7	-29,1	138,9	3,1	37,5	14,4	61,0	145,0
G.M.	18SPM	177	73,5	20	-3,7	-28,9	122,9	0,7	46,4	6,0	53,5	134,5
	22SPM	177	73,5	20	-1,7	-29,7	120,4	-1,0	46,5	21,7	56,5	141,5
	26SPM	177	73,5	20	-4,3	-30,3	117,7	-1,6	41,0	14,2	52,5	135,5

DISCUSSION:

From all of the results is clear that stroke rate change is a reason for changes of the kinematic structure of the rowing stroke, even on high international level athletes. How big these changes are and what is the direction of them? We will try to describe this with the next charts.

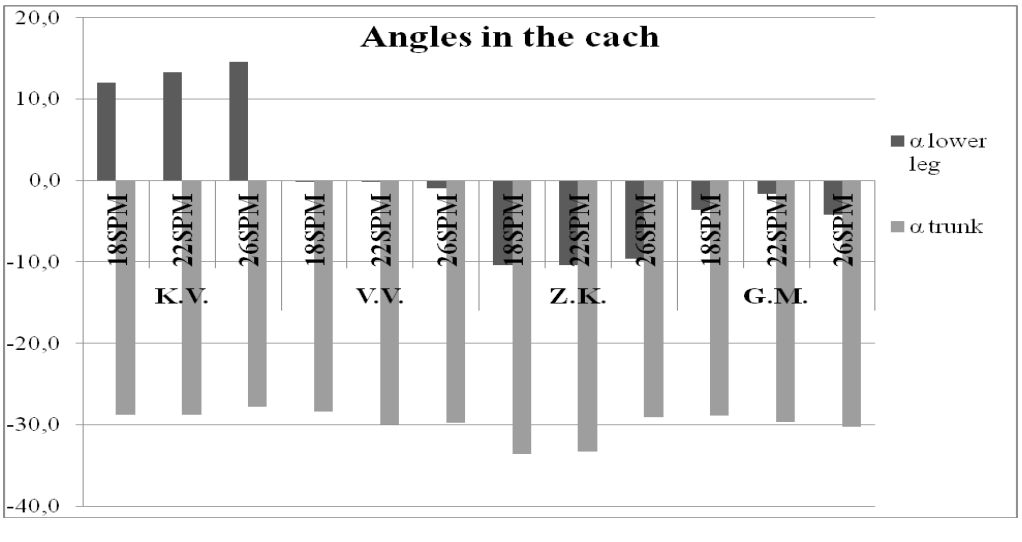
This chart shows changes of the specific rowing angles on the catch position. The first one is the lower leg angle against the vertical. It describe how much the rower use his leg. The negative values of that parameter mean that lower leg pass after the vertical during its moving forward. The most of the rowing biomechanics suppose it to be wrong and recommend footsteps correction. The athletes with lower height reach much smaller angle and in the most studied cases even below zero. But there is not clear tendency of changing with stroke rate increasing.

The body angle in the catch is also indicator for the style of rowing. Negative values mean inclination from perpendicular in the stern direction. Positive values mean inclination in the bow direction. This parameter don't have clear tendency of changing, also. Two of the rowers slightly increase this angle

Table 2:

Name	Stroke rate	Stroke time	Driving phase	Recovery phase	Stroke rate	Rithm	Cach propulsion	Time to 90°	Driving phase after 90°	End waste	Shoulders moving moment	Slide moving moment
K.V.	18SPM	3,25	1,23	2,02	18,44	1,64	0,21	0,63	0,17	0,23	1,39	1,89
	22SPM	2,71	1,11	1,60	22,11	1,44	0,19	0,56	0,17	0,20	1,27	1,62
	26SPM	2,31	1,00	1,31	26,01	1,31	0,17	0,51	0,14	0,18	1,13	1,39
V.V.	18SPM	2,94	1,16	1,78	20,41	1,53	0,22	0,50	0,18	0,26	1,23	1,70
	22SPM	2,35	1,10	1,25	25,57	1,13	0,22	0,48	0,17	0,23	1,19	1,51
	26SPM	2,12	1,03	1,09	28,30	1,06	0,18	0,45	0,18	0,22	1,10	1,34
Z.K.	18SPM	3,11	1,12	1,99	19,29	1,78	0,19	0,57	0,16	0,20	1,33	1,78
	22SPM	2,77	1,15	1,62	21,66	1,41	0,21	0,49	0,18	0,27	1,28	1,56
	26SPM	2,30	1,09	1,21	26,09	1,11	0,18	0,47	0,16	0,28	1,18	1,34
G.M.	18SPM	3,27	1,11	2,16	18,35	1,95	0,30	0,34	0,21	0,26	1,26	1,78
	22SPM	2,77	1,09	1,68	21,66	1,54	0,24	0,31	0,24	0,30	1,18	1,42
	26SPM	2,33	1,06	1,27	25,75	1,20	0,19	0,29	0,27	0,31	1,03	1,23
Avg.	**18SPM**	**3,14**	**1,16**	**1,99**	**19,09**	**1,72**	**0,23**	**0,51**	**0,18**	**0,24**	**1,30**	**1,79**
	22SPM	**2,65**	**1,11**	**1,54**	**22,64**	**1,38**	**0,21**	**0,46**	**0,19**	**0,25**	**1,23**	**1,53**
	26SPM	**2,26**	**1,05**	**1,22**	**26,50**	**1,17**	**0,18**	**0,43**	**0,19**	**0,25**	**1,11**	**1,32**

Chart 1



with stroke rate inkreasing, but the others keep almost the same values. That mean that the athletes don't decrease the leight of the stroke on the catch with increasing stroke rate.

This chart shows the trunk angle at the moment when the oars stay perpendicular of the boat axis in driving phase, trunk angle in the release position and the trunk angle at the moment of first seat moves.

It is clear that the best moment to apply a force is when the oars are perpendicular of the boat axis. That's why the body position at this point is such important. The best values are between -10° and 0°

when the positions of the joins and muscules is the best fo generate maximume forse level. Here we have a tendensy for inkreasing of that angle with stroke rate increasing. Only one athlete decreases it from 22SPM to 26 SPM. That mean unfounded aim to response of the increasing boat speed with earlier slide moving.

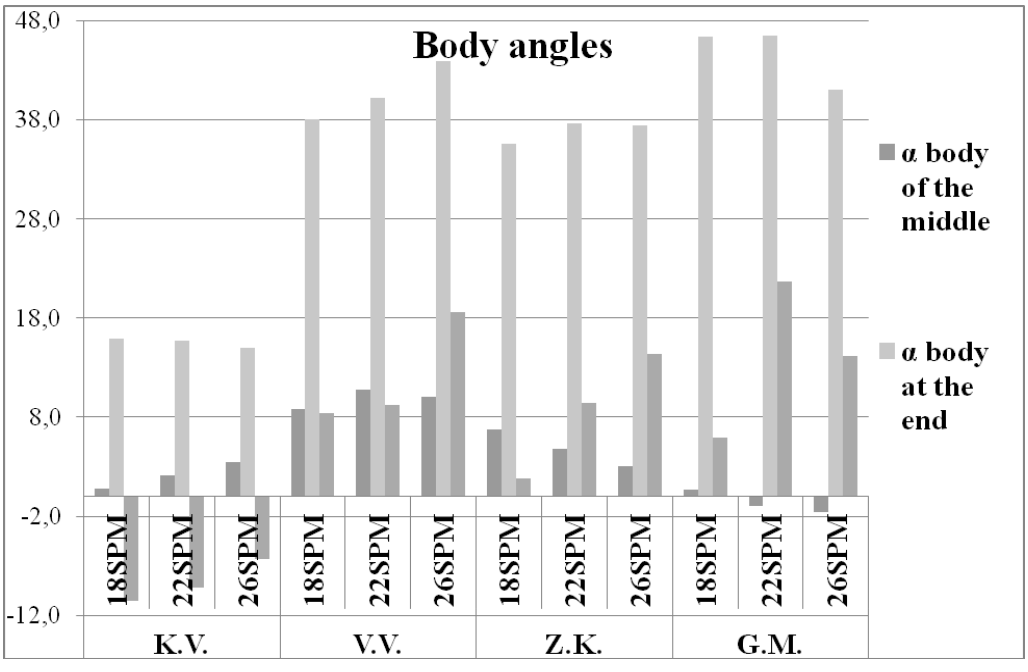


Chart 2:

The truk angle in the end of the driving phase don't shows any sighnificant changes. Only one of the athletes increases it from 18 SPM to 26 SPM who is a sighn for attempt to keep the leight of the stroke with rate increasing. But this follow increasing the inertional forces and embarrassing boat moving.

The trunk position at the moment of first slide moving is a really important, because the highest boat speed is then. Active moving the body to the stern after driving phase finishing makes conductive inertional forces who accelerate the boat. That's why, passing the body over perpendicular before leg's moving is really important. But the results show that only one athlete did that. All of them have a tendency to increase that angle with stroke rate increasing.

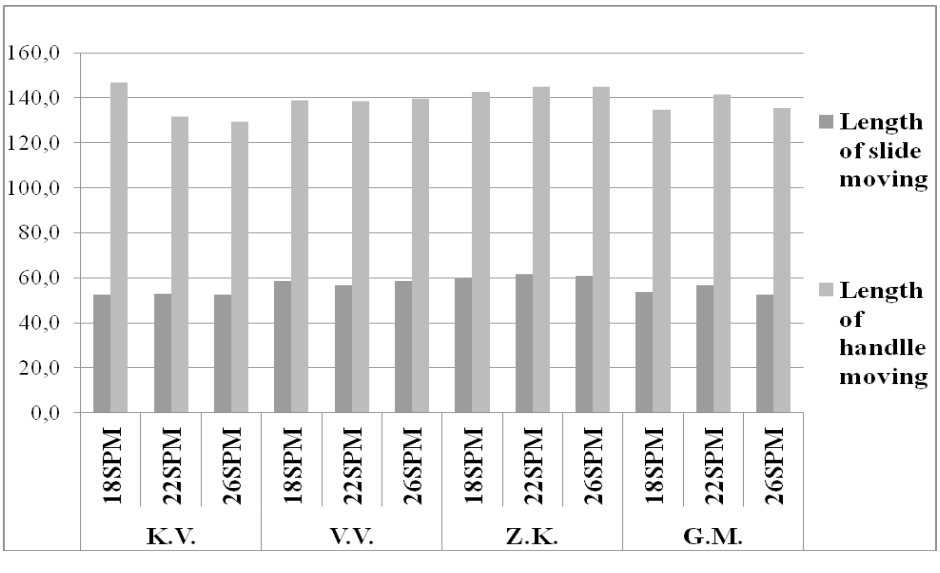


Chart 3:

Chart 3 shows seat and handle path lenght during different stroke rate. These results don't show big differences. Just one of the athletes decrease his stroke with more than 17 cm form 18 SPM to 26 SPM. The rest keep the same stroke length or slightly increase it.

The temporal characteristics are shown as an average values on the next charts for better changes tracking.

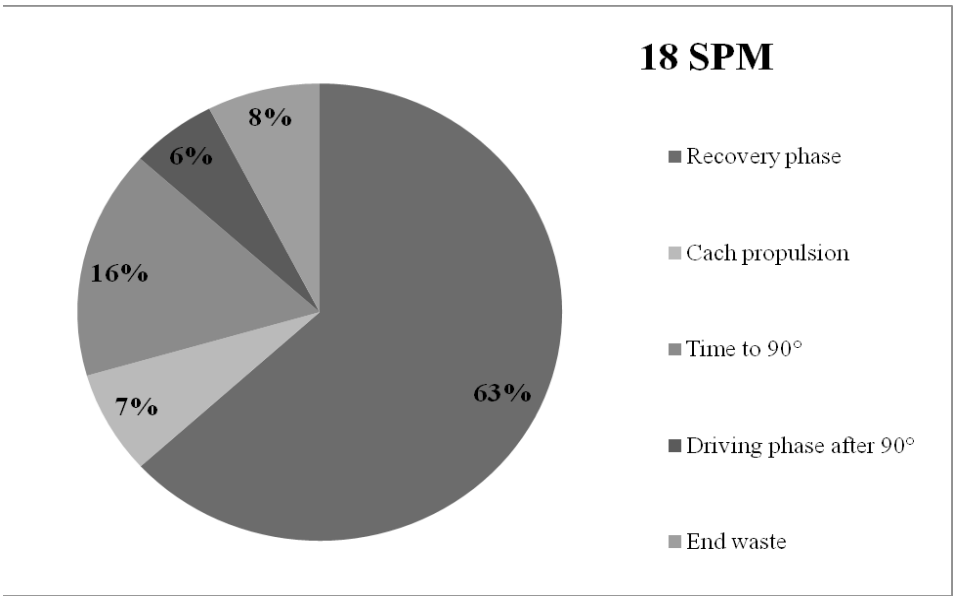


Chart 4

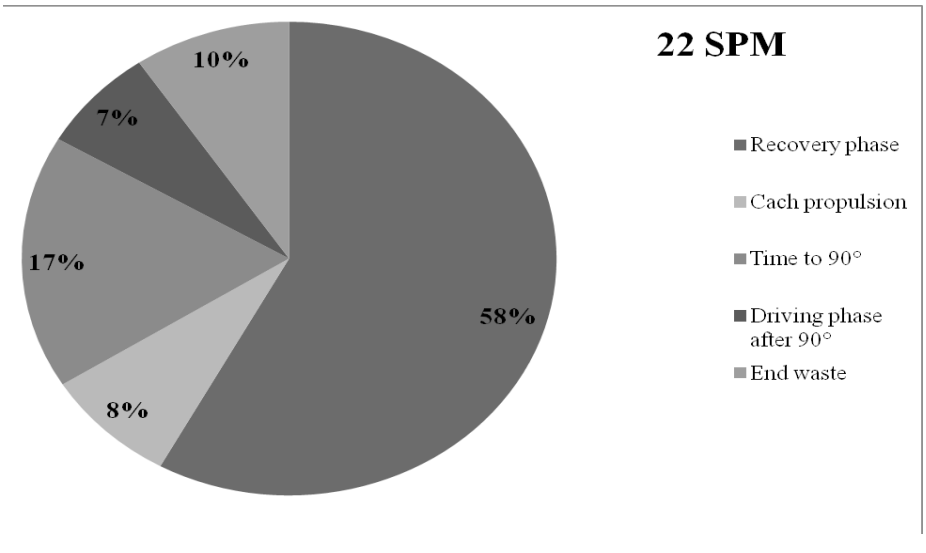


Chart 5

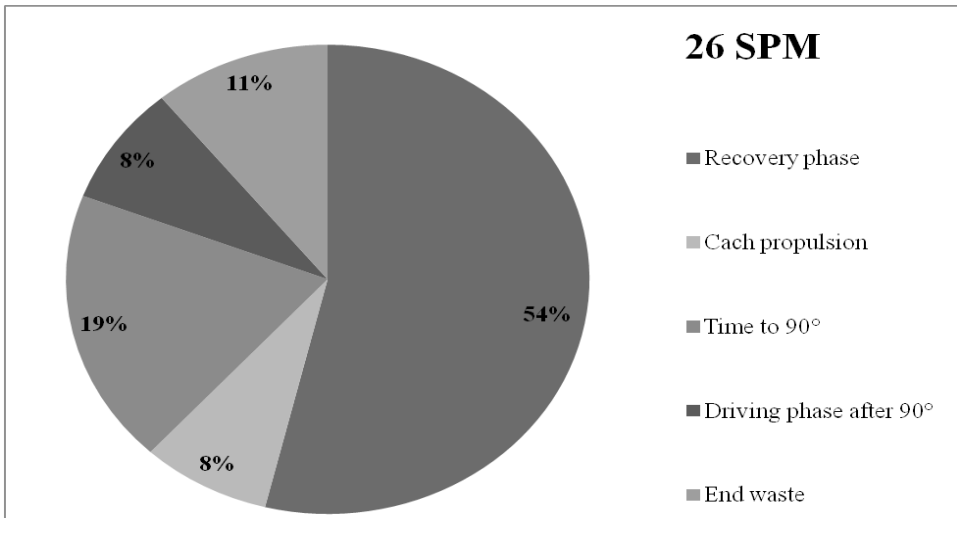


Chart 6

Chart 4 shows the rowing stroke phase distribution on 18 SPM. The longest recovery phase makes an impression. Almost equal waste in catch and release the blade and almost three times longer driving phase to the perpendicular then after are also shown.

Chart 5 shows the same phases on 22 SPM. The part of recovery significant decrease (-5%) and transforming itself in drive phase (2%) and waste (3%).

Chart 6 shows the changes in phases' structure of rowing stroke during 26 SPM. The recovery phase continues to decrease, but it's transform in blade work. The waste on the catch and release has the same part.

CONCLUSIONS:

From all of the results, we can make a conclusion that change of the stroke rate of rowing affects the spatial and temporal characteristics of the rowing stroke. The athletes keep their stroke length on the catch and release position. But they begin to move their seat earlier then caring the body over the perpendicular and lose the possibilities for additional increasing of the boat speed. More variations we can find in phases' structure of the rowing stroke. All of the athletes decrease the time of the driving phase much less then they decrease the recovery. The structure of the drive phase is correct with bigger part of work before perpendicular then after. Just increasing the ratio of the second part of driving with boat speed increasing is not correct. On the stroke rate 18 – 26 SPM, decreasing of the time for one stroke should be mostly by increasing of the power and speed of blade moving during driving. The waste time until the blade enter and exit the water is too much, also.

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THE ROLE OF QIGONG IN DEVELOPMENT OF SPECIFIC PERFORMANCE IN JUDO

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***Key words**: Qigong, performance of the movement, concentration, judo*

The literal translation of Qigong is "energizing, empowerment." Qigong is called Tao Yoga, which is traditional for China.

In the martial arts the qigong role is multiple - it improves the concentration on the performance of the movements, regulates and stimulates the respiratory function and coordination. Qigong has enormous role in directing the vector of the force in various actions and movements by breathing compression and directing the concentration.

The aim of this study is to improve the overall condition of the body and increase the functionality of life and specific performance in judo by performing specific exercises.

The article describes the various postures performed with hands and feet.

The Martial arts are an endless path of cultivation of personality. This process is endless and very different in the perspective of East and West.

Eastern understanding is the following:

1. When practicing martial arts, at this path, the subconscious of the trainee shall be released and thus releasing the hidden potential reserves his your body.
2 The methods of training in martial arts are opening energy channels according to Chinese medicine and activate key acupuncture areas and points. This is important to build physical and motor skills.

For the Europeans the practice of martial arts is sports training where the latest scientific achievements are implemented in the sport. In the present study, we aimed to describe the Asian system of martial arts training and a comparison with the standard modern training methods. The Asian system of training is lost in ancient times and its methods are difficult to apply to the European way of life and thinking.

Our main goal is to demonstrate the effectiveness of the Asian system in today's life.

D. Suzuki (2014) emphasizes that, when training martial arts, the mind should not be stopped on the movements of the enemy, and this is defined as immobility. "Not to move" means not to stop on the object you look, because while watching it and it passes - your mind is "nailed". When the mind stops on any object, which appeared to him, he cares about all feelings and thoughts. The suspension inevitably leads to a movement, which is excitement. So the mind is subject to these stops, by itself, it remains stationary, even on the surface seem flexible.

Suppose, for example that against you stand up, one after another, ten enemy and everyone is ready to strike with a sword. After the first one is handled, you will go to the second without allowing the mind to stop on anything. No matter how fast strokes follow, your mind will not pause between them. This will handle successfully with each of the ten. This is possible only if the mind moves from one object to the next without stop or an arrest. If the mind is not able to move in this way, he will surely lose the battle somewhere between two skirmishes or between two movements, if the scrum is a single opponent. When the mind becomes still, the movement becomes instantly, as the flint that strikes in the steel and put a spark, it is the same as a flash of lightning. Where is the movement located in the mind during the movement? The Japanese often talk about the thinking and watching with the belly. Eastern way of centering upon standing in different positions or movements is to direct your roots to the center of the

earth, to realize the great spring. Then the mind is not localized anywhere and using the whole body and flows through our being. When this happens, we use our hands when we need them, legs and eyes when we need and not wasting unnecessary time and energy. Localization of the mind means freezing to stop flowing freely as needed. He ceases to exist in its entirety and essence.

To achieve the aforementioned condition - physically and spiritually, the ancients have practiced a psychophysical system - Qigong. This is a healing technique, as many experts define it, as a kind of yoga related to martial arts.

M. Ji Zhen (1996) gave the following definition of Qigong:

1. The first definition is related to the characters forming Qigong. The character Qi means breath, and Gong is continuous exercises for its regulation and a maintain position.
2. Continuous work (Gunfu) for the improvement of breathing and energy. In ancient times, this method had the name Yang Shen-Fa - a method for restoring vitality. Some authors have defined Qigong as psychotherapy (Chi Jen M - 1996). It is necessary to underline that in ancient times the phrase Qigong is encountered extremely rarely.

For it is written only in the Book of Taos - Xu-Sun, during the Jin Dynasty (265-420 AD) quoted by M.Tszi Jen - (1996). The term is widely used in the late Jin Dynasty among the martial arts trainees. In today's book "The Secret of Shaolin gymnastics" (Shaolin - chuan mitszue) for Qigong are given two definitions:

- Return of energy.
- Coaching energy - quoted from M. Tszi Jen.

The first term is associated with Taoist self-energy.

The second one relates to the regulation of energy in Wushu - traditional Chinese martial arts.

In 1960, Director of Tangshan Clinic of Traditional Medicine Wang Jin Bo and colleagues after a long discussion, give the following definition of Qigong - Method for self-training the body and spirit in which is trained the posture, respiration, allocation, heart and internal organs using mind to concentrate. It is used for the improvement of breathing, movement and rhythm. It can be adjusted as to enhance the various mechanisms of the human body - initiate and stimulated the hidden forces within the body. This indicates a general strengthening and healing effect that helps to disease prevention and longevity.

Mantag Chia (1991) first defines what is "chi", which is the original life energy. It has its origin from the fertilization of the egg by the sperm. "Chi" is constantly flowing life energy that connects in a common feature various internal organs, muscles and joints and provides the body's overall functioning.

According M.Chia (1991) Qigong is a complete system that using the mind focuses on the movement of "chi" in different circular trajectories in the body of the practitioner. They are not randombut strictly defined. This energy in various Eastern traditions is called by different names - prana, pneuma, seed, kundalini energy. The Secrets How energy "chi" began to circulate in the body was found in China thousands of years ago, and its effect on life and longevity has been extremely positive.

C. Qian Tsyun (1998) defines Qigong as a science of essence and evolution of life and matter. Through many years of observations of nature, ancient people sensed that between humans and her internal relationships exist. This knowledge has been analyzed and rationalized after the repeated checking during the millennial practice. Qigong is a method of self-regulation of health, psyche and mind to achieve longevity and improve quality of life and living matter. The courage to describe this method comes after many years of personal checks and analysis.

According to Qian Tsyun C. (1998) Qigong has arisen long before Chinese writing, medicine and martial arts. He has so strong impact on the ancient culture of China that therein there is no such section that is not affected by this system. It is both science and practice that has developed a millennium.

Br. Franzis (2009) indicates targeting of thought in the practice of "qigong" (meditation) is the release of blocked energy attached to our thoughts. The goal is to find a way to change the deepest sub-structures of the mind and soul to open the road to happiness.

M. Petrov (2006) defines Qigong as a method called "Eastern energy sector". The author believes that Qigong is a psychophysical training, the purpose of which is controlling the internal energy of the hu-

man body. With this practice, the people acquires the ability to accumulate in itself the energy, to derive it from the outside, and then direct it at their own will in a certain area or point in or out their bodies.

By using this method, physical and mental abilities of the master of unarmed combat, greatly superior to the capabilities of an ordinary man.

V.I. Kudashov (2003) makes a comparison between the two systems - Yoga and Qigong. Probably based on years of experience, the author makes the following conclusion - those engaged seriously with yoga have as their task, even for a short time, religious mystical enlightenment. Evidence of their exceptional health and longevity are more a myth. This system is very complicated and the life style of the practitioners is very complicated, with many sacrifices, which is impossible for modern man.

Qigong is essentially the element of a warrior and an integral part of its preparation and it is practically aimed as psycho energetic improvement, coupled with maximum efficiency and minimum loss of time.

Both systems emphasize the interdependence of internal energy flow with breathing, through his control. However, the approach to it is quite different.

Yoga is using rhythmic breathing for nonspecific energy saturation of the organism.

Qigong is an integration aimed at harmonizing the energy exchange. Generalized concept of Qigong in China is a "system for tempering of improving the psyche and the body, treatment and promoting health".

Aim of the study

The aim is to optimize the special physical abilities in martial arts, through implementation of specialized traditional methods in the practice, based on Chinese Qigong.

METHODS OF STUDY

Subject to the study is the special physical training in martial arts.

The participants in the study were 20 actively doing sports males, aged between 18 and 20 years, training for five years in a sports club "Champions".

For purposes of the study were conducted two Tests - initial and final test for upper and lower limbs.

To solve the tasks of the study are used the following methods:

Overview and analysis of the specialized literature.

We studied 15 literature sources - 5 in foreign language and 10 in Bulgarian language.

This allows summarizing the opinion of leading experts on the subject. On that basis we created a methodology for the development of the special physical abilities for athletes actively training martial arts.

A sports pedagogical testing

Lower limb - squats on one leg - Figure 1

Way of performing

Folding is slowly and smoothly, while further movement becomes impossible. - Fig.2.

There should be no overrun; no reinforcing of the body during the whole movement the back remains straight. Repeat to failure.

Upper limbs- Pushups with one hand - Figure 3

The hand is on the floor directly in front of the chest. Legs stretched backwards. After stabilization of the position, the free hand stays at the waist - Fig.3.

Way of performing

Is performed descent towards floor until the jaw is on a fist off it - fig. 4

Methodological requirements: Do not let the body to tilt and twist of any country. The tempo is rather slow. The exercise must be performed to failure.

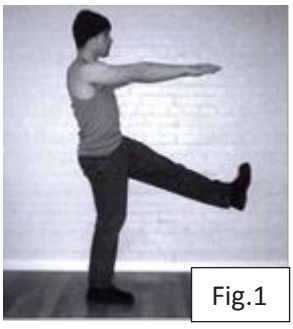

Fig.1

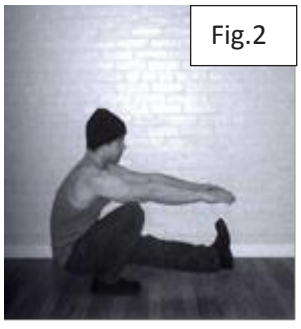

Fig.2

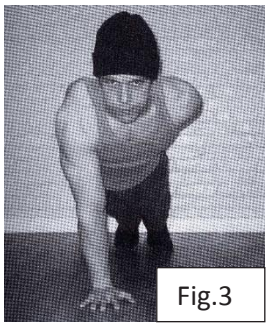

Fig.3

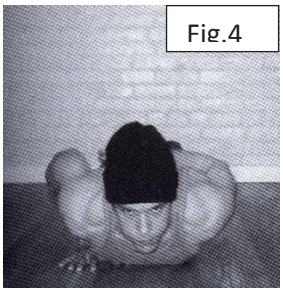

Fig.4

Sports pedagogical experiment.

For the purpose of the study was conducted sports pedagogical experiment lasting two months from 1.04.2014 until 1.06.2014, which was held in a sports club Wing-Chun "Champions".

The martial arts club is the most elite one, with participants in MMA with best rankings. The group of 20 people was divided into two groups of 10 people. The first group trained by standard methods, while the experimental group performed our program - Qigong exercises and came under specific impact of the original method developed by us, designed to develop specific physical abilities. Structurally the preparation of participants in the experimental group was divided into the following stages in the following sequence: The training sessions were held three times a week in those days did not foresee other physical exertion. The program consisted of the following exercises:

1. Complex exercises with hands and transitions from one position to another.
2. Complex positions with feet to transition from one position to another.

Features of the complex of arms and legs featured the following methodological requirements:

1. Set of exercises for arms and legs were performed one after another in a training exercise with passive rest 30 minutes between them. First performed complex hand and after complex for legs into one training session.
2. The exercises are performed with a certain respiratory coordination and concentrated attention to certain areas located in the body of the trainee. This allowed significant reduction of the implementation and the ultimate and close-to-ultimate load, the trainee is able to perform two or three transition over the limit on the level of what was at the time.
3. One set consisted of the implementation of the whole hands complex. The number of series reached 10-12. The break between them was 7-10 min by practicing the exercises decreased. The break was mostly passive. The number of series during the experiment reached 12 in a workout with a break of three to five minutes between sets.
4. The series leg were performed by the same procedure as those with arms only that their number reached 14-16 series. On days when you are not trained the specialized complex are mostly trained technical flexibility and tactical training.

RESULTS AND ANALYSIS

Values of the studied features of special physical preparedness at the beginning of the experiment

Fig. 5 Growth indicators for upper limbs

The dynamics of the upper limbs indicators showing significant growth because of the methodology used to develop strength.

Indicators lower limbs receive significant growth due to the methodology for the development of strength of the lower limbs.

From Figure 10 it is shown that the values of the t-criteria Student at all the indicators of these groups (for lower and upper limbs) is higher than the critical. This gave rise, high guaranteed probability (Pt ≥ 95%) to reject the null hypothesis and accepted as true the alternative, according to which at the beginning of the observed period, the experimental group was comparable to the control regarding the

level of development of motor abilities of the included contestants in the experiment. Following the applied training methodology, the indicators of the experimental group were significantly improved, clearly demonstrated by the significant values of the Student coefficient obtained after two-month implementation of the methodology.

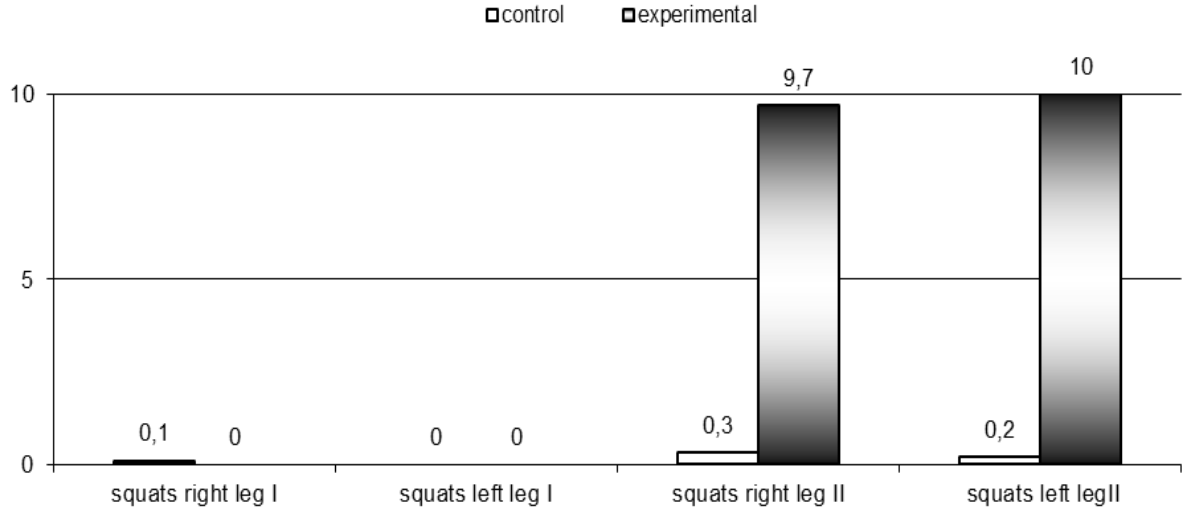

Fig. 5

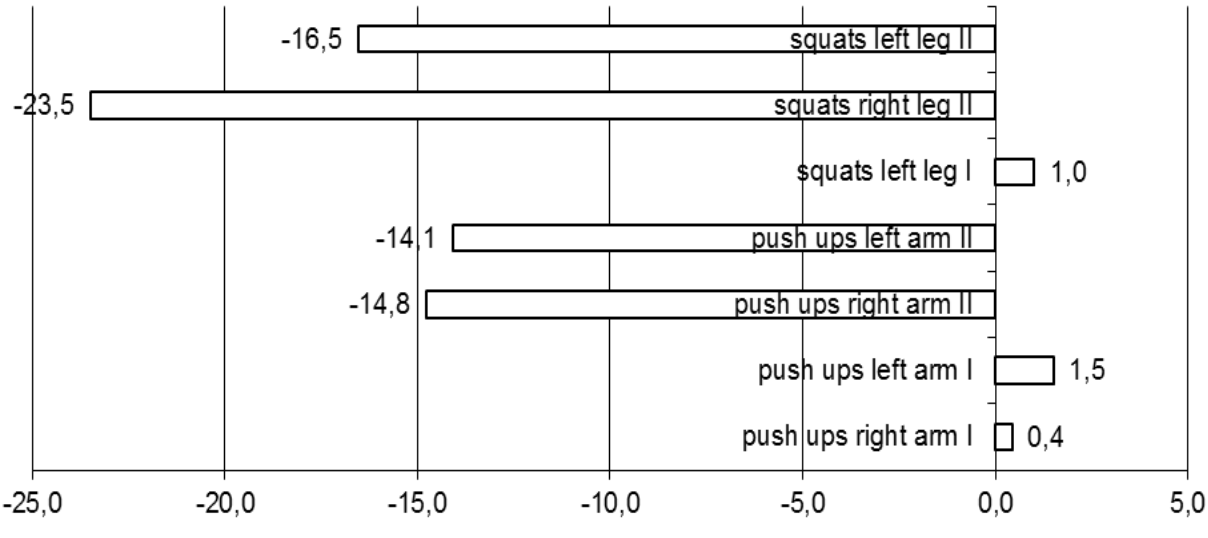

Fig. 6

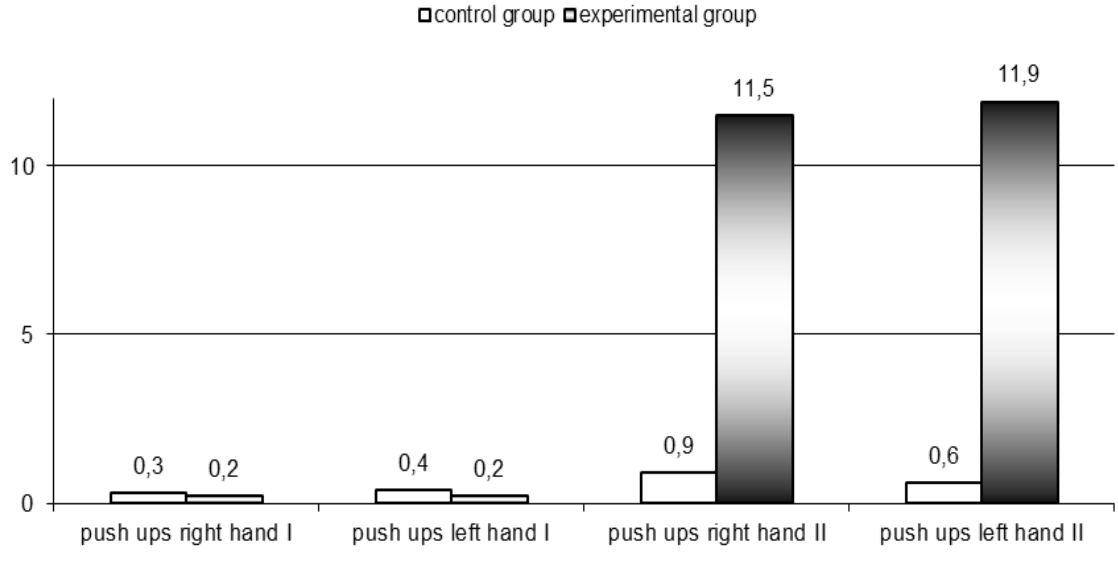

Fig. 7

CONCLUSIONS:

The dynamics of the upper limbs indicators shows significant growth as a result of the methodology used for the development of strength.

Indicators of lower limbs obtained significant growth due to the methodology for the development of strength of the lower limbs.

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FREESTYLE SPRINTERS IN THE DIFFERENT EVENTS

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Key words: *swimming, freestyle, sprint, tactics*

INTRODUCTION

The most important task in swimming tactics is the suitable energy distribution through the entire race. The even swimming velocity is meant to be the right answer. However, there are different swimmers and everybody competes in his own way in practice.

The primary factors in optimizing the training of any particular swimmer are the individual features of the swimmer (physiological features, anthropometry, type of nervous system, etc.) and the distance of the event for which the swimmer is training. It is accepted for short distances in swimming to be 50 and 100 m, for middle distances 200 and 400 m, and the long distances in swimming pool are the 800 and 1500 meters. Those swimmers who compete and achieve best results mainly in 50, 100 and 200 meters usually are defined as sprinters. According to the distance in which dominate, E. Maglischo (2003) distinguishes the sprinters in three categories. The first group which tends to perform relatively better in 50 m he names "fleet" sprinters. Their performance fall to some extend at the 100 distance and to grade extend in 200 races. Fleet sprinters have a high level of anaerobic power, but their aerobic capacity is very weak, probably because they have an unusually high percentage of fast-twitch muscle fibers. The second group - "normal" sprinters competes best in 100 m, although they can swim well 50 and/or 200 meters as well. They also have a high level of anaerobic power, although not as high as that of the fleet sprinters. Their percentage of fast-twitch and slow-twitch muscle fibers are probably close to 50-50. The third group - "distance" sprinters include swimmers who compete better at 200 m than at 50 and 100 meters. They have a little higher percentage of slow-twitch muscle fibers and although they compete at distances that are considered sprints their physiology is close to that of the middle distance swimmers. For this reason, freestylers in this category may also swim 400 meters. Experts give some advices and examples for completing different distances but the information is not comprehensive enough [3, 4, 5, 8, 9, 10].

The purpose of our research is to extend the knowledge needed for better preparation of freestyle swimmers according to their individuality. In this report we are going to focus on performance of different type of freestyle sprinters in their best events.

METHODS

We did an informational research and collected the available data for the top 100 swimmers in 50 m, 100 m and 200 m freestyle of the world rankings 2012. We analyzed the composition of these contingents and the main distances of every category swimmers. To differentiate the way they compete we compared the speed reserve, the coefficient of endurance, the laps and splits of different category swimmers competed at 50 m and 100 m or at 100 m and 200 m in same competition [1, 2, 5, 6, 8].

Speed reserve: $SR_{100} = tI50_{100} - t50$; $SR_{200} = tI100_{200} - t100$

Coefficient of endurance: $CE_{100}=t100/t50$; $CE_{200}=t200/t100$

We choose the result of the shorter event to be from the same competition instead of all-time best result in order to be done in maximum close conditions. The category of every swimmer was defined according to his position in the different events world rankings 2012. Descriptive statistics, t-test and Mann-Whitney U test are used for statistical analysis.

RESULTS

The results demonstrate that there are 103 swimmers in the top 100 of 50 m freestyle world rank list for 2012, because of the four equal results at the hundredth place. It could be said that three-quarters of them -76 are mainly 50 meters specialists. They occupy a better place in this rank list than in those of the other events. More than a half – 55 are amongst the best hundred swimmers in 100 m freestyle too and six of them are in the first hundred of 200 m freestyle. One-quarter – 26 swimmers are at better place in 100 m freestyle world rank list and one occupies the same position in both lists. The results show that 25 sprinters are mainly 100 meters specialists. Although 50 m is their second event, more of them are in the first half of the list – 2 in the first 10 and 6 in the second ten. Five freestylers of top hundred in 50 m are at better place in 200 m ranking. Two of them are mainly 200 meters specialists (Fig.1).

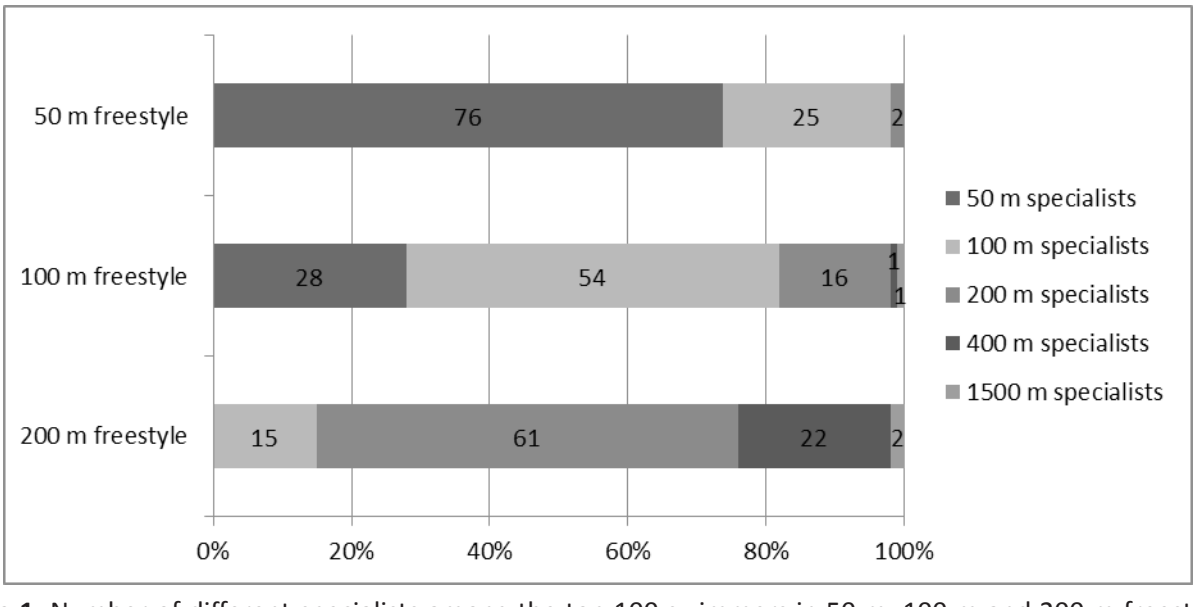

Figure 1. Number of different specialists among the top 100 swimmers in 50 m, 100 m and 200 m freestyle of the world rankings 2012

Slightly more than a half - 54 of the best hundred swimmers in 100 m freestyle for 2012 have a better position in comparison of their positions in the other freestyle events. So, 100 meters may be called their main event. One-third – 33 are also in top hundred at 200 meters. Seven of them are among the best 100 swimmers in 400 meters and two enter in the list of 1500 meters too. Better position in 200 m is occupied by 18 freestylers. Three of them definitely are not sprinters. They are better in 400 m and two are even better in 1500 meters. Sixteen are mainly 200 m specialist, the main event for one is 400 m and for one is 1500 meters. Almost equal (10 to 8) is their distribution between the first and second 50 swimmers of the ranking. The rest 28 are better in 50 m freestyle. Seven of them are distributed between the first 5 tens, but the majority is amongst the second 50 of the list.

Sixty-one are the specialists mostly in 200 meters among the hundred best swimmers of the world rankings in 200 m freestyle for 2012. Only 15 are specialists of 100 meters and the majority are in the second half of this list. No competitor whose main distance is 50 m enters in top 100 of 200 m freestyle. The presence of “stayers” in this event is even more sensible. Over one-third – 36 enter in top hundred of 400 m and 9 of them in top hundred of 1500 m as well. The specialists primarily in 400 m are 22 and those of 1500 m two. Ten of the distance swimmers are distributed evenly among the first 50 places, while the other 14 among the latter.

Fifty-nine of the first hundred swimmers in the ranking of 100 m freestyle for 2012 have a registered result at 50 m freestyle in the same competition. Despite the fact that 51 of them are generally in the top 100 at 50 meters, 35 of the achievements are of the same race. The rest 24 results are outside the first hundred. Thirty sprinters of this contingent are specialists mostly in 100 m, twenty-seven in 50 m and only two in 200 meters.

Comparison of results from the two events and ways of covering the distance of 100 meters between the two numerous groups of sprinters demonstrates significant differences between them. The specialists of 100 m have significantly better result in the same event than the specialists of 50 m and weaker results in the shortest one ($\alpha<0.05$). They have correspondingly smaller speed reserve and better coefficient of endurance. Despite that they can, the "fleet" sprinters does not swim faster over the first 50 meters ($\alpha>0.05$). They approach more cautiously in the beginning, as to the first segment they add an average of 0.39 s more than the others in relation to their result in the 50 m freestyle in the same race. The first half of the distance is covered by them an average of 5.71% slower than their current best time of 50 meters. For the specialists of 100 meters this difference is on average 3.9%. When comparing the result at 50 m and the 50 m split at 100 m, it must be borne in mind that between hand touch and push off respectively there is nearly 0.5 s difference for the tumble turn. The second half of the distance is significantly slower for "fleet" sprinters. Their second 50 meters are, on average, with 10.41% slower than the first. For „normal" sprinters this slowdown is 8.80%. Part of it, of course, is the lack of start jump at the second lap. Taking into consideration that there is no established standard and that everyone is an individual, the start jump gives about 2 seconds advantage and after removal of the tumble turn time it could be said that the first 50 m are around 1.5 s faster than the latter not counting the impact of fatigue (Tables 1, 2).

Table 1. Descriptive statistics for segments of the 100 m distance swum by the 50 m sprinters in top 100 swimmers of the 100 m freestyle world rankings 2012

Variable		Unit	n	Xmin	Xmax	R	$\bar{X}$	S	V	As	Ex	W
1	100 m result	(s)	27	47,92	49,5	1,58	49,09	0,4	0,81	-1,275	1,49	0,873
2	I-50	(s)	24	22,6	23,82	1,22	23,34	0,32	1,35	-0,461	-0,298	0,967
3	II-50	(s)	24	25,32	26,38	1,06	25,76	0,24	0,93	0,916	1,563	0,919
4	II50-I50	(s)	24	1,77	3,39	1,62	2,43	0,38	15,65	0,696	0,878	0,952
5	II50-I50	(%)	24	7,44	14,75	7,3	10,41	1,74		0,636	0,599	0,96
6	50 m result	(s)	27	21,54	22,59	1,05	22,09	0,3	1,37	-0,042	-0,842	0,967
7	I50-50 result	(s)	24	1,04	1,65	0,61	1,26	0,16	12,85	0,762	0,105	0,943
8	I50-50 result	(%)	24	4,62	7,46	2,83	5,71	0,76		0,712	-0,001	0,944
9	100 result/50 result		27	2,19	2,29	0,1	2,22	0,02	1,06	0,994	1,261	0,930

Table 2. Descriptive statistics for segments of the 100 m distance swum by the 100 m sprinters in top 100 swimmers of the 100 m freestyle world rankings 2012

Variable		**Unit**	**n**	**Xmin**	**Xmax**	**R**	$\bar{X}$	**S**	**V**	**As**	**Ex**	**W**
1	100 m result	(s)	30	47,1	49,48	2,38	48,69	0,6	1,22	-0,686	0,244	0,949
2	I-50	(s)	27	22,61	23,95	1,34	23,3	0,32	1,38	-0,355	0,041	0,976
3	II-50	(s)	27	24,42	26,1	1,68	25,35	0,43	1,71	-0,605	0,143	0,95
4	II50-I50	(s)	27	1,2	2,78	1,58	2,05	0,45	21,92	-0,309	-0,794	0,958
5	II50-I50	(%)	27	5,12	11,92	6,8	8,8	1,98		-0,256	-0,862	0,952
6	50 m result	(s)	30	21,74	23,4	1,66	22,47	0,4	1,78	0,237	-0,469	0,974
7	I50-50 result	(s)	27	0,42	1,31	0,89	0,87	0,25	28,23	-0,263	-0,474	0,964
8	I50-50 result	(%)	27	1,84	5,98	4,14	3,9	1,13		-0,232	-0,467	0,967
9	100 result/50 result		30	2,1	2,2	0,1	2,17	0,03	1,2	-0,456	-0,478	0,954

The results of the two specialists of 200 m do not differ significantly from the others results. Like the "fleet" sprinters, they pass the first 50 meters 5.58% slower than their result of 50 m freestyle in the

same race. Unlike them, they manage to swim faster the second half of the distance, due to their better endurance ($\alpha < 0.05$) (Table 3).

Forty-seven of the first hundred swimmers in the rankings of 200 m freestyle for 2012 have a registered result at 100 m freestyle in the same competition. Almost half of them - 23 are in the top 100 of this event. One of the swimmers has a result among the first hundred for 2012, but not in the same race. Twenty-seven competitors of this contingent are specialists mostly in 200 m, which is considered to be middle distance. For almost all of them, with few exceptions, 100 meters is their second specialty and these swimmers can be added to the category „distance" sprinters. Thirteen are "normal" sprinters, and seven are middle distance swimmers who perform best at 400 meters.

The specialists of 200 meters have significantly better results at 200 m freestyle than the specialists of 100 meters. On the other hand, they have weaker results in 100 m freestyle, but stronger than those of the specialists of 400 meters. The average values of the speed reserve and coefficient of endurance differ in the groups ($\alpha<0.05$). The middle distance swimmers have the slowest first lap. The average value of their first 50 m differs significantly from that of the „distance" sprinters, who are fastest at this segment. In comparison with the first lap of the 100 m freestyle, the first 50 m of the 200 m freestyle is 7.51 percent slower for the 100 m specialists and 4.77 percent and 3.86 percent for the 200 m and 400 m specialists respectively. The average 100 m splits keep the same order. They do not differ significantly, but the shorter the primary event of the swimmers is, the slower they swim the first half of the distance compared to their result at 100 m in the same race. The average change is 8.07%, 5.12% and 3.79%, respectively. The second half of the distance is somewhat in favor of the specialists of 400 meters ($\alpha>0.05$). It is 3.99% slower than the first hundred meters. For the specialists of 200 m, this slowdown is an average of 5.79% and for the "normal" sprinters 5.43% (Tables 4, 5, 6).

DISCUSSION AND CONCLUSIONS

The results demonstrate the large variety of swimmers according to their possibilities who entered in top 100 of the 50, 100 and 200 m freestyle world rankings 2012. Some 50 m sprinters swim 100 m well and some do not. There are 100 m sprinters who compete successfully at 50 m or at 200 m and some of them even at 400 and 1500 m and others who cannot. Some 200 m sprinters achieve good positions at 100 m and some of them at 50 m as well. There are middle distance and distance swimmers who compete well at 200 meters. Few of them are good at 100 m too.

The findings show statistically significant differences in many parameters regarding the way swimmers cover the distances of 100 and 200 m according to their category. The first lap of 100 m freestyle of the 50 m sprinters is almost the same as to the 100 m sprinters first lap which is slower related to their result of 50 m freestyle from the same competition. They swim so probably trying to avoid early acidosis because they produce and accumulate lactic acid more rapidly. Nevertheless, due to high level of acidosis or less endurance they swim slower the second lap. The two cases of the 200 m sprinters are not enough for categorical conclusions. Anyway, they have the slowest first lap at 100 m freestyle, which is a little faster than the 50 m sprinters and significantly slower than the 100 m sprinters relatively to their 50 m result. On the contrary, they have the fastest second lap in absolute and relative to their first lap values, which is significant comparing them to the 50 m sprinters. Their second half is stronger probably because they accumulate lactic acid more slowly and generally are more endurable.

The first 100 m of the 100 m sprinters at 200 m freestyle comparing to their result of 100 m freestyle from the same competition are slower than the beginning of the 200 m specialists, who are in their majority sprinters. Perhaps this is a precaution against early acidosis. However, their second half is also a little slower despite that they slow down less ($\alpha>0.05$). The beginning of the 400 m middle distance swimmers is even more slower but relatively to their result of 100 m freestyle is the fastest ($\alpha<0.05$). Due to lower level of acidosis or better endurance they slow down less than the 200 m specialists ($\alpha<0.05$) and have the fastest second half though not statistically significant.

On the basis of the data analysis can be made the following conclusions:

- Every sprint event is dominated by different type of sprinters, middle distance and distance swimmers.
- Different specialists swim in different way 100 and 200 meters freestyle.

Table 3: Descriptive statistics for segments of the 100 m distance swum by the 200 m sprinters in top 100 swimmers of the 100 m freestyle world rankings 2012

Variable		Unit	n	Xmin	Xmax	R	`C	S	V
1	100 m result	(s)	2	48,74	49,12	0,38	48,93	0,27	0,55
2	I-50	(s)	2	23,62	23,68	0,06	23,65	0,04	0,18
3	II-50	(s)	2	25,06	25,5	0,44	25,28	0,31	1,23
4	II50-I50	(s)	2	1,38	1,88	0,5	1,63	0,35	21,69
5	II50-I50	(%)	2	5,83	7,96	2,13	6,89	1,51	
6	50 m result	(s)	2	22,37	22,43	0,06	22,4	0,04	0,19
7	I50-50 result	(s)	2	1,19	1,31	0,12	1,25	0,08	6,79
8	I50-50 result	(%)	2	5,31	5,86	0,55	5,58	0,39	
9	100 result/50 result		2	2,18	2,19	0,01	2,18	0,01	0,36

Table 4: Descriptive statistics for segments of the 200 m distance swum by the 100 m sprinters in top 100 swimmers of the 200 m freestyle world rankings 2012

Variable		Unit	n	Xmin	**Xmax**	**R**	$\bar{X}$	**S**	**V**	**As**	**Ex**	**W**
1	200 m result	(s)	13	106,7	108,92	2,22	108,13	0,69	0,63	-1,066	0,376	0,881
2	50 split	(s)	12	24,74	25,8	1,06	25,21	0,38	1,5	0,352	-1,353	0,907
3	100 split	(s)	12	51,62	53,81	2,19	52,62	0,66	1,25	0,386	-0,296	0,946
4	150 split	(s)	11	79,41	81,52	2,11	80,34	0,65	0,81	0,278	-0,423	0,965
5	50 $split_{100}$	(s)	12	23,17	23,73	0,56	23,45	0,17	0,72	0,247	-0,493	0,948
6	II-100	(s)	12	54,29	56,23	1,94	55,46	0,67	1,21	-0,436	-1,239	0,908
7	II100-I100	(s)	12	1	4,54	3,54	2,84	1,13	39,87	-0,102	-0,837	0,965
8	II100-I100	(%)	12	1,86	8,8	6,94	5,43	2,21		-0,062	-0,802	0,967
9	100 m result	(s)	13	47,88	49,34	1,46	48,72	0,43	0,89	-0,612	-0,266	0,952
10	$I50_{200}$-$I50_{100}$	(s)	12	1,22	2,42	1,2	1,76	0,4	23	0,696	-0,737	0,87
11	$I50_{200}$-$I50_{100}$	(%)	12	5,19	10,35	5,16	7,51	1,75		0,721	-0,719	0,863
12	I100-100 result	(s)	12	3,16	5,02	1,86	3,93	0,64	16,19	0,551	-1,193	0,904
13	I100-100 result	(%)	12	6,5	10,29	3,79	8,07	1,33		0,532	-1,213	0,905
14	200 result/100 result		13	2,19	2,24	0,05	2,22	0,01	0,55	-1,107	2,102	0,913

Table 5: Descriptive statistics for segments of the 200 m distance swum by the 200 m specialists in top 100 swimmers of the 200 m freestyle world rankings 2012

Variable		Unit	n	Xmin	Xmax	R	$\bar{X}$	S	V	As	Ex	W
1	200 m result	(s)	27	103,14	108,87	5,73	107,51	1,15	1,07	-2,274	7,211	0,796
2	50 split	(s)	25	24,55	25,81	1,26	25,11	0,35	1,39	0,098	-0,627	0,97
3	100 split	(s)	25	50,64	53,41	2,77	52,22	0,65	1,25	-0,284	0,172	0,982
4	150 split	(s)	22	77,16	81,39	4,23	79,8	0,92	1,15	-0,763	2,207	0,927
5	50 $split_{100}$	(s)	25	22,78	24,81	2,03	23,97	0,46	1,93	-0,398	0,558	0,97
6	II-100	(s)	25	52,5	56,73	4,23	55,24	0,82	1,49	-1,442	4,27	0,895
7	II100-I100	(s)	25	1,57	5,42	3,85	3,02	0,89	29,57	0,744	0,938	0,955
8	II100-I100	(%)	25	2,95	10,56	7,62	5,79	1,75		0,796	1,039	0,952
9	100 m result	(s)	27	47,84	50,93	3,09	49,69	0,89	1,8	-0,389	-0,969	0,946
10	$I50_{200}$-$I50_{100}$	(s)	25	0,37	1,81	1,44	1,14	0,38	33,05	0,13	-0,5	0,976
11	$I50_{200}$-$I50_{100}$	(%)	25	1,49	7,77	6,28	4,77	1,64		0,192	-0,457	0,978
12	I100-100 result	(s)	25	1,47	4	2,53	2,54	0,61	24,06	0,462	-0,239	0,961
13	I100-100 result	(%)	25	2,89	8,29	5,4	5,12	1,3		0,497	-0,209	0,953
14	200 result/100 result		27	2,1	2,21	0,11	2,16	0,03	1,24	-0,247	0,033	0,961

Table 6. Descriptive statistics for segments of the 200 m distance swum by the 400 m middle distance swimmers in top 100 of the 200 m freestyle world rankings 2012

Variable		Unit	n	Xmin	Xmax	R	$\bar{X}$	S	V	As	Ex	W
1	200 m result	(s)	7	106,64	108,58	1,94	107,68	0,64	0,59	-0,083	0,414	0,889
2	50 split	(s)	6	25,09	26,02	0,93	25,51	0,37	1,46	0,213	-1,838	0,923
3	100 split	(s)	6	52,15	53,41	1,26	52,8	0,47	0,89	-0,225	-0,96	0,960
4	150 split	(s)	6	79,33	81,23	1,9	80,24	0,66	0,82	0,239	0,163	0,989
5	50 $split_{100}$	(s)	6	23,96	25,02	1,06	24,56	0,34	1,39	-0,877	2,805	0,858
6	II-100	(s)	6	54,43	55,5	1,07	54,9	0,44	0,79	0,214	-2,01	0,896
7	II100-I100	(s)	6	1,29	2,79	1,5	2,1	0,58	27,54	-0,186	-1,493	0,942
8	II100-I100	(%)	6	2,43	5,33	2,9	3,99	1,12		-0,182	-1,567	0,943
9	100 m result	(s)	7	106,64	108,58	1,94	107,68	0,64	0,59	-0,083	0,414	0,986
10	$I50_{200}$-$I50_{100}$	(s)	6	0,45	1,46	1,01	0,95	0,37	38,91	0,079	-1,002	0,961
11	$I50_{200}$-$I50_{100}$	(%)	6	1,83	5,94	4,12	3,86	1,52		0,066	-1,219	0,961
12	I100-100 result	(s)	6	0,7	2,5	1,8	1,92	0,65	33,63	-1,687	3,377	0,819
13	I100-100 result	(%)	6	1,35	4,94	3,58	3,79	1,29		-1,667	3,297	0,826
14	200 result/100 result		7	2,08	2,15	0,07	2,12	0,02	0,99	-0,147	0,889	0,979

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11. Table 6: Descriptive statistics for segments of the 200 m distance swum by the 400 m middle distance swimmers in top 100 of the 200 m freestyle world rankings 2012

COMPARATIVE MOVEMENT CONTENT ANALYSIS OF CHA-CHA -CHA COMPETITIVE DANCE PROGRAMS OF THE ELITE DANCE COUPLES IN WDSF AND WDC_AL" POSTER

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Kye words: *dancesport, competitive latin-american dancing, movement analysis, Laban Movement Analysis (LMA), dancing style*

INTRODUCTION

The modern development of the competitive ballroom dancing (International Ballroom & Latin) is characterized by a proclaimed separation and opposition of two major stylistic trends – a classic one, under the same name and a new one under the name Dancesport (Standard & Latin). Amateur dance couples, representatives of the first direction, compete in the "World Dance Council_Amateur League " (WDC_AL). They follow the traditional way of dance education and preparation in dance schools where their development is under the supervision of professional dance teachers and coaches, members of different national professional dance associations and councils, belonging to WDC. Representatives of the latter, who call themselves "dancesport athletes" are significantly more and are registered competitors in respective national dancesport federations, members of the "World DanceSport Federation" (WDSF). WDSF is recognized by the IOC as sole representative of this new aesthetic sport in the Olympic family of sports and its main goal is appearance of the dancesport in the program of the Summer Olympic Games (SOG). The dancesport athletes claim that their "athletic style" of dancing is superior to the "old-fashioned" and traditional socio-cultural approach of their counterparts to both competitive dance disciplines – Latin and Ballroom (Standard). This trend of the current stage of development of competitive ballroom dancing under the name of "dancesport" is largely due to the need to strengthen the sports aspect in the traditional ballroom dancing with the abovementioned main goal. However, according to Voronin R.E.[1]: "the emphasis on the sports characteristics in modern dancesport is contradicting in the very nature of the art of dance, thus destroying the structure of the ballroom dance aesthetic." The author and so do we believe that in this sport discipline, the movement structure is aesthetic by its form and expressive by its function, representing the unity of the human movement and its emotional content evoked by music with particular character and reflecting the relationship of men and women. This overstressed attention to the sport in the development of the modern competitive ballroom dancing meets equally strong opposition from the professional ballroom dancers and dance teachers in the WDC, who have established their WDC_AL as a counterpart of the WDSF amateur dancesport athletes organization.

In this context, we are interested to investigate the movement content of the competitive programs of elite amateur dance couples, representatives of both directions – competitive ballroom dancing and dancesport. Competitive dance Cha-cha-cha is selected for this study. Its character and pace of implementation provides a scope for broader movement interpretation of the music and hence the possibility of a brighter highlight of any existing significant differences in both styles of performance. Object of the study are the performances of two dance couples – world champions of the respective two styles – Angelio Langela – Kristina Moshenskaia (WDSF world amateur latin dancesport champions) and Troels Bager - Ina Jeliazkova (WDC_AL world amateur Latin champions).

METHODOLOGY

Dancesport like other similar aesthetic Olympic sports currently has a judging system in place that tries to efficiently and effectively choose winners. Following the recommendations of the IOC for improving

the objectivity of their judging system WDSF recently have accepted for implementation in their most important competitions a new system (System 2.1) which is based mostly on the adjudicating system of Ice Skating Union, recognized by IOC. This system uses points for marking the achievement of the competitors instead of ranking them by place in the competition. In competitive ballroom dancing system of WDC_AL adjudicating is comparative and based on selection, comparison, evaluation and placing of the competitive couples in the final round. There are many benefits and faults of both, the point and comparative systems [2]. One benefit of a point system over a comparative one is that it allows a judge to evaluate competitors to a standard. This also informs the competitors how well they are performing at a particular level of competition. However it does not mean that the point system is necessary better. It has problems of its own. One of the biggest is in defining exactly what a perfect score should consist of. In order to define a perfect score, competitors have to include in their routines for every dance specific compulsory movements with well defined marks for quantity and quality of their implementation. Judging has to include rules and procedures for deductions for every one of the criteria being judged. However all this elaborated and complicated procedures are still far from being well formulated and applied in the new WDSF System 2.1[3]. The traditional judging system used in the WDC_AL competitions is based on comparative judging against the same criteria, but the adjudicators are with no exception highly experienced and qualified professional dance teachers and dancers. They are fully capable of integrating both, the technical and artistic merits of the performances into one subjective but highly informed assessment which allows them to effectively rank couples and choose the winning one. Although the point system is more transparent and informative for the competitors, the way the scores are obtained will always be also somewhat subjective and controversial. There is a belief in WDSF that the more they are trying to objectify the evaluation of the dancesport performances the more they will be accepted as a sport rather than dance activity. This controversial goal however may bring a lost of the unique character and style of competitive ballroom dancing as an “artistic sport”, because the dancers will always follow what make them successful in competitions. And if the judging system is setting a priority on the objectively measured and usually physical strands of the performances like speed, strength, distance, amount of difficulty of the movements etc., a new “dancesport” style will really become a reality. So, when dancesport athletes claim that they are developing such a new style, they may well be right, if what is seen being selected as “the best” in their competitions has clearly stressed athleticism as a main feature and value in the performances. In this study we are making an attempt to clarify if this claim has a ground in the top amateur competitors of the WDSF by focusing on the movement content of the competitive Cha-cha-cha programs of WDSF and WDC_AL amateur Latin world champions. This comparison will give us information about differences in their performance styles. We are looking at characteristics of the movements which are informative for both athletic and artistic merits of the dance performances, such as: motor density, actions used, their dynamic and rhythmical characteristics, phrasing and relationships as well as at the style specific characteristics given by the Laban Movement Analysis (LMA) [4], which is an essential and universal tool for qualitative assessment of the performances in all dance styles. One of its significant aspects is the classification of movement structures which provides for a systematic analysis of movement. Laban defines intrinsic structures of movement as follows: the body, its actions, the space, dynamic qualities and relationships. Another very important category of LMA is „effort”. He considers effort as the inner impulse - a movement sensation, a thought, a feeling or emotion from which movement originates. It constitutes the psychomotoric interface between mental and physical components of human movement. This inner impulse or motivation is expressed by conscious or unconscious attitude toward four motion factors - space, weight, time, and flow, which creates the dynamic qualities of movement. The particular emphasis on, or selections from these factors make up what Laban calls the characteristic “effort” patterns which create the dynamic qualities of movements. Another aspect of dynamics is “rhythm”. Rhythm is identified as a combination of the change in speed and the duration of the dynamic actions. This in turn creates perceived accents in the movement phrase. All above together underlies particular style of dance as well as personal movement style of the dancer. A thorough study of any dance style however should also include an examination of the music to which it is performed and relationships between the music and movement of the dancers. As far as the examined two couples are not competing against each

other because of abovementioned political reasons, we assess the fulfillment of the requirements set by the common judging criteria for the two performances by method of expert analysis. 3 WDSF and 3 WDC international adjudicators have been involved in the evaluation of both dance performances. The common judging criteria in competitive ballroom dancing and dancesport are: 2 technical - TQ (Technical Quality), MM (Musicality of Movement) and 2 artistic - PS (Partnering Skills) and CP (Choreography and Presentation). They have a lot of ingredients which were thoroughly investigated and assessed by the experts in four observational procedures (one per every single criteria).

RESULTS AND DISSCUSSION

We have observed and analyzed video records of the 2014 WDSF European Latin Amateur Championship performance of the WDSF couple Nino-Kristina (couple 1) and the 2014 UK Open Latin Championship performance of the WDC_AL couple Troels-Ina (couple 2).

1. Evaluation (adjudicating) of the performances – it was done by 6 experts in four sessions and they found very similar qualities for both couples which were marked according to the WDSF Adj. System 2.1 scale, very close - between 9,5-10,0 (9 - Superior and 10 - Outstanding) for each of the criteria. So, this procedure made clear that there is not any reasonable objective differences in the technical and artistic quality of both performances. Our analysis reveals also that all of the basic characteristics of the competitive ballroom dance Cha-cha-cha (Table 1) given by the LMA [6] were in place and convincingly demonstrated by both couples.

Table1. Cha-cha-cha basic movement elements

Body	***Action***	***Space***	***Dynamics***	***Rhythm***
Legs and feets	*Stepping, gesturing, transferring weight*	*Shared and opposite directions, some design*	*sudden, strong, direct, bound*	*impact*

Cha-cha-cha qualities of Effort

Stressed Efforts	***Main***	***Secondary***
Motion Factor	*Time*	*Weight*
Inner partisipation	*Decision*	*Intention*
Concerned with	*When*	*What*
Affecting	*Intuiting*	*Sensing*

1+2 making incomplete effort (inner attitude)

Two motion factors	*Time +Weight*
Inner attitude	*Near*

adding efforts

Motion Factor	*Space*	*Flow*
Inner partisipation	*Attention*	*Progression*
Concerned with	*Where*	*How*
Affecting	*Thinking*	*Feeling*

creates Foreground + Background

Three Motion Factor	*Time/Weight/Space*	*Time/Weight/Flow*
Drives	*Action*	*Passion*

which makes Cha-cha-cha with following psychomotoric characteristics:

Main Dynamic Qualities – T/S/W/F	***Characteristics***
Sudden/Direct/Strong /Bound - complete effort	*Controlled,Powerful,Passionate*
Secondary Dynamic Qualities – 3 efforts	***Characteristics***
T/S/W - Sudden/Direct/Strong- stressed effort	*Punchy*
T/S/F - Sudden/Flexible/Free – stressed effort	*Playful*
T /S /F - Sudden /Direct/Free - stressed effort	*Alert, Awake*
S/W/F - Flexible/Strong/Free - stressed effort	*Enterprising*

2. Assessment of the athletic part of the performances - in order to do that we consider the quantity of actions which involve body weight manipulation (steps with weight transfer, leg actions, body actions) made by the dancers during whole performance. The highest possible quantity is received by filling ev-

ery half beat in the music with such an action. In a two bar musical phrase of Cha-cha-cha their number is 16 (8 beatsX2) and for approx. 1,5 min. duration (40 bars) we have 320 actions, as maximum. Here we introduce the characteristic "Motor Density" (MD). We define this characteristic as ratio between the number of the abovementioned actions in the performance of the dancer and the number of the half-beat time periods for the duration of the performance, and consider it as an athletic characteristic. The basic motor density of the dance is therefore: MD= N/T=10/16=0.625 (where N=10 is number of steps in the basic figures construction of two bar phrase and T=16 is the number of half beat intervals in the two bar phrase). On (Fig.1) we show the compared MD for the man and ladies in both performances. One can see that they are very close to the basic one and even a bit lower, which means that there is no any prominent athleticism in either of the performances. The main feature of this comparison is that couple 1 has less difference in MD for the man and lady than couple 2 which means that the lady in couple 1 is taking almost the same active role in the partnership as man. We could say that this is a bit stronger athletic approach from their side.

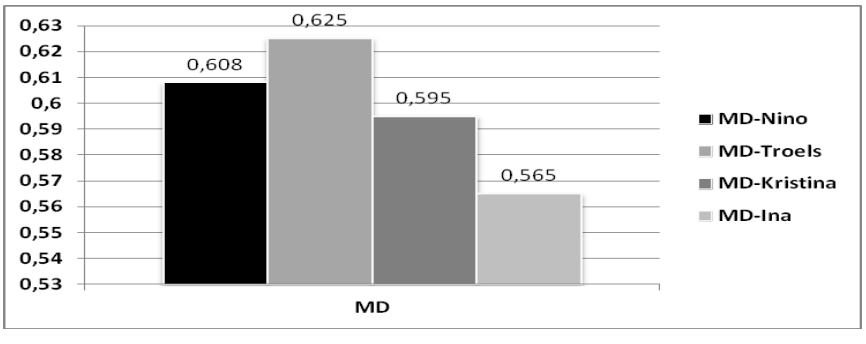


Fig.1

3. Assessment of the musicality of movement – musicality is connected with the correlation between music and dance movements. We looked at the different rhythmical characteristics of the music and the movements used in the both performances (and in the basic ballroom competitive dance Cha-cha-cha as well). Below we show the movement rhythms used in both performances**:**

REGULAR RHYTHMS:

R1 – **1**,2,**3**,4,&; **5**,6,**7**,8,&; - basic music rhythm (1,1,1,1/2,1/2; 1,1,1,1/2,1/2);

R2 – 2,**3**,4,&,**5**; 6,**7**,8,&**1** – basic cha-cha-cha rhythm (1,1,1/2,1/2,1; 1,1,1/2,1/2,1);

R3 – 2,**3**,4,&,**5**; 6,&,**7**,8,&,**1** – 3 cha-cha-cha rhythm (1,1,1/2,1/2,1,1/2,1/2,1,1/2,1/2,1);

R4 – 2,**3**,4,&,5,&,6,&...; 2,**3**,&,4,&,5,&,6,&...; 2,&,3,&,4,&,5,&,6,& - cont. cha-cha-cha rhythm

R5 – 2,&,3,&,4,&,**5**; 6,&,7,&,8,&,**1** – Cuban break rhythm (1/2,1/2,1/2,1/2,1/2,1/2,1)

R6 – 2,&,**3**,4,&,**5**; 6,&,**7**,8,&,**1** – Split Cuban break rhythm (1/2,1/2,1,1/2,1/2,1)

SYNCOPATED RHYTHMS:

S1 - &,**3**,4,&,**5**; &,**7**,8,&,**1**; &**1**…, &**3**….; &**5**….; &**7**….. – Whapacha rhythm

S2 - **2**,3,4,&,5; **6**,7,8,&,1; - syncopated basic cha-cha-cha rhythm

S3 - &,**2**....; &,**4**.....; &,**6**.....; &,**8**..... – syncopated Whapacha rhythm

S4 – ...3&**4**..; ...5&**6**...; ...7&**8**...; ...1&**2**... – syncopated cha-cha-cha rhythm

SLOW RHYTHMS: any rhythm with more than 1 beat duration of the steps

S1.R – **1**2...; ...**3**4...; ...**5**6...; ...**7**8... – regular slow rhythm

S2.R – &,**1**2...; ...&,**3**4...; ...&,**5**6..., ...&,**7**8... – regular slow Whapacha rhythm

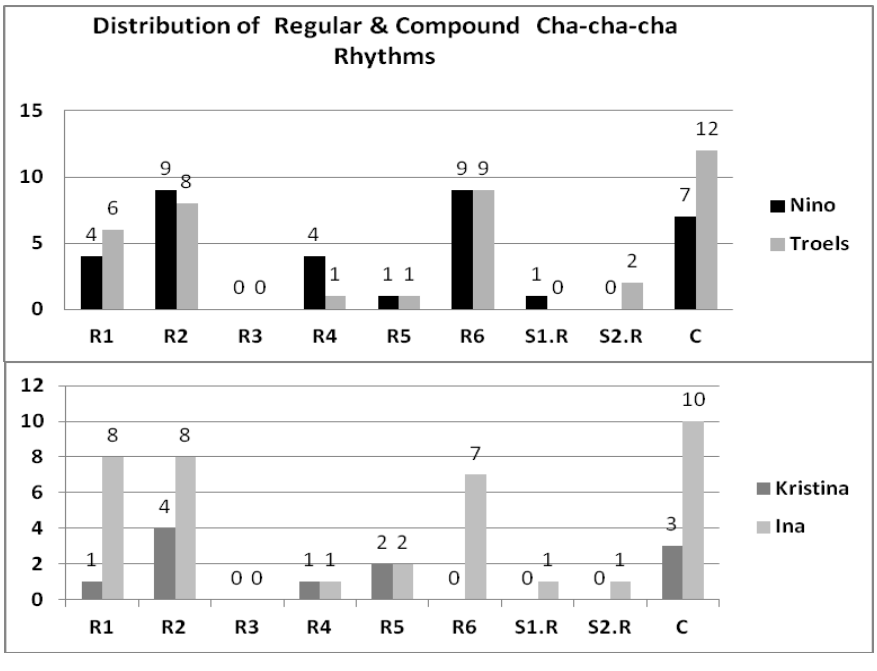
S1.S – **2**3...; ...**4**5...; ...**6**7...; ...**8**1... – syncopated slow rhythm

S2.S – &,**2**3…; …&,**4**5…; …&,**6**7…; &,**8**1… - syncopated slow Whapacha rhythm

COMPOUND RHYTHMS: any combination of the above rhythms

Generally the correlation between movements and music in Cha-cha-cha is based on the percussive rhythmic line of the music. It has a simple character by taking steps and body parts actions mostly on every downbeat as well as regularly or from time to time on some upbeats. Possible links between music and dance movements can be created in the form of synchronization or syncopation, as well as in the form of concurrency and/or comparability in different slow and compound rhythms. On (Fig.2 a) and b)) we compare the quantity of different types of regular, syncopated, slow and compound rhythms used by man and ladies in both couple performances. One can see some similarities and some differences in the presented distributions, but they are all matter of a personal choice and in harmony with the music and the style of the Cha-cha-cha. On (Fig.3) we show distribution of the beginnings of individual movement phrases for men and ladies in relation to the basic two bar phrase of music. There is a balanced spread of this characteristic between all beats in the two bar phrase as well as obvious peak on beat 2 for the men and the ladies in both couples.

a)



b)

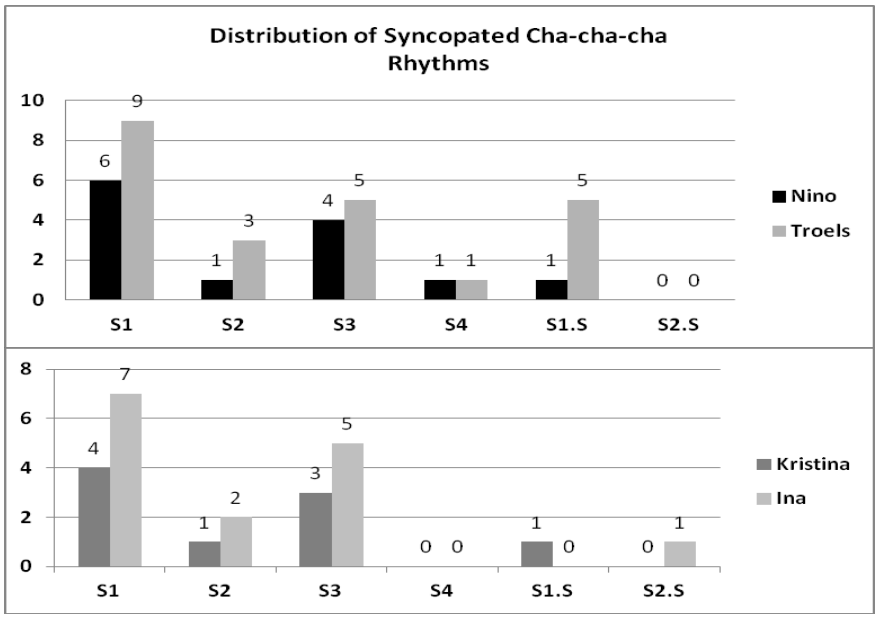


Fig.2

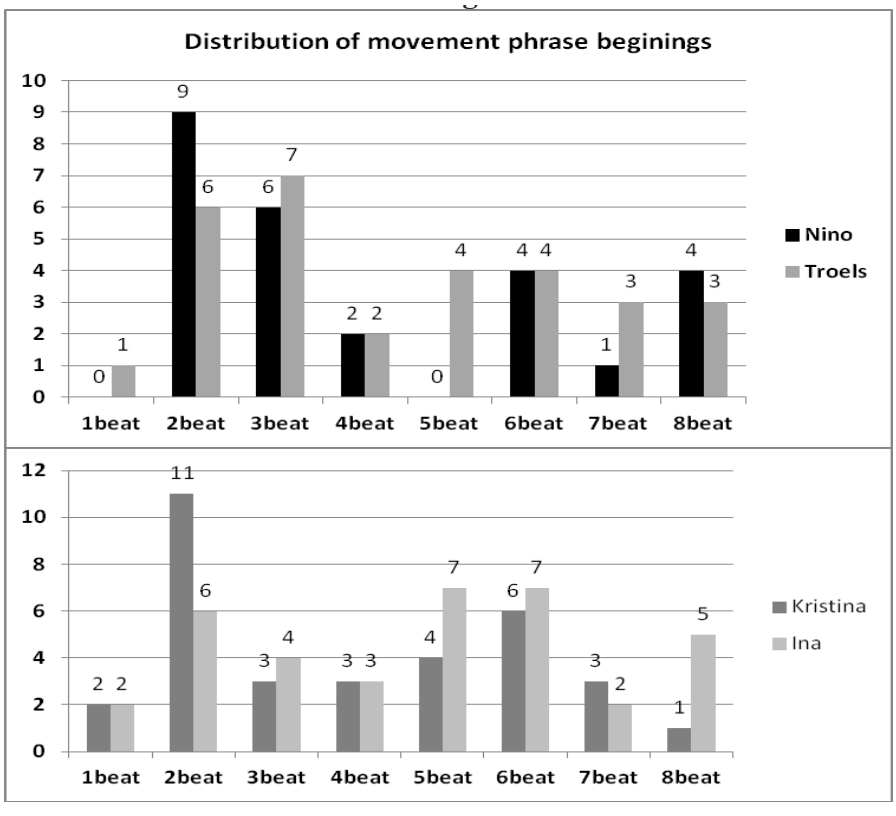


Fig.3

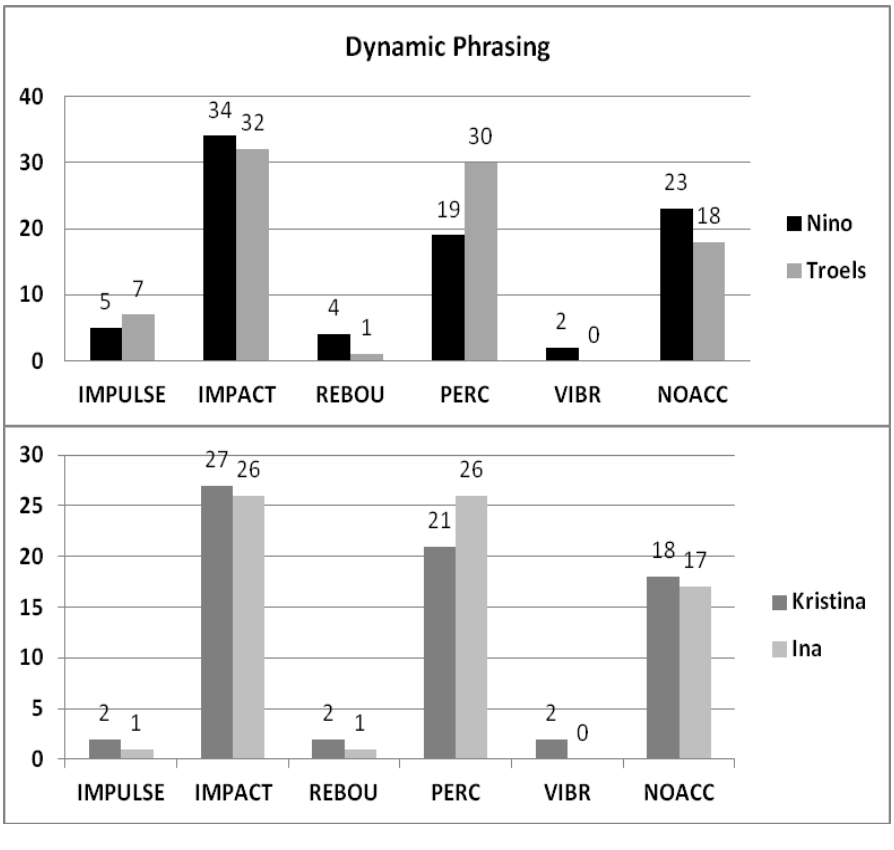


Fig.4

4. Assessment of the dynamic structures and choreographic text - disclosure of the dynamic content of movements can be seen in the context of the entire dance composition (choreography) by examining of the motif phrases and the structure of effort. It can be done on several levels. The generall one is associated with dynamic phrasing of several successive motor actions depending on the place of

emphasis in the energy in the movement phrase - in the beginning (impulsive), in the end (impactive) or in the middle (swing). Of course, we can also have non accented or multi accented (percussive or vibratory) phrases of movement. The compared distributions of the different types of individual dynamic phrases for men and ladies in both performances are shown on (Fig. 4). It is clearly seen the predominant impactive and percussive type of the dynamic phrasing for both couples which is typical for the style and character of the Cha-cha-cha. On (Fig.5) we present the distribution of the dynamic phrase synchronization (unison or canon) for both couples. One can see that they are also almost identical.

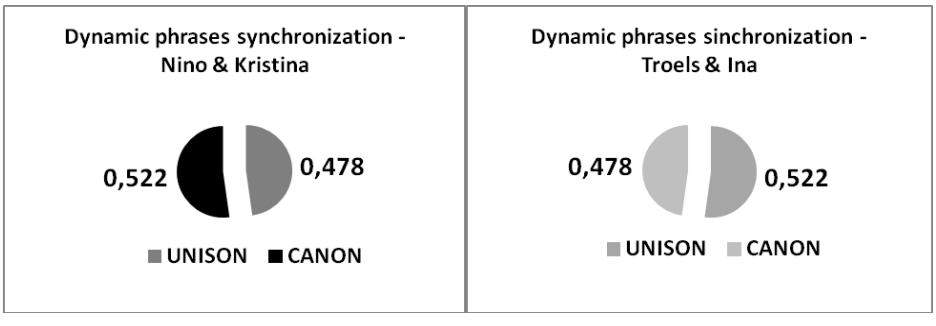


Fig.5

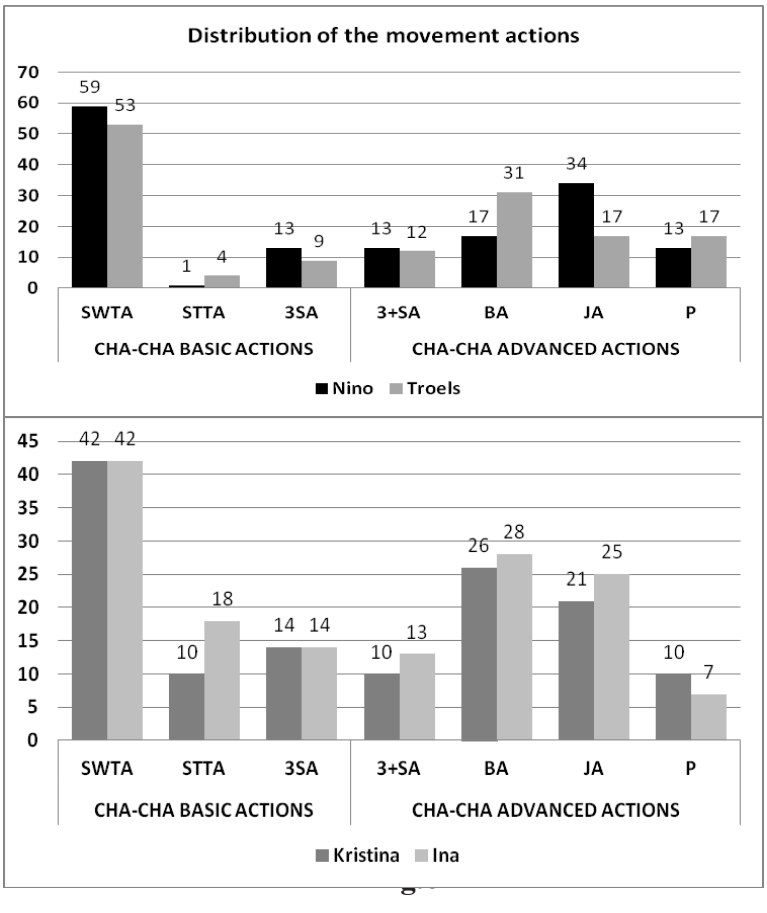


Fig.6

The choreographic text of both performances is characterized by complete absence of any recognizable basic figure in the composition. Instead, the couples are developing the constructions of such figures by changing the number and rhythm of their steps, directions and amounts of turn, positions and holds, as well as by replacement of the type of actions. Nevertheless both couples are using mostly characteristic basic and well defined advanced Cha-cha-cha actions in their routines. On (Fig.6) the compared distributions of individual basic cha-cha-cha actions (SWTA - steps (walks) with weight transfer actions;

STTA – step with twist and turn actions; 3SA – three step actions) and advanced one (3+SA – continuous steps actions; BA – body (hip) actions; JA – jesturing actions; P - poses (lines)) for men and ladies in both performances are presented. Here we can also see identical distributions for the men and ladies, as well as between them in both performances with the only exception for the distribution of advanced actions for the men.

CONCLUSION

Modern competitive ballroom dancing is claiming to be considered as a real sport under the name "dancesport" and is candidate for taking part in SOG. And the reason is that while the emphasis of dance is on expression no one can deny that the competitive dancers are placing equal attention on the athletic side of their performance, too. However, the question is if this is enough to claim that already a different - sportive dance style has been created. The results of this study shows a high degree of similarity in the movement content both in terms of quantitative and qualitative characteristics for the competitive Cha-cha-cha dance performances of the world WDSF and WDC_AL amateur Latin champions. The LMA analysis shows clear compliance of the movement characteristics of both performances to the fundamental ballroom Cha-cha-cha characterization. We could not find in our analysis any evidence for distinctiveness of the both styles of performance. In conclusion, the claims of the WDSF and its dancers-athletes for development of their own distinctive dancesport style are still more intent than a reality. Obviously where would competitors place themselves on the continuum "dancers-athletes" depends mostly on the organization to which they belong and at least in their best proponents has nothing to do with the performance style.

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INFLUNCE OF ANAEROBIC TRAINING ON SELECTED FITNESS PARAMETERS OF ORIENTATION STUDENTS

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Key words: *Underweight, Speed, power*

INTRODUCTION

Underweight is defined as the person whose body mass index is less than 18.5 kg/m^2 (2). It is considered as a health problem, associated with several medical risk factors such as hyperthyroidism (16), diet deficiency, and illness. Underweight is also associated with genetics (1, 24), metabolism, poor physical stamina, and a weak immune system. It can be treated using weight training which enhances weight gain (15), muscle tone, and bone mineral density (6). The combination of weight training as well as Jump training induces muscle hypertrophy and leads to weight gain for underweight subjects. Increasing calorie intake can also be one of the means for the treatment of underweight individuals. It has been noticed that Researchers and physical educators have ignored the underweight individuals which can be clearly observed in the literature.

Jumping is a fast and powerful movement which ultimately promotes the improvement of performance in sport via the physiological adaptation that occurs in the central nervous system. The improvement of strength, power (14) and running economy (26) are the advantages of jump training. When combined with sprint training it improves the muscular strength, enhance total strength, and power production. However, muscle and joint injuries such as Vertebra, Osteoarticular (7), muscle Soreness, muscle damage, and injury of a musculoskeletal nature (9) may occur with jump training. Various studies have focused on the effect of combined weight training and Plyometric training on speed (4, 8, 22), power (17, 18), strength (11), agility, and flexibility (27) of male subjects. One study has investigated the influence of 10 weeks of combined Plyometric-sprint and weight training with the Meridian elite athletic shoe for speed and power in women (20). Other research has examined the impact of 6 weeks of combined sprint and jump training on speed for youth male soccer players (13). Results of some of these studies have been shown that there is a significant difference between groups at a sprint time (18), power (18), strength (19), agility (27) and flexibility (27). Others have found out that these parameters had shown similar results between groups (4, 17, 8, 22). However, some of these studies have reported a positive training effect when pre-test was compared with post-test (27, 8, 22, 19). Conflicting results may attribute to the fact that the previous studies have reported different exercise drills, modes of testing, data analyses, and types of subjects. To our knowledge, there is no single study investigating the efficacy of combined jump-sprint training for speed, power, muscular endurance, and flexibility for orientation normal weight and underweight male students. Therefore, the purpose of this study was to compare the effect of six weeks of jump-sprint training on selected fitness parameters in underweight and normal weight male orientation students.

METHOD

Design

This study adopted a pre-test, post-test design involving two groups of subjects.

Subjects

Forty male students between the ages of 18 to 19 years from KFUPM undergoing the orientation courses were selected as subjects for this study. The anthropometric measurements of height, body mass

and body fat were taken. Based on the height and body mass measurements the BMI was calculated for the subjects. Only the underweight (less than 18.5 kg /m^2) and normal weight (18.5-24.9 kg/m^2) subjects were allowed to participate in this study. The subjects were divided into 2 experimental groups called underweight training (UW; n=20) group and normal weight training (NW; n=20) group based on their BMI. The subjects were specifically instructed not to participate in any other type of jump and sprint training and were not permitted to use weight training during the study. The subjects in both experimental groups were instructed to perform the exercise in each training session with maximum effort (i.e. Maximal intensity). Each jump was to be performed to reach a maximal height with minimal ground contact time. The normal weight subjects were instructed to maintain their normal dietary practices and the underweight subjects were asked to increase their dietary intake throughout the study. The objectives of this study were explained and the subjects were informed to withdraw their consent in case of discomfort during the period of participation in the study.

ANTHROPOMETRICS & BODY COMPOSITION

To assess the influence of combined jump and sprint training, the following anthropometric and body composition parameters of age, height, body mass, body mass index, body fat %, and fat free mass were measured before and after the training period. Body mass was measured to the nearest 0.1kg using (Seca Medical Balance-Germany) when the subject wearing a sport dress (Trousers and T shirts). Height was measured using a studio-meter to the nearest 1.0 cm. Body mass index was calculated by dividing weight in kg by height in meters squared. Body fat was measured by skin-fold taken with a Harpenden Skinfold calliper at four sites (biceps, triceps, abdomen, and sub scapular (23). Fat free mass was calculated by multiplying the body fat percentage of the body mass value than subtracting the resulting value of the body mass.

TESTING

The test measures were as follows: 40-m sprint (max speed), Standing long jump (power), Sit ups (muscular endurance; 30-Sec) and Sit and reach (flexibility).

PREPERATION

Warming up was performed in 5 to 10 minutes prior to each test of dependent variable and training sessions, including jogging and stretching exercises. Cool down was administrated (stretching for 5 minutes) at the end of each training day.

40-M SPRINT (MAXIMUM SPEED)

Subjects were asked to run with full speed from the starting line to the finish line in their lanes. To increase the competition and motivation between participants, pair of students was clubbed in each running trail. The test was performed on a track and the subjects were asked to stand immediately behind the starting line, and as soon as they were able to hear the sound of the whistle, they were asked to run with full speed. Two trials were given and the best time was recorded by a digital sport stop watch (Casio HS70W, China). A rest period of 5 minutes was allowed between trails.

STANDING LONG JUMP (EXPLOSIVE POWER)

Subjects were asked to stand immediately behind the take- off line, with feet apart and the knees bent. The subjects were asked to jump as far as possible with the swing of the arms. The jumped distance was measured by a tape meter from the take-off line to the part of the body that touched the floor nearest to the take-off line. The scorer was asked to stand at the side to observe the mark. Two trails were given for each subject and the best was recorded in centimeters. A two minute rest period was given between trails.

SIT UPS (MUSCULAR ENDURANCE)

The subject was asked to lie down on a mat on their backs with knees bent less than 90 degrees and touch each other, feet put together and heels not more than 30 centimeters from buttocks. Hands

crossed and kept on the chest, and head on the mat. The feet were held by the partners to keep them in touch with the floor. On the signal of the timer, the subject was asked to lift his body up from the floor with head up which counted one sit up. Return to the start point with the back on the floor before the next set up was compulsory. Sit up stopped at the signal of the timer. The number of the correct execute sit ups performed in 30 seconds duration were scored. Two trials were given to each subject and the best one was recorded. A rest period of two minutes was allowed between trails.

SIT & REACH (Flexibility)

The subjects were asked to remove the shoes and sit on the floor facing the flexibility box with knees fully extended and feet kept flat against the box and about four inches apart. The subjects were asked to reach as far as possible with palms down and one hand placed on top of the other. They were asked to hold this position for a maximum of 1 to 2 seconds, keeping the knees locked at all the time. Two trails were given to each subject and the most distant point reached with the fingertips of both hands was recorded. A rest period of two minutes was given between trails.

TRAINING PROGRAM

The training program consisted of combined jump and sprint training. The training protocol was for 40 minutes per training session twice a week, for 6 weeks. The subjects of the 2 groups were instructed about the proper execution of all the exercises used during the training period of the training regimen. The training protocols included leg and arm exercises. An adaptation phase was allowed to familiarize all subjects with jump-sprint training drills.

JUMP & SPRINT TRAINING

The training program consisted of sprinting distances of 20, 30, and 40-m and jumping drills of single leg hop, double leg hop, and frog jump. On each training session, the subject was asked to perform 5 frog jump followed by 20m sprint x 3 (sets), 5 double leg hop followed by 40m sprint x 3 (sets), and 5 single leg hop followed by 30m sprint x 3 (sets) in the first week and increased to (10 x 3) in the fifth week. In the last week of the study the training load and volume were reduced for the purpose of decreasing the muscle stress before the post measurement tests (4 x 2). A 2 to 3 minute rest period between sets and 1 min between each training unit (distance and jump) were allowed. The subjects were asked to concentrate on the technique and the maximum speed of jumping and sprinting.

STATISTICAL ANALYSIS

Mean and standard deviation were calculated for all dependent variables. Independent t-tests were used to determine any significant differences between the underweight and normal weight experimental groups before training measures and when the post - test was subtracted from pre- test (mean difference) after training. Paired t-tests were used to asses any significant differences within groups before and after training. The level of significance was set at P □ 0.05. All the data were analyzed using SPSS (version 16).

RESULTS

Physical Characteristic Measures

Table 1 illustrated that normal weight group showed significant differences at baseline in BM (58.53 ± 7.98 vs. 50.99 ± 4.34 kg, P =. 001), BMI (20.55 ± 2.08 vs. 17.08 ± 0.93 kg/m^2, P =.000), BF% (12.71 ± 3.33 vs. 9.87 ± 2.43 %, P =. 004) and FFM (50.92 ± 5.71 vs. 45.96 ± 3.98 kg, P =. 003) with respect to underweight group. However, both experimental groups showed no change (P □. 05) in all physical character variables when post training measures were subtracted from pre training measures using independent t-test.

Table 1. Physical characteristic means (± SD) of normal weight and underweight Experimental groups measured at pre and post training.

Variables	Tests	Underweight Group (n=20) Mean ± SD	Normal Weight Group (n=20) Mean ± SD	P-Values Sig. (2-tailed)
Age (y)	Pre	18.05 ± 0.22	18.05 ± 0.22	P ?. 05
Height (cm)	Pre	1.71 ± 0.05	1.690 ± 0.06	P =. 152
BM (kg)	Pre	50.99 ± 4.34	58.53 ± 7.98	P =. 001*
	Post	53.16 ± 4.15	61.26 ± 7.45	P =. 015*
	Post-Pre	2.16 ± 1.64	2.73 ± 1.91	P =. 324
BMI (kg/m^2)	Pre	17.08 ± 0.93	20.55 ± 2.08	P =. 000*
	Post	17.91 ± 1.04	21.53 ± 1.91	P =. 000*
	Post-Pre	0.83 ± 0.87	0.98 ± 0.68	P =. 560
BF (%)	Pre	9.87 ± 2.43	12.71 ± 3.33	P =. 004*
	Post	10.22 ± 2.53	12.67 ± 3.49	P =. 015*
	Post-Pre	0.35 ± 1.31	-0.04 ± 1.35	P =. 357
FFM (kg)	Pre	45.96 ± 3.98	50.92 ± 5.71	P =. 003*
	Post	47.66 ± 3.62	53.35 ± 5.33	P =. 000*
	Post-Pre	1.70 ± 1.16	2.43 ± 1.27	P =. 065

BM: body mass, BMI: body mass index, BF: body fat, FFM: fat free mass, Pre: before training measure, Post: after training measure, Post-Pre: mean differences, SD: standard deviation, p-Values: Probability of significance, *: significant.

40-M SPRINT

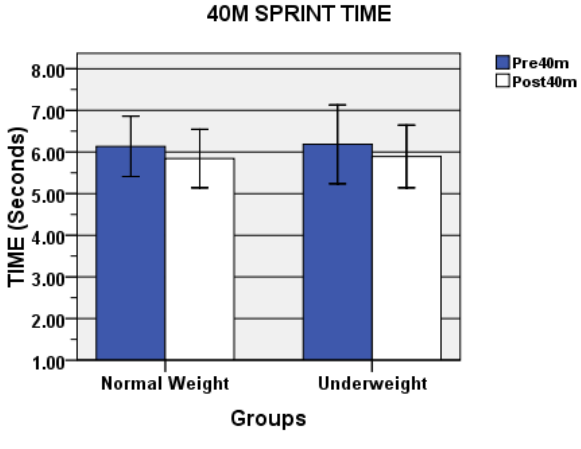

Figure 1. 40m sprint time means (± SD) measured at pre and post training for two experimental groups.

It can be seen from Figure 1 that both training groups showed similar (P ?. 05) improvement when the post- test value were subtracted from the pre- test. However, paired t-test showed that normal weight group improved significantly by 4.7% (5.84 ±. 35 to 6.13 ±. 36 Sec, P =. 002) and underweight group by 4.6% (5.89 ±. 37 to 6.18 ±. 47 Sec, P ?. 001) when the post - test measure was compared with the pre - test measure.

STANDING LONG JUMP

Figure 2 indicated that the normal weight group means value increased significantly greater than under-weight group (10.90 ± 7.09 vs. 6.90 ± 4.30 cm, P =. 037, respectively) when the post- test mean value was subtracted from pre-test. When a pre-test mean value was compared with post- test, significant increases were observed in normal group by 5.9% (192.05 ± 28.06 to 203.53 ± 24.85 cm, P =. 000) and underweight group by 3.6% (188.10 ± 22.53 to 195 ± 21.06 cm, P ?. 001).

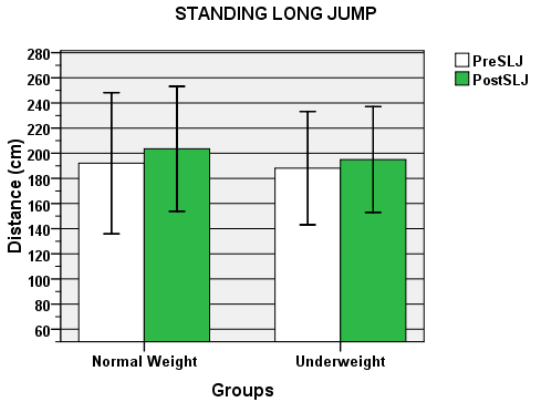

Figure 2. Standing long jump means (± SD) measured at pre and post-training in two experimental groups.

SIT UPS

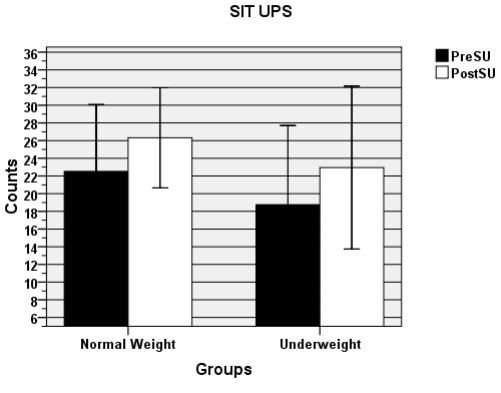

Figure 3: Sit Ups means (± SD) measured at pre and post-training in two experimental groups.

Figure 3 showed that there was no significant difference between normal weight and underweight groups when post-test mean value was subtracted from pre-test (3.60 ± 2.39 vs. 4.20 ± 2.16 counts; P =. 411, respectively). However, an increment of 16.8% was observed in the normal weight group, when the post - test was compared with pre-test (22.53 ± 3.77 to 26.32 ± 2.82 counts; P ?. 001) and by 22.4% in the underweight group (18.75 ± 4.48 to 22.95 ± 4.60 counts; P ?. 001).

SIT & REACH

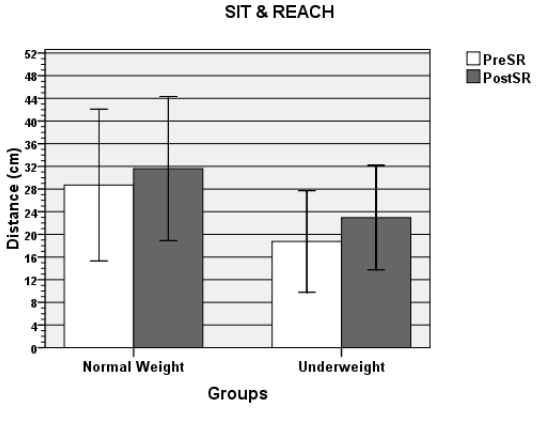

Figure 4. Sit and reach means (± SD) measured at pre and post-training in two experimental groups.

It is observed in Figure 4 that after 6 weeks of training, there was a significant greater mean value in the underweight group with respect to normal weight group (4.20 ± 2.16 vs. 2.90 ± 1.68 cm; P =. 041, respectively) when the post - test was subtracted from pre-test. When the post - test was compared with pre-test, a significant increase was shown in the underweight group by 22.4% (18.75 ± 4.48 to 22.95 ± 4.60 cm; P ?. 001) and by 10.1% (28.70 ± 6.69 to 31.60 ± 6.36 cm; P ?. 001) in the normal weight group.

DISCUSION

The results of the current study confirmed that there were significant differences between groups in standing long jump and sit and reach, but no change was noticed in 40-m sprint time and sit ups after 6 weeks of combined jump and sprint training. The underweight group showed a greater improvement in flexibility with respect to their counterpart. This outcome may be due to the fact that underweight subjects had lower body fat percent and fat free mass in comparison with the normal weight group. The normal weight group obtained remarkably greater performance in standing long jump than the underweight group. This can be attributed to the fact that the normal weight subjects had maintained the same body fat percentage and gained more muscle mass after training which enhanced the ability of the muscles and the central nervous system resulting in the improvement of power performance. The findings between groups on 40-m sprint time were in agreement with the result of (Ronnestsd, et al. 2008, Ratamess, et al. 2007, Taheri, et al. 2014, and Rimmer and Sleivert, 2000). Panackal, et al. (2012) emphasized significant differences between training groups and the control group after training.

The results of within groups in 40-m sprint time showed significant improvements in both training groups (Taheri, et al. 2014, Rimmer and Sleivert, 2000, Ronnestad, et al. 2008); the normal weight group significantly improved by 4.7% and the underweight group by 4.6%. These results were comparable with the findings of some previous studies which indicated improvement of 1%, 7-9%, 1.7% and 8.8% respectively (Ronnestad et al. 2008, Ratamess et al. 2007, Rimmer & Sleivert, 2000, Chelly et al. 2010). The increased neuromuscular solidity of the plantor flexor muscles is a great contributor of the efficacy of sprint training (Kreamer, et al. 2000). The elasticity of the plantor flexor muscles has great influence on the attainment of maximum speed of 40-m sprint distance (Ratamess, et al. 2007). The power output of the hip flexor muscles are the most important parts of the body, contributing in the maximum speed phase (Kreamer, et al. 2000). The possible mechanisms of the improvement in sprint performance can be interpreted via the neuromuscular changes that include temporal sequencing of muscle activation, preferential recruitment of the fastest motor units, increased nerve conduction velocity, frequency or degree of muscle innervations, and increased ability to maintain muscle recruitment and rapid firing throughout the sprint (Chelly et al. 2010). Previous studies stated that neuromuscular adaptations, occurs after plyometric training, contributed to the observed gains in sprint performance.

The results of standing long jump were identical with the outcomes of the study of Markovic et al. (2007) who suggested an increment of 2.8% after training. Ratamess et al. (2007) indicated that the greater contributions of the plantor flexor muscles of the hip, knee, and ankle were 46, 4, and 50%, respectively during the propulsive phase of the standing long jump. Power production (Chelly et al. 2010) was boosted by coordination (De Villarreal et al. 2009) and neuromuscular adaptations (Kreamer, et al. 2000) that were induced by plyometric training. Panackal, et al. (2012) have supported that standing long jump increased significantly by10 (ST), 13 (PT), and 14% (CT) within the group. In contrast, Ratamess, et al. (2007) provided no change between groups, but there were significant increases by 7 and 9% within the groups.

CONCLUSION

It was concluded that 6 weeks of combined jump and sprint training induced remarkable effectiveness on explosive power and flexibility, but no change in speed and muscular strength among underweight and normal weight groups of orientation male students. It was also observed that both training groups improved significantly when pre-tests were compared with post-tests in all selected fitness variables.

ACKNOWLEDGEMENT

The Authors thank the authorities of King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia, and the subjects for the help in completion of this study.

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ANAEROBIC POWER IN SHORT-TRACK SKATERS – A PILOT STUDY

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Key words: *Wingate test, anaerobic power, short-track*

INTODUCTION

Short-track speed skating is a type of ice speed skating competitions, in which several skaters compete on an oval ice track with a circumference of 111.12 m. Short-track was introduced in the Olympic Games in Albertville in 1992 [10]. The sport is very popular in China and South Korea, which dominate international competitions [8]. Bulgaria also has many great successes in this discipline achieved by E. Radanova, who gained three Olympic medals. There are promising young skaters such as K. Manoilova, who won three titles in the Junior Europa Cup Final held in Sofia in 2014.

Data on physiological characteristics of short-track skaters are very scarce. Accepted methodology for functional assessment of the effects of training on the physical qualities of athletes is lacking, which hinders the control and optimization of the training process.

Essential characteristic of short-track is the high speed achieved by athletes during competitions. Ability to develop and maintain high speed is an important feature of many sports, including long track speed skating and ice hockey [4, 11]. Sprinting performance over various distances depends on the development of muscle power and strength [12].

The Wingate anaerobic test is a standard method for assessment of anaerobic capabilities and muscle power of the lower extremities in athletes from different sports [1, 2, 3, 7].

In the available literature data on the anaerobic capabilities of short-track skaters are scarce. Muscle power and muscle endurance of Bulgarian short-track skaters were not investigated systematically.

The hypothesis of the study is that the results of the Wingate test in Bulgarian short-track skaters are similar to those, demonstrated by athletes from other sports. The aim of the study was to assess the anaerobic power of Bulgarian short-track speed skaters by Wingate anaerobic test.

METHODS

In the study participated two male (age 16; height, 174 cm; body mass, 63 kg and age 30 years; height, 177 cm; body mass, 75 kg) and five female short-track skaters (age between 15 and 21 years; height, 163.4±5.4 cm; body mass, 55.6±4.4 kg).

Anaerobic power was assessed by a standard anaerobic Wingate test (WANT) [7]. The test requires pedalling a mechanically braked Monark cycle ergometer (Monark Ergomedic 894E, Monark Exercise AB, Vansbro, Sweden) with maximal effort for 30 s. The subjects warmed up for 5 minutes at a pedaling rate of 60–70 rpm [3, 6]. The warm-up was followed with a run-up practice of 5 seconds during which the actual test load was imposed to accustom the participants to the full resistance. After a rest of six minutes, subjects performed the WANT against a resistance of 11% of body mass for male athletes and 9% of body mass for female athletes. In two male and two female skaters the test was conducted twice at an interval of one month. The first test (WANT1) was performed at the end of preparatory period, the second test (WANT2) – at the beginning of the competition period. The parameters of anaerobic power obtained by the test included: peak power (Watts) - PP, relative peak power (Watts/kg) - RPP, mean power (Watts) - MP, relative mean power (Watts/kg) - RMP, minimal power (Watts) - MinP, relative minimal power (Watts/kg) - RMinP and fatigue index – FI [3, 7].

Descriptive statistics are used to summarize and describe the data in the study.

RESULTS

The basic anthropometric measurements and individual results of all subjects from the first test are shown in Table 1.

Table 1. Individual data on height, weight and Wingate test results (WANT1); m – male, f - female

Subject №	1	2	3	4	5	6	7
Gender	m	m	f	f	f	f	f
Height [cm]	174	177	171	158	167	161	160
Weight [kg]	63	75	62	52	57	56	51
PP	876.64	1231.66	735.47	646.59	722.49	611.31	631.81
RPP	13.91	16.42	11.86	12.43	12.68	10.92	12.39
MP	634.41	855.38	531.82	503.26	526.63	475.53	470.1
RMP	10.07	11.41	8.58	9.68	9.24	8.49	9.22
MinP	425.26	530.23	291.39	284.7	365.84	280.22	326.11
RMinP	6.75	7.07	4.7	5.48	6.42	5	6.39
FI	51.49	56.95	60.38	55.97	49.36	54.16	48.38

Table 2 presents the results of descriptive statistics of five female skaters from the Wingate test.

Table 2. Summary statistics of data form the Wingate test (WANT1) in female skaters.

	PP	RPP	MP	RMP	MinP	RMinP	FI
Min	611.31	10.92	470.10	8.49	280.22	4.70	48.38
Max	735.47	12.68	531.82	9.68	365.84	6.42	60.38
Mean	669.53	12.06	501.47	9.04	309.65	5.60	53.65
Std. error	24.99	0.31	12.68	0.22	16.20	0.35	2.20
Variance	3122.86	0.49	803.58	0.25	1312.58	0.62	24.28
Stand. dev	55.88	0.70	28.35	0.50	36.23	0.79	4.93
Median	646.59	12.39	503.26	9.22	291.39	5.48	54.16
25 prcntil	621.56	11.39	472.82	8.54	282.46	4.85	48.87
75 prcntil	728.98	12.56	529.23	9.46	345.98	6.41	58.18
Skewness	0.41	-1.38	-0.08	0.02	1.18	0.10	0.32
Kurtosis	-2.80	1.54	-2.83	-1.82	0.19	-2.71	-1.23
Geom. mean	667.69	12.04	500.83	9.03	308.04	5.55	53.47
Coeff. var	8.35	5.82	5.65	5.52	11.70	14.07	9.18

Table 3 and table 4 present the changes in anaerobic parameters form WANT1 to WANT2 in the two male athletes, who performed the test twice.

Table 3. Data from WANT1 and WANT2 in one of the male skaters (№1); gain – the changes from WANT1 to WANT2; % change - the gain expressed as a percentage; minus sign indicates a decrease in the result

Male skater №1	WANT 1	WANT 2	gain	% change
PP	876.64	899.97	23.33	2.7
RPP	13.91	13.85	-0.06	-0.4
MP	634.41	677.73	43.32	6.8
RMP	10.07	10.43	0.36	3.6
MinP	425.26	466.48	41.22	9.7
RMinP	6.75	7.177	0.427	6.3
FI	51.49	48.17	-3.32	-6.4

Table 4. Data from WANT1 and WANT2 in the other male skater (№2); gain – the changes from WANT1 to WANT2; % change - the gain expressed as a percentage; minus sign indicates a decrease in the result

Male skater №2	WANT 1	WANT 2	gain	% change
PP	1231.66	1046.19	-185.47	-15.06
RPP	16.42	13.77	-2.65	-16.14
MP	855.38	797.25	-58.13	-6.80
RMP	11.41	10.49	-0.92	-8.06
MinP	530.23	496.54	-33.69	-6.35
RMinP	7.07	6.53	-0.54	-7.60
FI	56.95	52.54	-4.41	-7.74

Table 5 and table 6 present the changes in anaerobic parameters form WANT1 to WANT2 in the two female athletes, who performed the test twice.

Table 5. Data from WANT1 and WANT2 in one of the female skaters (№1); gain – the changes from WANT1 to WANT2; % change - the gain expressed as a percentage; minus sign indicates a decrease in the result

Female skater №1	WANT 1	WANT 2	gain	% change
PP	611.31	675.54	64.23	10.5
RPP	10.92	11.85	0.93	8.5
MP	475.53	486.21	10.68	2.2
RMP	8.49	8.53	0.04	0.5
MinP	280.22	274.9	-5.32	-1.9
RMinP	5.004	4.823	-0.18	-3.6
FI	54.16	59.31	5.15	9.5

Table 6. Data from WANT1 and WANT2 in the other female skater (№2); gain – the changes from WANT1 to WANT2; % change - the gain expressed as a percentage; minus sign indicates a decrease in the result

Female skater №2	WANT 1	WANT 2	gain	% change
PP	735.47	731.78	-3.69	-0.5
RPP	11.86	11.62	-0.24	-2.0
MP	531.82	558.13	26.31	4.9
RMP	8.58	8.86	0.28	3.3
MinP	291.39	379.32	87.93	30.2
RMinP	4.7	6.021	1.32	28.1
FI	60.38	48.16	-12.22	-20.2

DISCUSSION AND CONCLUSIONS

The lack of descriptive data in the literature regarding anaerobic capabilities of short-track skaters permits comparisons only with available data from studies involving long-track speed skaters or athletes from other sports.

Relative peak anaerobic power (RPP) in one of the male athlete is 13.91 W/kg (Table 1) and is lower than in the elite Canadian speed skaters (16.6 ± 0.9 W/ kg). In the other skater the value of RPP - 16.42 W / kg (Table 1) is almost identical to the result of Canadian athletes [5].

In the female skaters RPP is 12.06 ± 0.70 W/kg (Table 2). This value is very close to the data for elite Canadian speed skaters (12.3 ± 0.5 W / kg) [5].

The relative mean anaerobic power (RMP) in both men is 10.07 and 11.41 W/kg, (Table 1) respectively

and is lower than in the elite Canadian athletes speed skaters, (12.7 ± 0.5 W/kg) [5]. Compared with the Bulgarian elite volleyball players [3] the male skater №1 has lower values of PP, MP and MinP, but RPP and RMP are greater. In athlete №2 PP, RPP, MP, RMP and MinP are greater than in the volleyball players. It must be noted that in the volleyball players the load of the test was 7.5% of body mass, e.g. lower than in the current study [3].

In the female skaters RMP is 9.04±0.5 W/kg (Table 2). This value is comparable to the average result of elite Canadian players (9.7 ± 0.2 W/kg) [5].

Retesting after one month showed improvement in most anaerobic parameters with one of the men (№1) (between 2.7% and 9.7%) (Table 3), while in the other (№2) was found deterioration in results (between 6.4% and 16.1%) (Table 4). In one female skater (№1) retesting showed improvement in peak and mean anaerobic power, but also increase in the index of fatigue (Table 5), combined with a reduction in MinP and RMinP. In the female athlete №2 an increase in the MP and a significant reduction of FI (20.2%), was found, combined with an increase in MinP and RMinP (Table 6).

In comparison with traditional 400 m track skating, short-track skating requires significantly more technical and tactical skills [9]. The differences between these two sports may explain the differences in the results.

In conclusion, the results of this pilot study show that the Wingate anaerobic test allows to identify individual differences between the parameters of the anaerobic power of short-track skaters formed during the training process. In the athletes who showed deterioration analysis of the causes leading to the observed changes and correction of training to develop muscular power of the lower extremities can be recommended. In view of the lack of data on anaerobic capabilities of short-track skaters the periodic use of Wingate anaerobic test is advisable. The data from this test are useful for assessing the effect of training on muscle function of short-track speed skaters and for detailing of the training loads.

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ANALYSIS OF THE INTERNATIONAL TABLE TENNIS FESTIVAL ALBENA, 2013 AND 2014

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INTRODUCTION

Table tennis is one of the most popular sports all over the world. People`s interest is due to the fact that game is easy, the rules are understandable, dynamic and unrepeatable situations and the characteristic emotion that caries itself. There are conditions for creativity and development of thinking; you experience sports and technical capabilities in difficult and dynamic situation.

In the newly opened "Albena" sports hall in 1999 the first table tournament is held. In the days of the tournament there are: open team tournament, best of five system, open doubles and individual tournament. Because of the short time for organization and advertising the players are mainly from Bulgaria. From the next year the tournament becomes international with participants from Belarus, Russia, Romania and other. The perfect playing conditions and the accommodations give the possibility to combine a sea vacation and to practice your favorite sport, attract more and more participants in the following years.

Purpose and goals:

The purpose of our study is to analyze and compare the indicators (*Table 2*) from the tournaments held in Albena for the period 2013 and 2014.

To complete our goals we have set the following major tasks*:*

1. To analyze the data from the tournaments held in Albena during the period 2013 and 2014;
2. Presentation of the data in graphic form;
3. Display and conclusion and recommendations of the survey.

Contingent of the study:

Contingent of the applied research are men, women, junior boys, junior girls, cadets and cadet girls, boys and girls and veterans-men and women.

Methods of the study: The complexity and the social nature of the tournament required for the study to implement complex of scientific **methods** and **methodologies**.

Teaching methods and methodologies / monitoring, training programs and sport activities with table tennis (including tests to assess the results of the study).

Mathematical and statistical methods for data processing -

The results of the survey are mathematically and statistically processed with the program SPSS 19.0. Depending on the specific tasks of the study are implemented the following mathematical and statistical methods:

Graphic analysis - The graphs contain important indicators and through them it is easy to get a visualization for a certain period of time.

Software program (for organizing and planning of tournaments) –*Table tennis tournament planner* - program for organizing of sports events.

At *table 1* we have shown 5 main indicators, connected to our study.

Table 1

№ indicator	*Name of indicator*	*2013.*	*2014.*
1.	Countries	10	14
2.	Entries	723	873
3.	Matches played	1346	1616
4.	Sets played	4545	4997
5.	Points played	76348	84573

Analysis of the results:

The analysis of the results of the study is made in several directions, in connection with the goals of the study.

Figure.1. Pre-submitted entries for the International table tennis festival – Albena 2013 and 2014.

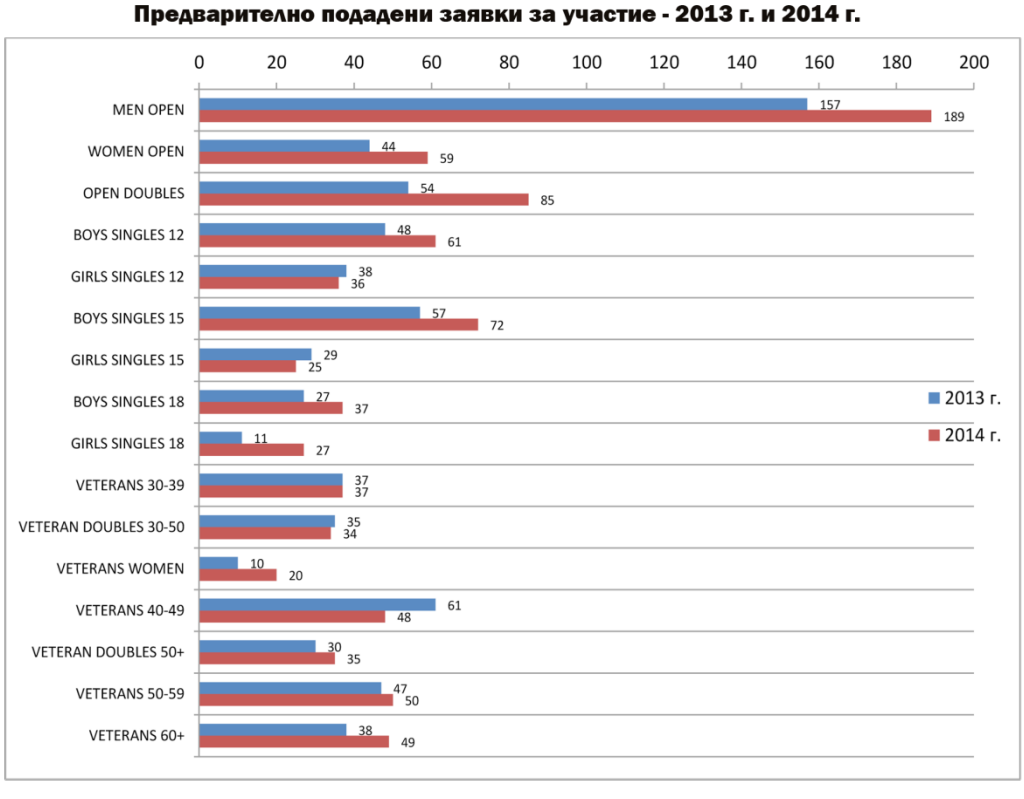

Figure.1. Pre-submitted entries for the International table tennis festival – Albena 2013 and 2014.

Graphic display of the data of the International table tennis tournament in Albena for the period of 2013 and 2014.

Based on the processed data we can make the following conclusions and recommendations:

With the courtesy of Roy Norton, England, the International Table Tennis Festival is included in the Calendar of the International Table Tennis Federation and International Veterans Federation. The interest is rising and you have 150 entries more with some new countries as Armenia, Kazakhstan, Germany and USA.

The excellent playing conditions, the perfect organization of training camps and the specially trained organization staff makes the Festival attractive place for hundreds of table tennis fans. The 16th edition

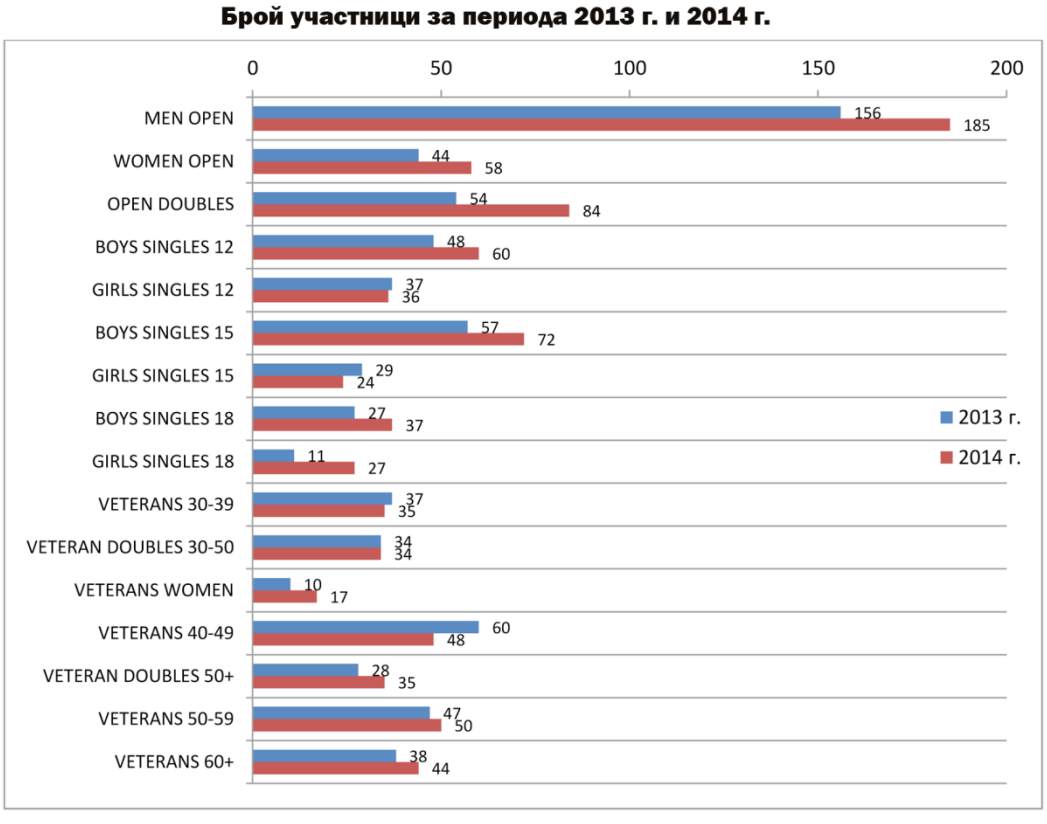

Figure 2. Participants in the International table tennis festival – Albena 2013 and 2014

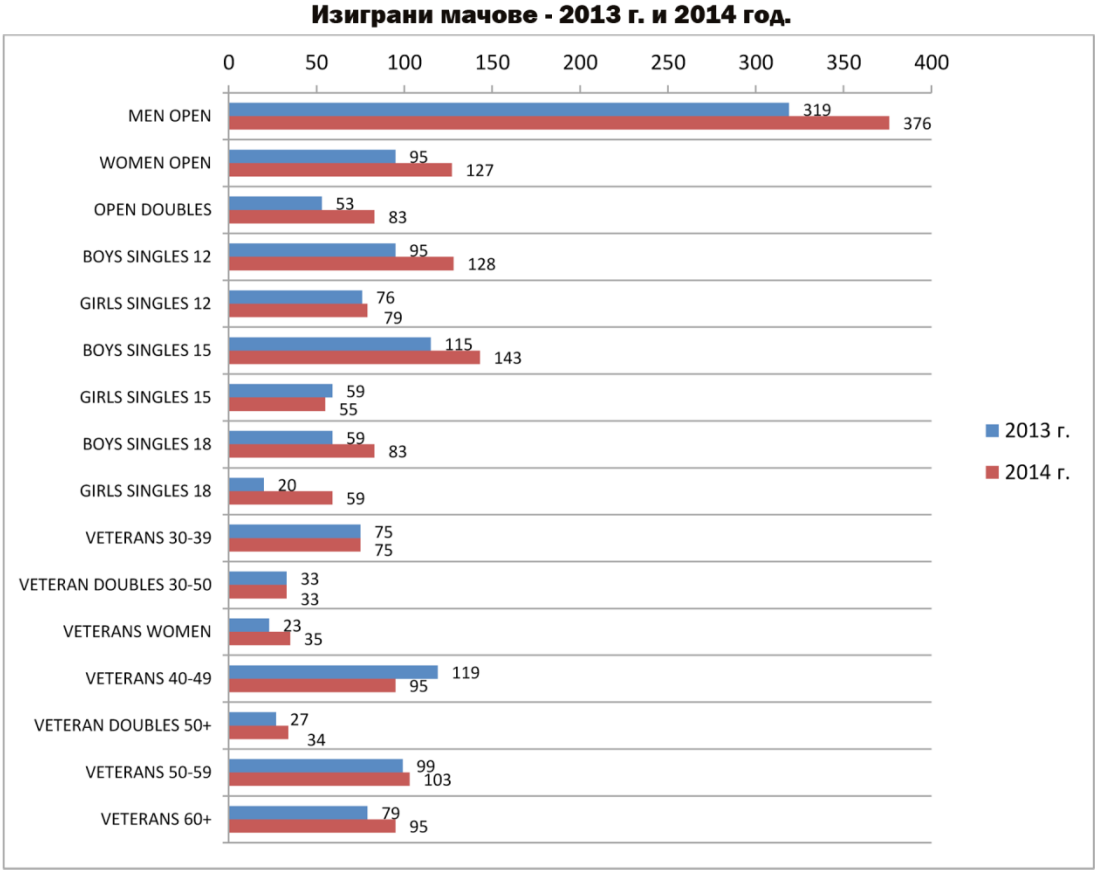

Figure 3. Number of played matches in the International table tennis festival – Albena 2013 and 2014

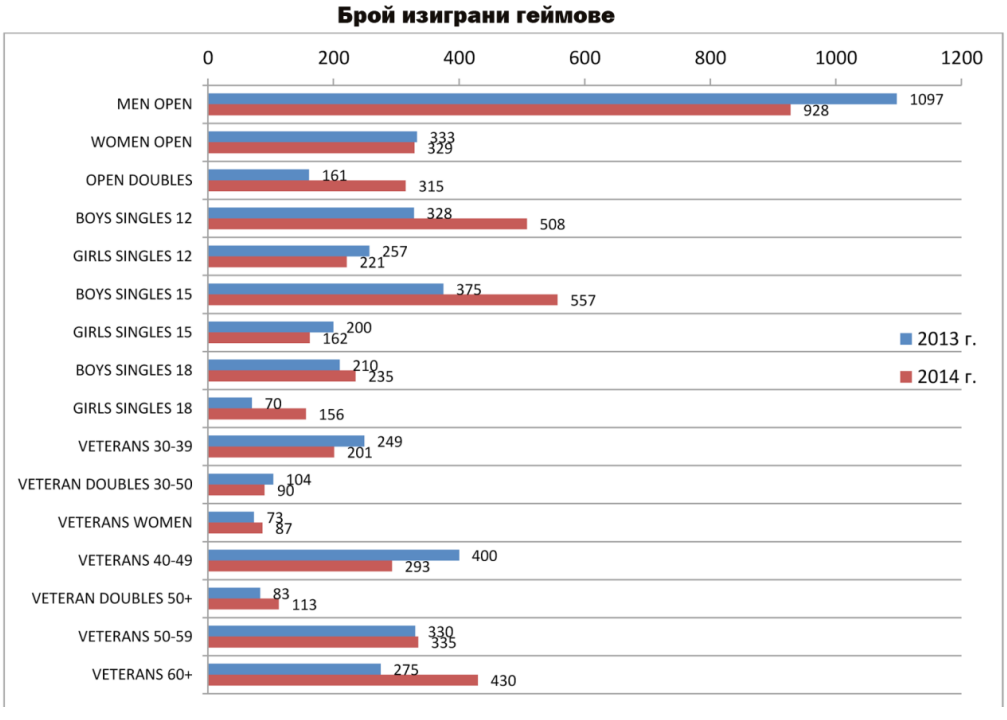

Figure 4. Number of played Sets in the International table tennis festival – Albena 2013 and 2014.

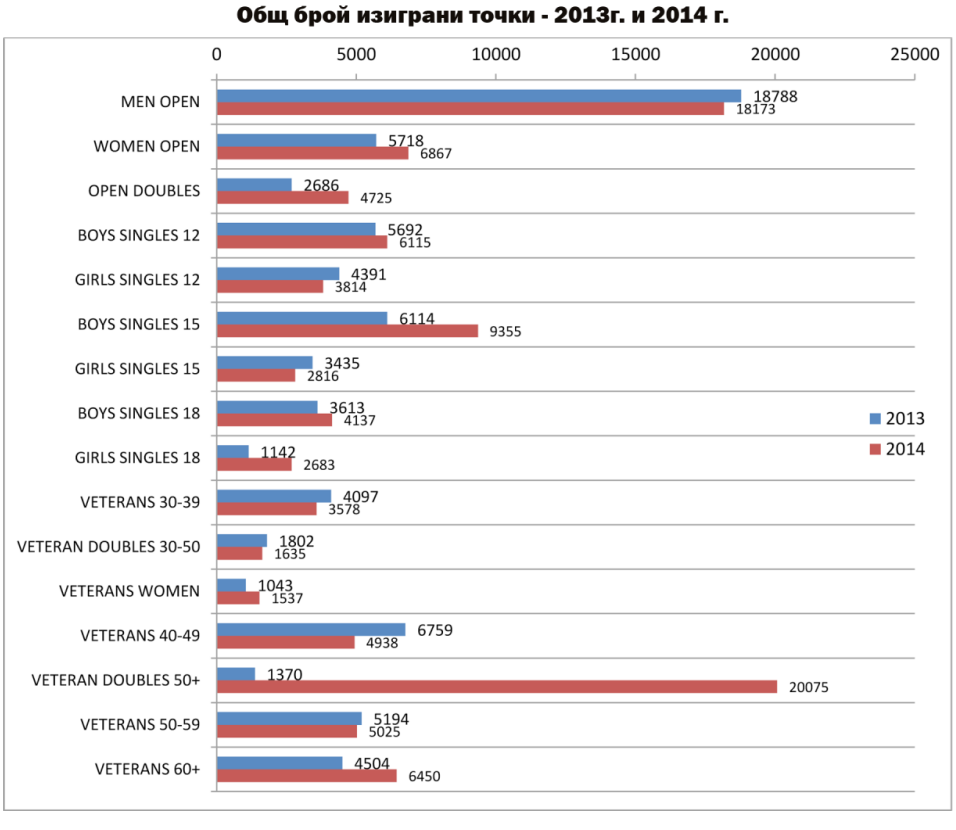

Figure .5. Number of played points the International table tennis festival – Albena 2013 and 2014

of the Festival made a record with 270 matches, 452 sets and 8225 scored points more than last year. During the years the Festival kept the interest and continues to be visited by masters of the small ball, players, and coaches from other countries, which will help for the advertisement of the tournament.

Used literature: http://www.tabletennisalbena.com, www.tournamentsoftware.com,

ANALYSIS OF TRAINING METHODS „MULTIBALL TRAINING" IN THE MODERN TABLE TENNIS

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***Key words**: table tennis, multiball training.*

INTRODUCTION

Modern table tennis is very dynamic sport, straightening athletes with high demands for technical, tactical, physical and mental preparation. The demand for higher efficiency of the training process, by increasing the density of the training sessions, it is achieved by the method "multibol training". Training multiballs can cover up all the aspects of table tennis. It is the best way to learn or correct a stroke because the ball placement, spin and speed can vary creating official match playing situations. The possibilities in training exercises and routines are endless.

Multiball is a method of table tennis training that was first introduced by the Chinese. It works extremely well in situations where the coach is working with just one player, but it can also be used successfully with a 1:2 or 1:3 ratio of coach to players, or in group training sessions (where players are feeding multiball for each other).

Multiball is not only for advanced table tennis players. It can be incorporated into the practice sessions of all ability groups, from absolute beginners to intermediate and advanced players.

"The impact of training tools on the sportsman depends to a large extent on the methods of their application. Depending on the purpose and objectives of training in practical activities using a number of methods that affect different sides of sports training (physical, technical, tactical, psychological). The essence of these methods and their arrangement is also one of the unsolved problems in the theory of sport. "[Dasheva, 2011].

"Multiball training" is interval and variable-interval method of training.

The purpose of present study is to analysis and systematic "Multiball training" method for developing and improving the training process in modern table tennis.

METHODOLOGY

Content analysis. We analyzed the literature defining the theoretical and practical aspects of the „multibol training."

Observation of three international coaching seminar in Bulgaria, International children and youth training camp EuroKids in Bulgaria (Table 1); posted videos in various Internet platforms.

Interview. Conducted interviews with leading European and international trainers in the field of children and youth tennis.

RESULTS

For implementing the "Multiball Training" is necessary to obtain a variety of sports equipment such as:

- Table tennis balls - at least 50-100 balls. Most of the cases are used standard balls for table tennis (40 mm diameter, white and orange). For applying the method can be selected using the balls of the same color or mixed. When submitting balls of different color can complicate conditions for training by defining different way to play the ball towards its color (for example: serial top-spin against backspin ball, the white ball is directed diagonally and the orange - straight). There are also "non-standard" table tennis balls: bigger balls and with a different color than the standard. A typical example is the methodology of the French Table Tennis Federation's training 4-7 year old children. The inclusion of non-standard balls in the "multiball training" is used in the initial train-

Table 1.

№	Type Event	Dates	Place
1.	ITTF-PTT Level 1 Coach Education + Seminar	15-21.08.2011	Chepelare, Bulgaria
2.	Eurokids Training camp	24-29.06.2012	Albena, Bulgaria
3.	ITTF Level 2 Coach Education + ITTF-PTT Level 1 Course Conductor Training	7-14.08.2012	Plovdiv, Bulgaria
4.	ITTF-PTT Level 1 Coach Education + Training camp	7-15.11.2013	Plovdiv, Bulgaria

ing for children, as well as creating custom conditions and diversity in advanced and high sport performance athletes.

- Container for balls – a staff where are placed a minimum of 50-100 balls. It should be comfortable, not too deep for quick picking up the balls by non-playing hand without disturbing the rhythm and speed of submission of balls.
- Stand for balls' container - it brings comfort especially in balls feeding from middle and far distance of the table. The feeding close to the table may also be performed by placing the box on the table.
- Balls collector - for rapidly and conveniently collection of balls.
- Staffs for defining a goal – a hoop, sheet of paper, cones, various figures of animals, etc.
- Return board - new modern technical device that is placed at opposite of players end of the table. It returns hit balls back into the player's side.
- Table tennis rackets – the feeder should have rackets with different rubbers for simulating different playing styles according to the training activity purpose.
- Stopwatch – for measuring the working and recovering intervals.
- Table tennis spin wheel – it's able to be placed outside the table or on the table depending on what strike will be implemented (example: a player is doing forehand push on the spin wheel and forehand topspin against backspin ball of feeder).
- There are other technical tools that can be used for "multiball training" method. It depends on the feeder's creativity.
- For feeding "multiball training" non-playing hand picks up 2-6 balls and then the balls one at a time are hit to the competitor. There are different ways of feeding depending on the feeding racket, feeder technical level, the aims of the training process, and the level of the player:
- Depending on the position for feeding:
  - ✓ Close to the net: when feeding balls for short and long pushes and fast blocks. The feeder must manage to play the ball as a "drop", meaning after it bounces on the table after having released it from a small height from his free hand. This allows him to achieve a certain speed without having to apply too much force with the racket. When the fed push has to be a backspin, feeder needs to accelerate the racket head underneath the ball with the help of his hand and fingers [Molodzoff, 2008].
  - ✓ Average distance from the table: when feeding attack balls and topspins. The feeder, positioned on the level of the bottom line, will not let the ball bounce on the table before playing it, but will play it directly from his racket, at a certain height, in a way that will produce a trajectory that is similar to that in a rally. On the other hand, it is obvious that when a feeder has to mix different types of balsa, the position close to net is better and the prior bounce of the ball on the table is obligatory [Molodzoff, 2008].
  - ✓ Far away from the table: when feeding defense balls and topspins played far from the table. The third difficulty is the feeder's action when he plays the ball. In fact, the speed of the fed ball doesn't have to influence the quality of the fed ball. If the feeder needs twice as long to chop a ball than to feed a ball without spin because he needs to backswing first, the exercise is not

satisfactory in terms of enabling the training player to perceive the information very early, which will not correspond to the perception he will have during a real match [Molodzoff, 2008].

- Depending on in which side of the rocket feeder performs the hits:
  - ✓ forehand strikes;
  - ✓ backhand strikes;
- The most used technical elements for "multiball training" are:
  - ✓ Flip;
  - ✓ Short push/chop;
  - ✓ Long push/chop;
  - ✓ Drive;
  - ✓ Lob.
- Depends on used grip:
  - ✓ Shakehand grip;
  - ✓ Pengrip;
  - ✓ Other (for example: the thumb is on one side of the racket, and the four fingers are spread on the reverse side).
- Depending on the type of tossing the ball by free hand
  - ✓ Tossing below the height of the net;
  - ✓ Tossing the ball at the height of the net;
  - ✓ Tossing the ball above the net;
  - ✓ Dropping and bouncing the ball;
  - ✓ High tossing above the height of the net;
  - ✓ without toss/drop the ball.
- Depending on the contact of the ball with the racket:
  - ✓ "drob" - immediately hitting after the ball bounce on the table;
  - ✓ hitting in the highest point of the trajectory after the bounce on the table;
  - ✓ hitting in downward/upward trajectory after the bounce from the table;
  - ✓ hitting without toss;
  - ✓ hitting after the ball is thrown at an angle other than 90 degrees with of the playing surface.
- Depending on the focus of the training activity:
  - ✓ Technical training - learn and improve strokes and types of movements toward the ball (Fig. 1, 2, 3);
  - ✓ Tactical training - studying, improving individual game style and in pairs (Fig. 4);
  - ✓ Physical training
    - Speed of reaction - feeder directs balls at different place on table with high cadence (65-75 balls per minute) for 10-15 seconds.
    - Speed of a single movement – the athlete plays with a heavy racket, performing a strike. Feeder is trying to direct the ball in the same way with a cadence of 50-60 balls per minute within 10-15 seconds.
    - Speed (frequency) of motion – the athlete plays with its racket or a heavy rocket, fulfilling a precise technical task. Feeder directs balls with high cadence (75-80 beats per minute).
    - Agility - feeder hit balls with different rotation, direction and force with an average temp.
    - Endurance - the athlete plays exercise; the feeder hit the balls with low cadence (55-65 beats per minute) for 45-90 seconds.
  - ✓ Psychological preparation:
    - Modeling of different game situations - delivering different tactical combinations in conventional results (9: 9, 8:10, 10:10, etc.).
    - Increase concentration - feeding balls at different speeds, different rotation. Can be used with different a racket with different rubbers. The player should watch the rotation of the racket ant the ball..

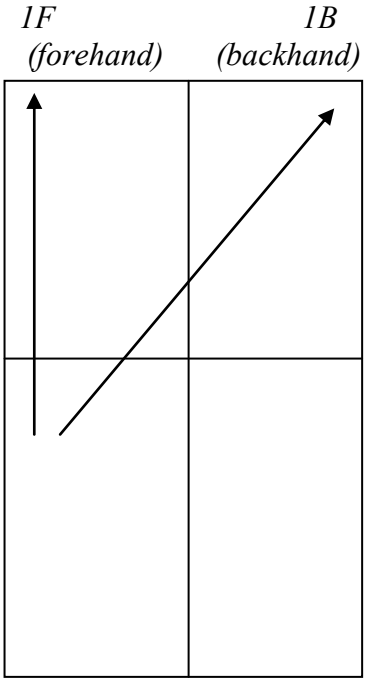

Fig. 1. Exercise for beginners

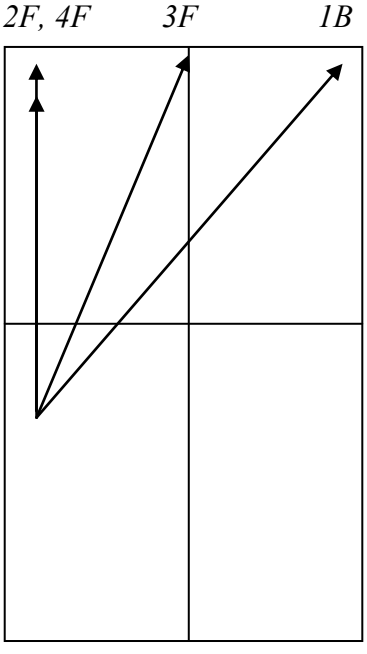

Fig. 2. Side to side footwork

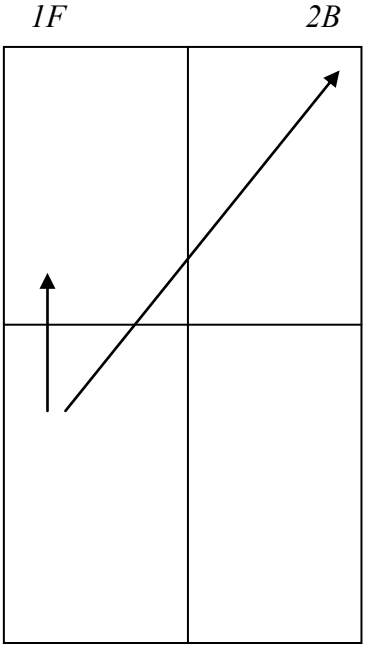

Fig. 3. In/Out Footwork

Left Hand (L), Right Hand (R)

6LF	5LF
4LF	3RF
2RF	1RF

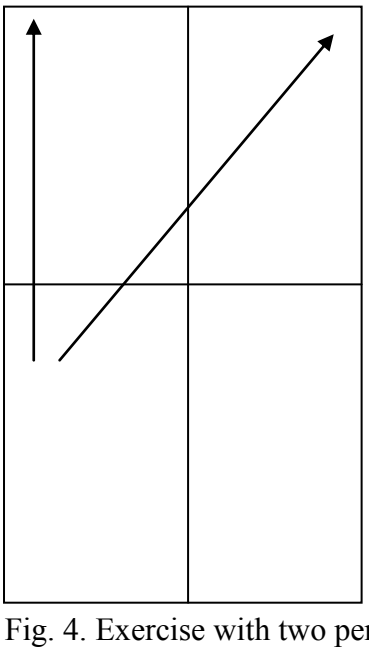

Fig. 4. Exercise with two persons

- Depending on the training process periods “multiball training” method can be applied:
  - ✓ Preparation period;
  - ✓ Competitive period
    - Just before the competition;
    - During competition - often practiced by the Chinese national team;
    - Immediately after the competition.

• Depending on the number of players:
  - ✓ One player;
  - ✓ Two players:
    - playing both, alternately;
    - one plays and the other collects balls;
  - ✓ Three players:
    - playing simultaneously, alternately;
    - two play both, alternately, one collects balls;
    - One play, two collect balls both.
  - ✓ Four players:
    - playing simultaneously, alternately;
    - Two play both, simultaneously, alternately, two collect balls both;
    - One plays; three collecting balls.
    - Three play; one collects balls.

• Method for control. In 2002, Portuguese coaches offer a test battery for measurement and control of the following specific skills of the competitors using the method "multiball training":
  - ✓ Speed of reaction;
  - ✓ Speed of single movement;
  - ✓ Speed (frequency) of movements;
  - ✓ Agility.

DISCUSSION AND CONCLUSIONS:

"Multiball training" is method for training and controls the technical skills of the competitors. The method is able to be applied for each training session, each training period and for each level player.

Feeder can be anyone who has good skills in table tennis. Often, coaches are feeding balls, but in China, mostly athletes. Better technical feeder skills involve better feeding and conducting of training sessions. The effectiveness of the method depends on the creativity of the coach and his knowledge of competitors and the level of the feeder.

We achieve a high density of training sessions using the "multiball training" method.

'Multiball training' method is a coaching tool which is utilised by all leading countries of the world. The uses of multiball are many, including, to developing individual strokes, increasing the quality and intensity of training, working on specific tactical situations; increasing speed, agility, endurance.

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DYNAMIC POSTURAL CONTROL IN PATIENTS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Key words: *postural control, proprioreception, anterior cruciate ligament, functional tests*

INTRODUCTION

One of the reasons for ligament traumas and repeated traumas in the knee is impaired dynamic postural control. Many authors claim that after anterior cruciate ligament (ACL) reconstruction there is a difference in the dynamic postural control between operated and non-operated leg [1-3,6]. Apart of that most of the patients develop a compensatory mechanism for the non-operated leg while loading the lower limbs in order to complete the functional activity and in that way it works harder than the operated one [10,12]. For that reason an excellent regained dynamic postural control is needed for a save and self-confident return to sport activities for a patient after ACL reconstruction, which is best determined by an adequate functional assessment tests at the end of his treatment. The functional test put the patients in ambient close to his daily activities and in that way it is possible to evaluate the general function of the knee as part of the lower kinetic chain, respectfully the dynamic postural control. During the dynamic functional tests the knee undergoes considerable shear mechanical stress, which makes them a very reliable tool for assessing the dynamic knee function. The chosen functional tests should answer to the movements of daily activities and also to be consistent with the abilities of the functional status at the present moment of the tested patient [9].

Researchers have shown that after any muskulo-skeletal trauma a good postural balance, static and dynamic, can be build successfully with proper proprioceptive and functional exercises mainly done in close kinetic chain exercises [5,8,11]. The way a patient should be treated with physiotherapy is still questionable. Some authors [7,11] support the accelerated recovery program, with early involvement of proprioceptive exercises and early weight bearing, while others [7,13] still follow the delay one, where loading the operated leg is allowed after the first month postoperatively and the proprioceptive exercise are included around day 45 postoperatively.

The purpose of the present report is to show the level of dynamic postural control of patients after ACL reconstruction at the 6th month postoperatively.

METHODOLOGY

Forty patients, separated in two groups, control and experimental one have been evaluated. The groups were formed according to the involved therapeutic methods and the beginning of the physiotherapy treatment. The main difference was: the onset and progression of the proprioceptive exercises; those in close kinetic chain; and weight bearing on the operated leg. The patients from the experimental group (EG) followed the accelarated therapeutic program, while the ones from the control group (CG) followed the delayed one.

Several functional assessment tests were done at the 6th postoperative month: straight line walking; dealing stairs; figure-of-8 running; straight line running and single-leg hop for a distance, in order to

evaluate quantitatively and qualitatively the dynamic postural control of the two measured groups and to make a comparison between them.

Quantitatively the patients were assessed trough a scale (1 to 4, 1 – no pain, smoothly performed task as with non-operated leg; 2 – light pain, compensatory movements and limping; 3 – severe pain, considerable limping; 4 – use of assistive devices, or refusing to perform the test) based on the subjective feeling of the patient himself. The time qualitative results were statistically processed with the descriptive and dispersion analysis.

RESULTS AND DISCUSSION

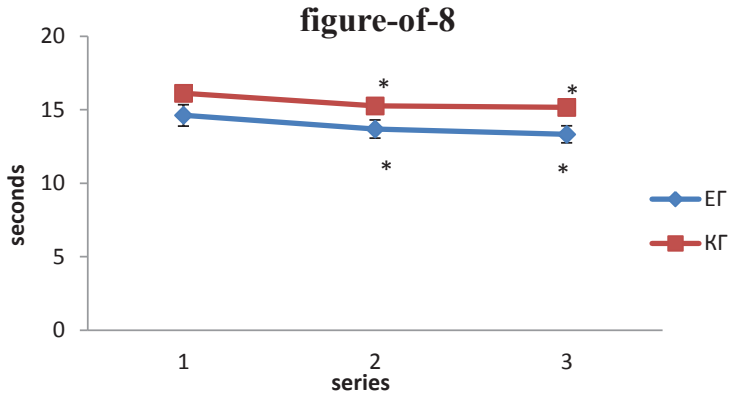
Straight line walking, dealing stairs and straight line running tests at that stage of recovery was an easy task for the patients from both groups, as they performed it correctly and with very similar qualitative results. Only the quantitative value differs slightly: for dealing stairs - there was still 9.5% from the control group, who felt pain and did some compensatory movement while descending or ascending stairs; for running in straight line - only one patient from the EG reported for pain and deficiency, while in the CG 15 patients (71.4%) complained of light pain and uncertainty while loading the operated leg (table 1).

Table 1. Quantitative value of functional tests

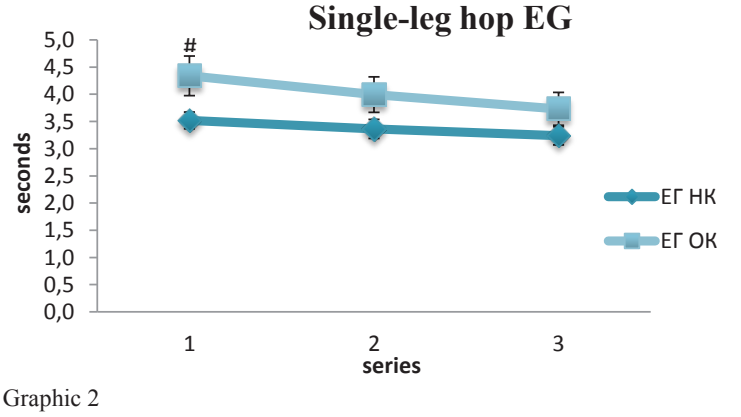
	Patients	Quantit. Value	Walking 6м	Stairs 6м	Running 6м	Figure-of-8 6м	Single-leg hop 6м
EG (n=19)	N	4	0	0	0	0	0
		3	0	0	0	0	0
		2	0	0	1	5	6
		1	19	19	18	14	13
	%	4	0	0	0	0	0
		3	0	0	0	0	0
		2	0	0	5,3	26,3	31,6
		1	100	100	94,7	73,7	68,4
КГ **(n=21)**	**N**	4	0	0	0	0	0
		3	0	0	0	1	1
		2	0	2	15	11	14
		1	21	19	6	9	6
	%	4	0	0	0	0	0
		3	0	0	0	4,7	4,7
		2	0	9,5	71,4	52,4	66,7
		1	100	90,5	28,6	42,9	28,6

In those 3 functional tests, it was expectable that qualitatively the patients from both groups would perform them with equal speed, as these tests do not provoke directly ACL stability function and joint proprioreception, as much as they require sufficient joint range of motion and muscle strength of the lower kinetic chain. But still the quantitative performance was worse for the controls, because of the subjective feeling due to poor proprioreception.

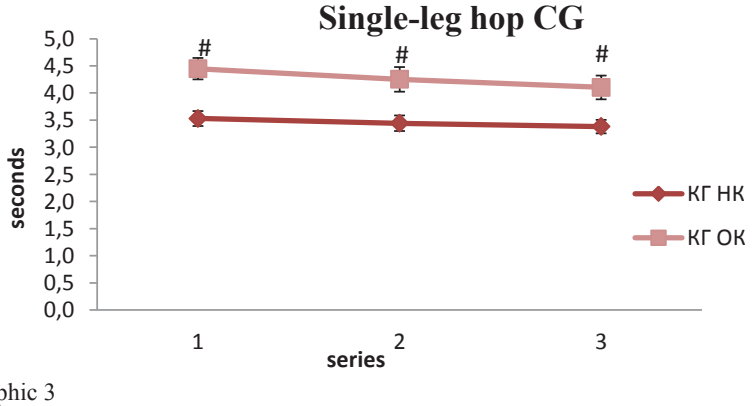
The figure-of-8 running test evaluates the ability of the patient to shift rapidly the direction of movement, as well as the general agility of the lower limbs, which makes it one of the most precise dynamic functional tests for ACL deficiency function [4]. In our research the patient from the EG showed better performance in qualitative (graphic 1) and quantitative (table 1) way, which could be explained with better developed dynamic postural control after the ACL reconstruction, due to early evolvement of the operated lower limb in the daily functional tasks.



Graphic 1
* st.significance (p<0,05) of the1st measurment with the rest



Graphic 2
st.significance (p<0,05) between the operated and non-operated leg



Graphic 3
st.significance (p<0,05) between the operated and non-operated leg

Single-leg hop for a distance test is another very useful and practically reliable test for determining ACL deteriorated function [9]. The patients from the EG showed a similar tendency of performance with the operated and non-operated leg (graphic 2), while the controls performed the task worse with the operated than the non-operated leg (graphic 3). The general quantitative value for this test is better for the EG. Only 31.6% of patients reported light pain and instability while performing the task with the operated leg. In the CG 66.7% gave the same mark and 4.7% complained of severe pain and great instability while performing the hops (table 1). The better quantitative and qualitative performance of the test form the patients of the EG is due to early start and regular training of proprioceptive exercises, which are crucial for building a good postural balance.

CONCLUSION

At the 6th postoperative month after ACL reconstruction, the neuromuscular control of the operated leg was almost equally return as the non-operated one for the patients from the experimental group, as they managed to complete the given functional tasks almost equally with both legs. Unlike the patients from the control group who showed different tendency of performance with the operated leg. This was distinctly seen in the results of figure-of-8 running test and single-leg hop test. Good neuromuscular control provides good dynamic postural balance. Early proprioreceptive training and CKC exercises in patients after ACL reconstruction gives quicker and better results of returning the dynamic postural control.

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INCREASED FOOT SKIN MOISTURE IS A RISK FACTOR FOR OCCURRENCE OF ONYCHOMYCOSIS IN PROFESSIONAL SOCCER PLAYERS

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***Key-words**: soccer players, onychomycosis, moisture of the skin*

Increased skin moisture predisposes to occurrence and development of fungi not only on the skin, but also on the nails. Soccer players from Bulgarian Professional Football League were examined for onychomycosis of lower extremities as foot skin moisture was also measured. Materials and methods: 79 male soccer players were examined: 28 from "A" and 51 from "B" group {18 from group leader (B 1) and 33 from group outsider (B 2)}. Moisture measurement in each patient was made with Hydrosensor®. Hydrosensor measures skin moisture using three-grade scale (I. Dry skin, II. Well hydrated skin, III. Moist skin). Results: Using Pearson Chi-Square I found statistical significance ($p < 0,00001$) between increased foot moisture and occurrence of onychomycosis in all professional soccer player. Conclusion: Increased foot skin moisture is a risk factor for occurrence of fungal infection in soccer players. Increased foot skin moisture in combination with other risk factors (using shared showers, exchange of shoes and socks) is a cause for occurrence of onychomycosis. The large number of professional soccer players with diagnosed onychomycosis imposes conduction of compulsory mycological examination in all soccer players.

Many professional soccer players have been diagnosed with onychomycosis and this necessitates conduction of mandatory mycological examinationin all soccer players.Professional soccer players are at high risk of developing onychomycosis - the reason for this is wearing synthetic socks and sport shoes that lead to sweating andpromote fungal growth. Increased skin moisture predisposes to occurrence and development of fungi not only on the skin, but also on the nails. Usage of shared showers is a risk factor forthe spread of mycotic diseases.

Materials and methods: Soccer players from Professional Soccer Leaguewere examined for onychomycosis of lower extremities and foot skin moisture was also measured. The group of professional soccer players includes athletes from three clubs aged from 16 to 34 years – 28 from "A" Professional Soccer League (A 1) leader, 18 from„B" group (B 1) leaderand 33 from„B" group (B 2) outsider. Out of 79 athletesin total, onychomycosis was diagnosed in 30 (37,97%) – 4 (5,06% of 79) from„A1" 5 (6,33% of 79) from„B1" group leader and 21 (26,58% of 79) from„B2" group team.

Skin moisture measurement in each soccer player was made with Hydrosensor® (Fig. 1). This device allows individualadjustments, according to environmental temperature and air moisture and determination of degree of hydrationby touching the skin with a probe. Hydrosensor measures skin moisture using three-grade scale (I. Dry skin, II.Well hydrated skin, III.Moist skin).

Increased skin moisture is a predisposing condition for development of a fungal infection not only on the skin but also on the nails and there is plenty of evidence for this. {2,3}

Onychomycosis is a disease with slow course, etiologically related to fungal infection of nail plate, caused by dermatophytes,yeasts and molds. {1,5}

UsingPearson Chi-Square we found statistical dependence ($p < 0,00001$)between increased foot moisture and occurrence of onychomycosis in professional soccer players.

Onychomycosis rate is highest in group (B2)- 21 and 9 infected among leaders in (A1) and (B1) groups. (Table 1)

Skin moisture affects the development of onychomycosis in all soccer league players. (Table 2)

The most common risk factors for onychomycosis:{5} (Table 3)

Fig. 1 Moisture measuring device (Hydrosensor)

Fig. 2 Soccer player with onychomycosis

Fig. 3 Soccer player with onychomycosis

Fig. 4: Soccer player with onychomycosis

Table 1 Incidence ofonychomycosis in professional athletes

Soccer players – group	Onychomycosis		Total	Pearson Chi-Square	df	p
	No	Yes				
A	24 (49,0%)	4 (13,3%)	28 (35,4%)	14,79	2	**0,0002**
B1	13 (26,5%)	5 (16,7%)	18 (22,8%)			
B2	12 (25,5%)	21 (70,0%)	33 (41,8%)			

Table 2. Increased skin moisture as a risk factor for onychomycosis in all examined soccer players

Soccer players – group	Onychomycosis		Total	Pearson Chi-Square	df	p
	No	Yes				
A	24 (49,0%)	4 (13,3%)	28 (35,4%)	14,79	2	**0,0002**
B1	13 (26,5%)	5 (16,7%)	18 (22,8%)			
B2	12 (25,5%)	21 (70,0%)	33 (41,8%)			

Table 3. Onychomycosis risk factors

Risk factors for onychomycosis	
• Family anamnesis	• Trauma to the nail plate
• Men	• Peripheral vascular disease
• Aging	• Immunosuppressive therapy
• Existing chronic interdigital athlete's foot	• Atopic dermatitis
• Athletes	• Malignancies
• Hyperhidrosis	• AIDS
• Diabetes	• Other
• Psoriasis	

Based on the performed examinations, it was found that increased foot moisture in professional soccerplayers is the cause of higher onychomycosisrate.

Purim et al. performed similar study to evaluate occurrence of mycoses affecting the legs of soccer players. Purim et al. reached the conclusion that increased skin moisture is a very important factor for development of nail fungal infection. {4}

Conclusion:Increased skin moisture is a risk factor for occurrence of fungal infection in soccer players.

Increased foot skin moisture in combination with other risk factors (usage of shared showers, exchange of shoes and socks) is a cause for occurrence of onychomycosis. In soccer players from (A) and (B1) groups, the use of local medicaments that decrease foot sweating is a cause for lower onychomycosis rate.Many professional soccer players have been diagnosed with onychomycosis and this necessitates conduction of mandatory mycological examination.

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PHYSYCAL ACTIVITY COMPLEX PROGRAM IN CASES WITH SHORTENING OF THE HAMSTRING

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Key words: *shortening;hamstring; kinesitherapy; acupressure*

To function properly, the human body must be in good condition. Violation of any part or system of the body inevitably leads to changes in the overall constitution and functioning of the body. A number of factors from the surrounding environment as well as internal to the body, could disrupt the proper and harmonious functioning of our body. Systems of Chinese medicine to achieve harmony between body and spirit have been developed for thousands of years and have proven success. In the culture of this ancient civilization are intertwined natural and physical methods for strengthen and maintaining of the health. The shortening of the hamstring is widespread and common condition of the musculoskeletal system. About this condition contributs factors such as lifestyle, active training, improper methods of training, lack of adequate stretching at the beginning and end of training, immobilization or reduced physical activity, diseases of the musculoskeletal system and others. All these factors have a complete and complex effects on the human body. Nowadays, despite medical advances, everyday life, the great stress, lack of leisure and culture of sport and movement are one of the main prerequisites for the development of many diseases and pathological conditions in modern human.

Research shows that this condition is observed as in people with a sedentary lifestyle and in active people. The condition is observed in both juvenile and adult individuals, affecting both men and women. Higher percentage of affected elderly due to physiological changes occurring in the body, reducing the amount of water in the body, lowering the elasticity of tissues and decreased physical activity. Due to the great comprehensiveness of the problem by sex, age and lifestyle is important to have a look at its overcome and prevention of future injuries.

Etiological factors are: genetic, insufficient stretching, problems in lumbar-sacral area, postural deformities, previous trauma of the hamstring, currently injury of muscles and tendons, occupying a forced position for a long time of the day.

The clinical picture in those with shortened hamstring is identical in most of them. It was found feeling of discomfort, pain and pulling on the back part of the thigh and popliteal fossa. These symptoms occur most often in specific examination of this muscle group or during activities of daily living, causing stretching of the muscle group. The most common sensation is described as moderate to strong pulling, tension and dull pain in the back part of the thigh; also objective studies show reduced range of motion at the hip. This condition affects both men and women; it can be observed both in active exercising individuals and those with a sedentary life or absence of purposeful physical activity.

Physical methods to control the shortened hamstring muscle: physiotherapy, kinesitherapy, special means and methods of treatment - acupressure - a method of Chinese medicine system, Pilates and more.

The aim of the study was to determine the impact of complex Physical Activity Complex Program in cases with shortening of the hamstring.

MATERIAL AND METHOD

In the period from July to August 2013 we've tested 13 individuals voluntarily. The study was conducted at home. We've tested six male and seven female. The age range 20-25 years includes 4 of the respondents, the range 25-30 years includes 1 person, the range 30-35 years includes 3 persons and the range

35-40 includes 5 persons.

To all respondents were made the test of Adams, Schober's test, goniometry of the ankle joint, manual muscle testing for m. gastrocnemius, examination of length and elasticity of the hamstring (Laseg's test), measuring range of motion in the hips, examination of palpable pain at acupoint *Chen-shang* UB *57*, study of subjective complaints. For the tests were used goniometer and centimeter. **Methods of complex program**: The participants in the study was administered complex kinesitherapeutical methodology that combines the application of active exercises, ANMO Chinese massage and stretching exercises.

Results and analysis: Processing of the results obtained from the survey is used analysis of variance, statistical hypothesis testing, that used t – criterion of Student for dependent samples. The results are illustrated with diagrams:

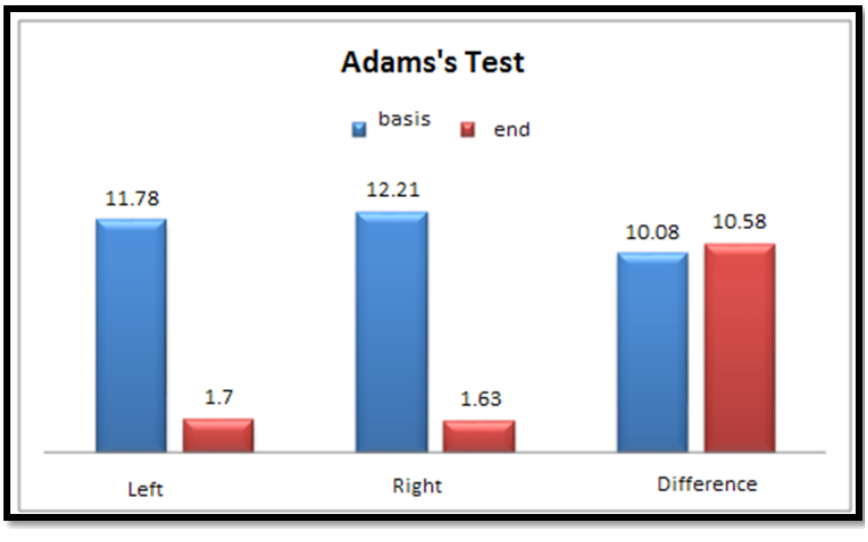

Chart 1. Comparison of test results of Adams's test before and after the complex program of physical therapy.

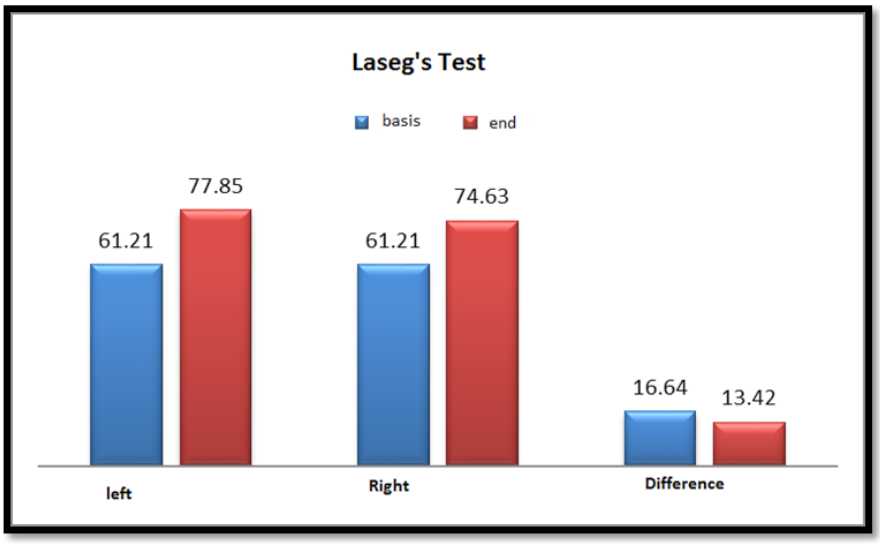

Chart 2. Comparison of the results of the test length and elasticity (Laseg's test) of the hamstring before and after the complex program of physical therapy.

Comparing the results of the initial and final examination of the Adams test (chart 1) we noticed a demonstration of reduction of the distance from the nail phalanx of the third finger to the ground when sloping the body forward with 10.08 cm 10.58 cm to the left and to the right, indicating that attached program of physical therapy has given result and the shortening of hamstring decreased.

Comparing the results of the initial and final study of the hamstring (Chart 2) we noticed a demonstration of increase in the range of motion at the left hip with 16,64 ° and at the right hip with 13,42 °, in-

dicating that the applied program of physical therapy has given results and the shortening of hamstring decreased.

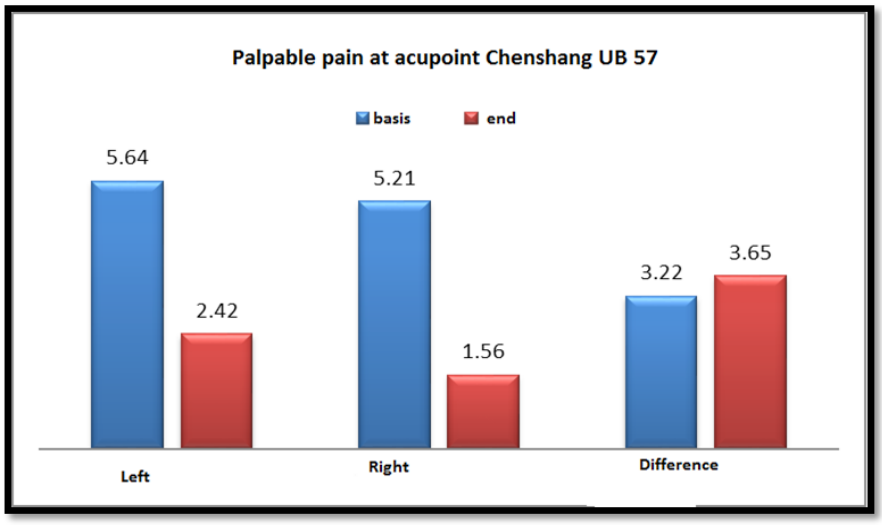

Chart 3. Comparison of test results palpable pain at acupoint *Chenshang* UB *57* administered before and after physical therapy program.

Comparing the results of the initial and final study of palpable pain at acupoint *Chenshang* UB *57* (chart 3) we noticed a demonstration of reduction in the sensation of pain by 3.22to the left and 3.65 to the right lower limb, indicating that the methodology applied at acupoint *Chenshang* UB *57* has affected the sense of pain.

CONCLUSION

1. This condition is common in the young and active age as a consequence of the stagnant lifestyle and reduced physical activity. It concerns a certain disregard for the consequences that it brings.
2. The Complex Program in Cases with Shortening of the Hamstring with an individual approach has a good effect and positive end results.
3. Working with a contingent of people with a sedentary lifestyle is important to assess the factors of working environment, and the everyday life that could be adjusted and optimized to prevent the shortening of the hamstring.
4. The complete methodology can be combined with visiting sauna at least once a week, and the application of massage in the muscle group.
5. A consultation with a physiotherapist is important for making an objective assessment of the situation, preparation of individual training and adequate recovery.

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PHYSICAL ACTIVITY AND GASTROINTESTINAL TRACT IN SPORTING PEOPLE (REVIEWED THEORETICAL STUDY)

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Keywords: *exercise, physical activity, gut, gastrointestinal tract*

INTRODUCTION

Gastrointestinal tract plays an important role in the athlete's performance mainly as source of nutrients, assuring energy demands and recovery processes. Opposite, athlete's sports activity may influence gastrointestinal system. Exercise is a known stimulant of the autonomic nervous system and much is known about its effects on cardiac, respiratory, and endocrine function [2]. However, the impact of exercise and physical activity on organs of the digestive system in sporting people is poorly understood.

The review comprises 35 sources (from 1982 to 2014 year) from the bibliographic database PubMed. Mainly, studies were performed in healthy adults.

The purpose of the study is to update the information related to the influence of physical activity (PA) on the gastrointestinal tract (GIT) and related organs.

MATERIAL AND METHODS

Physiology of GIT is not well understood, since most gastroenterological researches are carried out in fasting state and at rest. In the bibliographic database PubMed we searched those studies that investigate the effect of physical activity on various aspects of the digestive system. Assigned keywords were: exercise, physical activity, gut, gastrointestinal tract. After thorough analysis we decided that most useful grouping of the studies is according to the described effects. Thus, based on the described effects, the influence of PA on GIT can be distinguished in physiological and pathological (including serious pathology).

RESULTS

Physiological effects of physical activity:

Exocrine secretion in the gastrointestinal tract. We found very little information about secretion of exocrine glands in GIT during physical activity. According to earlier studies gastric secretion is inhibited during moderate or severe exercise [6]. However, FM Moses (1990) mentions that gastric acid secretion probably changes little with exercise [20].

Gastrointestinal motility and transit. Bowel habit, or whole gut transit, is a far from 'regular' phenomenon. Its considerable normal variability has been well documented [21].

Gastric emptying during exercise depends on many factors such as caloric content, osmolarity of food, food temperature and conditions of exercise [20]. Gastric emptying of liquids is accelerated or remained unchanged depending on the severity of the exercise and whether it precedes or follows fluid intake [6]. Physical activity of moderate intensity accelerates gastric emptying but heavy intensity exercise inhibit it [2, 6]. It is generally accepted that light exercise accelerates the emptying of liquids, vigorous exercise slow emptying of solid food and have little effect on the emptying of liquids [20].

The normal small intestine transit time, examined in fasting state, is between 3 and 6 hours [24]. The first study focused on the effects of exercise on the passage of food through the gastrointestinal tract (particularly the small intestine) was made by J. Cammack et al. in 1982 [6]. The experiment was con-

ducted after a standardized breakfast with prolonged moderate aerobic exercise on a bicycle ergometer with a total duration of load and rest 6 hours [6]. Unlike the strong effect that is achieved on the acceleration of gastric emptying, such is not accountable for the small intestine [6]. The same conclusion made also K.A. Rao et al. (2004) which examined the intestinal transit time in athletes with and without symptoms from the GIT [24].

Light to moderate exercise has little effect on gastric emptying and transit time through the small intestine [21]. However, these changes are less important compared to the disproportionate involvement of the colon in the whole gut transit time - between 75% and 90% of the transit time is carried out in the colon [21]. In various studies the transit time through the colon remains unaffected or significantly increased as a result of physical activity [24, 25]. Contrary to previous studies S.C. Satish (1999) shows that graded exercise decreases the motility of the colon [25]. Moreover, more vigorous intensity of the exercise is associated with a greater reduction in motor activity [25]. During the rest after exercising motor activity is restored immediately [25]. Transverse and descending colon showed less activity during exercise than rectosigmoid colon [25]. Also, during the recovery period, the pressor function of rectosigmoid area returns to the control values, while in the transverse and descending colon was observed prolonged suppression of motor function [25].

GJ Qettle (1991) found that the time for transit through the GIT is dramatically reduced from moderate exercise (jogging and biking) – from 51.2 hours to 36.6 hours in biking and 34.0 hours in jogging [21]. There is no significant difference between the transit time for both types of exercising [21]. The other parameters of defecation, stool weight and stool frequency, however, were not significantly affected by the studied moderate physical activity [21].

R. Dainese et al. (2004) and A. Villoria et al. (2006) examined the influence of physical activity on the transit of intestinal gases and their evacuation in healthy subjects [7, 35]. They found that moderate physical activity improves gas elimination and reduces symptoms in patients complaining of bloating [7, 35].

Exercise and physical activity also affect gallbladder motility. Single load with aerobic exercise increases the ejection fraction of the gallbladder in healthy women without obesity. The effect is weak and not statistically reliable. Continuous exercising with energetic walking for 12 weeks (5 times/week) significantly increases the ejection fraction of the gallbladder [22].

Splanchnic circulation. In 1939 Kats and Robdard described the splanchnic circulation as a 'blood giver of the circulation' and pointed out that the splanchnic circulation may play a major role in overall cardiovascular regulation [23]. In order to meet the metabolic needs of skeletal muscle during exercise, splanchnic circulation is reduced and the blood flow to the organs in the abdomen is reduced by 20-30% to 80% during maximum exercise compared to rest [2, 22, 23,]. The most pronounced changes in splanchnic perfusion occur within the first 10 minutes of intense exercise showing rapid response of the splanchnic vascular bed. The severity of splanchnic hypoperfusion is proportional to exercise intensity [33]. Reducing effect of mesentery blood flow is established also by Qamar and Read (1987) both in fasting state and after food intake [23]. Decreasing of splanchnic circulation is due to the redistribution of blood from splanchnic organs to working muscles, but in trained individuals that decrease is relatively small than in untrained [10, 23].

Nutrients absorption and intestinal mucosa permeability. Absorption in the GIT during exercise is not well explored, but probably the changes are small under normal circumstances [20]. Some researchers pointed out that regardless of the dramatic decrease in gastrointestinal blood flow, the absorption of fluids, electrolytes and glucose is unaffected by physical activity [6]. Others show that moderate exercise reduces the absorption of glucose, while vigorous exercise does not affect the absorption of water, salt or glucose [2, 20]. G.R. Barclay and L.A. Turnberg in 1988 found that moderate exercise (lasting 50 min.) significantly reduces absorption of water, Na, Cl and K. During the recovery period, the absorption of water, Na and Cl returns to baseline control values, but the absorption of K remains considerably reduced [2].

Secretion of gut hormones. Appetite and satiety. Appetite and eating habits are controlled by a number

of peripheral signals that vary in response to food intake and act on the hypothalamus and brainstem. Such feedback signals include a lot of gut hormones, such as peptide YY (PYY) and glucagon-like peptide-1 (GLP-1). Both peptides are released from L-cells of the distal small intestine and colon, and their function is associated with induction of satiety and suppression of food intake [32]. C. Martins et al. (2007) found for the first time that a single application of moderate exercise increases postprandial plasma concentrations of peptide YY (PYY), glucagon-like peptide-1 (GLP-1) and pancreatic polypeptide (PP), in subjects with normal body weight with a parallel reduction of hunger. This effect is maintained during the subsequent period for GLP-1 and PP, but not for PYY [19]. Similar conclusions made Sh. Ueda et al. (2009) comparing changes in gut hormones in a single moderate exercise between normal weight and overweight subjects. However, they found no significant changes in hunger, satiation and satiety in response to exercise, as well as no statistically significant differences between normal weight and overweight subjects [31].

Gut hormones show specificity in relation to the intensity and variety of exercise. Circulating levels of PYY3-36 are enhanced with increasing intensity of exercise, while this is not applicable for GLP-1 [32]. The short-term increase in the concentrations of anorexigenic peptides (PYY and GLP-1) and tendency toward increasing of acylated ghrelin concentration was observed in running, but not in walking [15]. Weight bearing exercises suppress the appetite in a greater extent than exercises that do not bear the weight of the body [14]. D. R. Broom et al. (2009) found that: 1) hunger is suppressed during and for a short while after resistance and aerobic exercise, 2) acylated ghrelin is suppressed during resistance and aerobic exercise, and 3) PYY is increased during and after aerobic exercise [4]. In another study (K. Deighton et al. (2013)) conducted with endurance exercise and sprint interval exercise (Wingate test), it was found that: 1) appetite and acylated ghrelin were suppressed during exercise, but the effect is more pronounced in sprints interval exercise, 2) PYY increased during exercise, but more constantly during endurance exercise, 3) exercise energy expenditure is greater in endurance exercise than that in sprint interval exercise, 4) energy intake does not differ between trials. Therefore, relative energy intake (energy intake minus the net energy expenditure of exercise) was lower in endurance exercise than that in sprint interval exercise. An acute bout of endurance exercise resulted in lower appetite perceptions in the hours after exercise than sprint interval exercise and induced a greater 24 h energy deficit due to higher energy expenditure during exercise [8]. Fitness level also affects the fasting and postprandial consentrations of gut hormones [13, 30].

Prevention of diseases:

Physical activity seems to protect from colon cancer, cholelithiasis and diverticular disease [1, 3, 9, 15, 16, 18, 22, 27, 28]. Constipation has been shown to be related to inactivity. Despite this, no overwhelming evidence exists for a positive effect of physical exercise as a treatment option for chronic constipation [27]. The improved transit time through the colon in physical activity may reduce the risk of diverticulosis, hemorrhoids, gastrointestinal hemorrhage, and inflammatory bowel disease [10, 22]. Population-based studies suggest that resistance exercise is associated with lower levels of intrahepatic lipid [11]. Epidemiological studies have shown that regular exercise can prevent onset of colon cancer [1, 22]. It is estimated that 12-14% of cases of colon cancer are due to the lack of vigorous physical activity [28]. Recent studies have found that during physical activity skeletal muscles secrete myokines, called SPARC (secreted protein acidic and rich in cystein), which are associated with a number of health effects. They improve metabolism and have anti-inflammatory effects on the organs, but one of their main effect is the inhibition of tumor cell proliferation of the colon [1, 16].

Pathological effects of physical activity:

Transient pathological symptoms.

During exhausting endurance events 30% to 50% of participants may exhibit one or more symptoms from the gastrointestinal tract, which are often considered as a result of poor digestion, impaired absorption (malabsorption), alteration of small intestine transit and inadequate food and drink intake [5, 9, 18, 22]. Interestingly, in athletes (mostly long distance runners) are occurred some gastrointestinal symptoms such as cramps, vomiting, lower abdominal spasms, urge to defecate, diarrhea, rectal incon-

tinence and bleeding [17, 20, 24, 34]. These symptoms appear more frequently in women than in men after high-intensity athletics exercise [20, 24]. However, these acute symptoms are transient and do not harm the health of the athletes in long term. The only exception is recurrent gastrointestinal bleeding during training and competition, which in the long term can cause anemia [3, 22].

Digestive symptoms occurring with exercise referable to the oesophagus include chest pain, gastro-oesophageal reflux symptoms, or symptoms related to alterations in motility. Symptoms from the stomach as acute gastric stasis may occur after running [20]. Complaints from lower gastrointestinal tract (such as cramps of the smooth muscle of the intestines, diarrhea - sometimes with blood, and urge to defecate) seems to be associated more with changes in motility, tone, absorption and secretion in the GIT [5, 10]. These symptoms are caused primarily by the reduction of gut circulation and the secretion of substances such as vasoactive intestinal polypeptide, secretin and peptide histidine methionine [5]. Reduction of splanchnic circulation during exercise is well described, and the colon is probably more sensitive to ischemia than the small intestine because of insufficient collateral blood supply, especially around the splenic flexure (flexura colica splenica) [10].

Prolonged strenuous exercise (especially performed at high ambient temperature and/or combined with dehydration) are one of the three main causes for loss of integrity of the intestinal barrier function (together with heat stress and taking certain medications such as nonsteroidal anti-inflammatory substances) [10, 17, 22]. The loss of integrity of the intestinal barrier function result in increased permeability of the intestinal mucosa, which may be the reason for the passage of endotoxins from the intestine into the general circulation [10, 17]. This, in turn, causes a cascade of inflammatory reactions, increasing the loss of barrier function, and under severe conditions, leading to serious consequences for the entire organism. T. Marchbank et al. (2011) established that the permeability of the gastrointestinal tract is increased approximately 2.5-fold in response to 20 minutes of high intense exercise at 80% VO2max [17]. K. van Wijck et al. (2013) showed that resistance exercise damages the intestinal wall in healthy subjects, leading to a reduction in protein digestion and their absorption kinetics during the acute postprandial phase of recovery [34].

Bleeding from the gastrointestinal tract is the most severe digestive disorder under exercising. Athletes can develop hematemesis or melena after competition or training. Most common reasons for this bleeding are ischemic colitis and gastritis caused by lesions during running. Lesions are transient, overcome rapidly at rest and are not recognized if endoscopy is not performed until 48-72 hours after exercise. The reason for this is the remarkable regenerative capacity of the GIT. Epithelial cells, for example, have a life span of only 4-5 days [10, 20].

Serious pathological complications.

Two publications present cases of ischemic colitis as a result of long distance running [12] and vigorous physical exercise [26]. First case occurred in female competitor of 15 km mountain race. At 10 km she experienced generalized severe crampy abdominal pains, forcing her to stop the race. Over the next few hours she noted bleeding from the proximal (vomiting with small portions of blood) and distal part of the digestive system (bloody red stools). Histological examination revealed extensive mucosal haemorrhage, dilated capillaries, patchy fibrosis and superficial erosions, which are a typical feature of acute ischemic colitis. Subsequent examinations have found lower mesenteric blood flow (with 70%) after running and the ratio mesenteric/aortic blood flow decreased from 1.0 to 0.2 at rest after the stress test, the values of which returned to baseline after 60 minutes [12]. The second case is described in a 26 year old man. In three consecutive days he committed serious training program (consisting of 20 minutes bodybuilding and 2 hours of continuous running) during midday hours at high ambient temperature. The day the symptoms appeared, he started the training immediately after an abundant meal intake. After ruling out other possible causes of the symptoms, the origin of the disease was considered to be the result of a change in the blood flow from mesenteric area secondary to an increased demand of blood caused by a vigorous physical exercise practiced in a hot day [26].

An interesting case is described by N. Tewari et al. (2013). They found that as a result of strenuous exercise may occur chylous ascites. Chylous ascites is defined as the extravasation of a creamy appearing

peritoneal fluid rich in triglycerides caused by the presence of thoracic or intestinal lymph in the abdominal cavity. It is a rare condition, which is usually associated with trauma. The reported case is a 38-year-old man who after participating in a triathlon, gets a severe central abdominal pain, associated with reduced appetite, nausea and vomiting. This unusual case of chyle leak after strenuous exercise has never before been described. The mechanism of rupture of the cisterna chyli may have been related to hyperextension and hyperflexion occurring during the triathlon. [29].

Discussion:

The analyzed data show undoubted influence of exercise on gastrointestinal tract. Tendency is toward accelerating of the transit during moderate intensity aerobic exercise with possible further influence of exercise type (running increase transit time greater than biking). Splanchnic circulation and absorption of certain electrolytes are decreased. Secretion of appetite reducing gut peptides is increased.

Exaggerated and exhaustive exercise (accompanied with other factors such as high ambient temperature and dehydratation) has an adverse effect on the digestive system, which, depending on the state of the body, can result in transient or serious disturbances. In most cases acute symptoms are transient and do not harm the health of athletes. The exception is repeated gastrointestinal bleeding during training and competition, which can cause anemia.

CONCLUSION:

The variety of types of physical activity, fitness level of the participants and conditions of trial create a large variability. Moreover, we did not found studies investigating the effect of resistive exercise and the exercise of the abdominal muscles. The influence of physical activity on gastrointestinal tract is not fully understood and is a prerequisite for new searches.

However, based on reviewed articles and physiological effects, we assume that regular physical activity with correct intensity can reduces the risk of recurrence of gastrointestinal diseases and improves the state in others. Excessive physical activity (with dehydration), contrariwise, is unfavorable and depending on the condition of the organism and ambient conditions can lead to transient or serious pathological complications.

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CHANGES IN COMMUNICATION SKILLS IN CHILDREN WITH AUTISTIC SPECTRUM DISORDERS AFTER THERAPEUTIC RIDING SESSIONS

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***Key words**: autistic spectrum, therapeutic riding, communication, behavior*

INTRODUCTION

Autism spectrum disorder is a complex condition that affects brain development, particularly in the areas of communication and social interaction. Symptoms include: -difficulties with communication, both verbal and non-verbal difficulties with attention span and concentration, repetitious behavior, such as:

- Obsessively rocking, flapping hands, repeating words, or arranging objects;
- Difficulties with social skills and group activities;
- Difficulties when make and maintain eye contact;
- Difficulties with basic skills such as dressing, eating, brushing teeth, and bathing.

The horses give the possibility to the children to create emotional relations and special relationships; it has an impact on all kinds of sensor integration as tactile, vestibular, visual, proprioceptive stimulation and smell perception (Smith, 2010); it helps the development of their cognitive abilities and stimulates the motor function. Every minute on the horse back stimulates the child's brain with more than 1000 neural impulses, which could not be achieved in clinical conditions. (Doucette, 2011). The child is concentrated and analyzes the information better when he/she has different tasks to focus. The elementary task as giving the direction "Forward!" is an efficient way to create communication abilities. The children gain confidence and strength that they can control and communicate with so big animal. This environment makes the learning atmosphere more amusing than the clinic's, so the children become more open for learning. This is not environment which breaks the routine activities. (Smith,2010)

The **aim o**f the study is to determine the influence of therapeutic riding program on communication skills and some behavior disorders in the autistic spectrum

METHODOLOGY

The study took place in Sports Riding Center "Han Asparuh" in Sofia. The duration was 5 months. There were held 40 sessions with 6 children (three boys and three girls) which average age is 7,33 years old who have the diagnose "disorders in autistic spectrum". The psychological status of the children was done by a clinical psychologist.

We used Childhood Autism Rating Scale(sample) (Eric Schopler, Robert Reichler, MD, and Barbara Rochen Renner, Western Psychological Services, Los Angeles: 1993) The CARS rates the child on a scale from 1 to 4 in each of 15 areas.

THERAPEUTIC HORSEBACK RIDING PROGRAM

The first therapeutic horseback riding session coincides with the first meeting of the children with so big animal. Some of them are frightened, the others are curious. Firstly the children should get use to the horse as live element of the environment. The patients learn how to take care for the horse – to clean the horse in the stable, to feed it, to comb it. During this experiment at the beginning the children only watched because it is hard to overcome immediately the resistance to the routine activities in children with autistic spectrum disorders. During the second and the third session all children ventured to

take active part in the care of the animal. Main Stage begins with putting the children on the horse back for 3-4 minute until they get used to the direct contact with the horse. While the children are moving together with the horse they are manually helped and corrected to take the right sitting position on the horse back with lifted head and shoulders, without bending the trunk. Also they are helped by giving instructions and by encouraging them. In the next sessions the speed of horse' walk rises and different exercises are included. Firstly these exercises are done in a "relaxed mood" when the horse stopped, after a while the exercise should be done while the horse is walking.

RESULTS

1. Relating to People

The data from Childhood Autism Rating Scale show that the patients who took part in the study have progress with relating to people. At the beginning they were in the group of *Moderate abnormal relationships* because they demonstrated aloofness, timidity, fear of new people, ignoring the adults during their attempt to communicate. At the end of the course they had *Mildly abnormal relationships* with the others because they improved their communication skills and formed new useful habits. We consider that this progress is a result of the direct contact with the animal which is mediator between the children, the team and the parents. This is also result of the acts of caring for the animal which helped the children to join to the team. This is how they understood that the communication with the others is not so scary and could be pleasant. Fig1.)

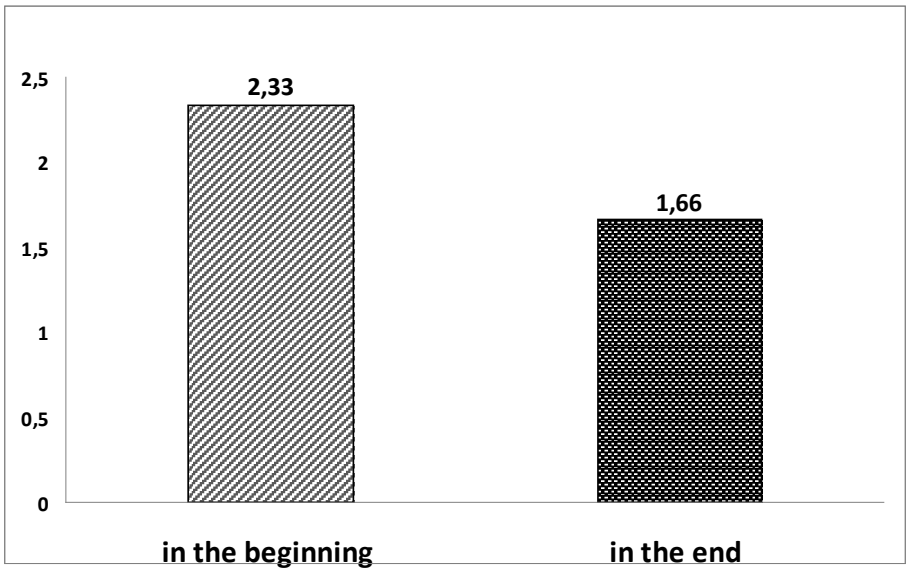

Fig 1 Changes in "Relating to People" *Average value for all six children

2. Body Use

The results from Childhood Autism Rating Scale at the beginning of the therapeutic horseback riding course show that patients had almost equal level of *Moderately abnormal body use,* because of their strange behavior in this age: finger movements, peculiar finger or body posturing, staring or picking at the body and self-directed aggression. At the end of the Therapeutic horseback riding course there is improvement in the way they use their body. This is result of the exercises done on the horse' back and the care of the children for the horse which contributed for the improvement of the balance, the coordination, the gross motor function and fine motor function. The care for the horse has formed different coordination skills of upper limbs, which reflects on the different types of grips and movements. This inhibits the stereotype movements of the children with disorders in the autism spectrum. Gaining control on the horse back improves the children`s motivation which helped them to control their own body. (Fig.2).

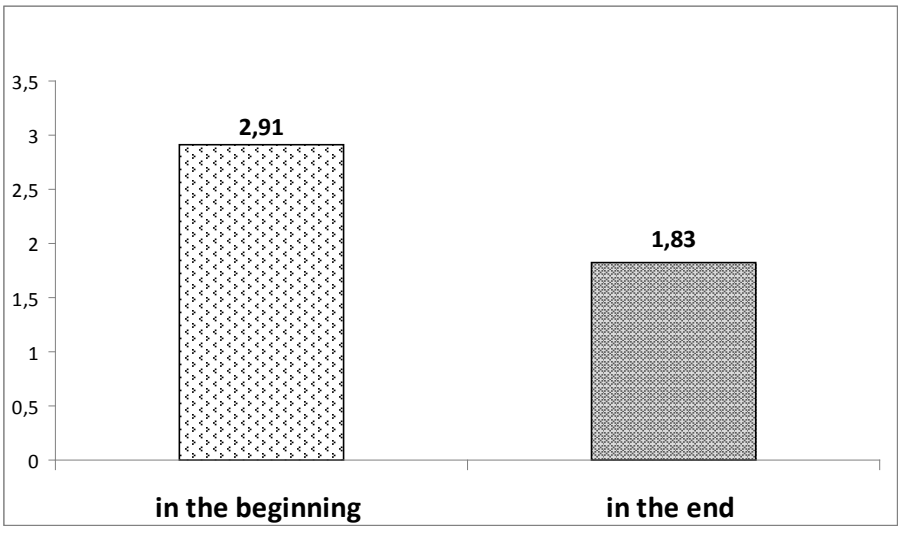

Fig. 2. Changes in „Body Use". *Average value for all six children

3.Adaptation to Change

The results represented on fig.3 show that the children gradually passed from *Moderately abnormal adaptation* to change to *Mildly abnormal adaptation to change*. The horse required the attention of the children all the time during the riding or the process of caring for the horse. This helped them to develop their ability to adapt to the changes in the environment. The children showed lower active resistance to the changes of the environment because of the accumulated effect of the sessions and the build trust in the horse and the team. Some of the children had favorite activities which they did with undisguised joy. The imitation exercises, the method with counting and the tracking of the direction had a positive effect on keeping patients' attention for longer time.

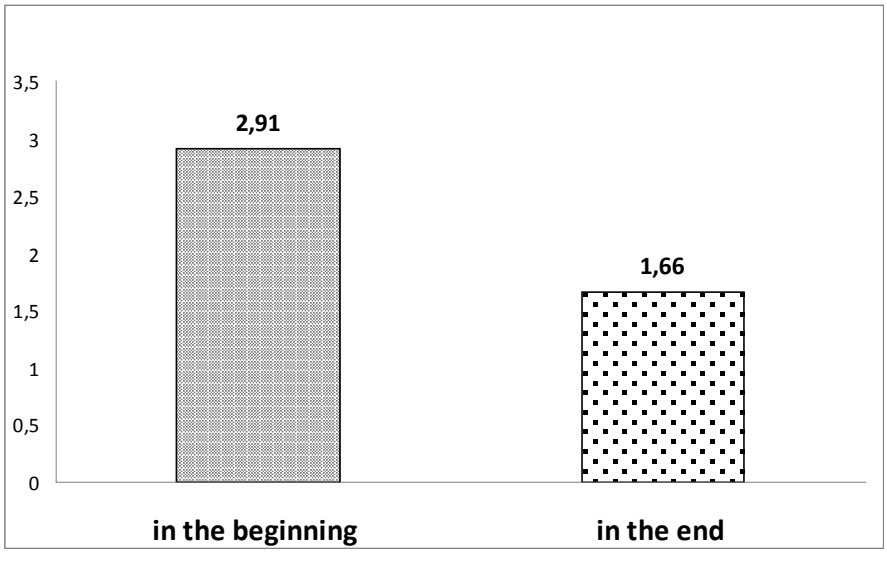

Fig.3 Adaptation to Change" *Average value for all six children

4. Listening Response

The results from the psychological study are systematized in fig. 4 and show clearly the unusual reactions of the patients towards sounds at the beginning of the course of therapeutic horseback riding. Sometimes they ignored them, other times they were startled by unknown sounds. The children gradually stopped to pay attention to these unusual sounds and their negative responses reduced thanks to the clear commands and the specialized means used for concentration.

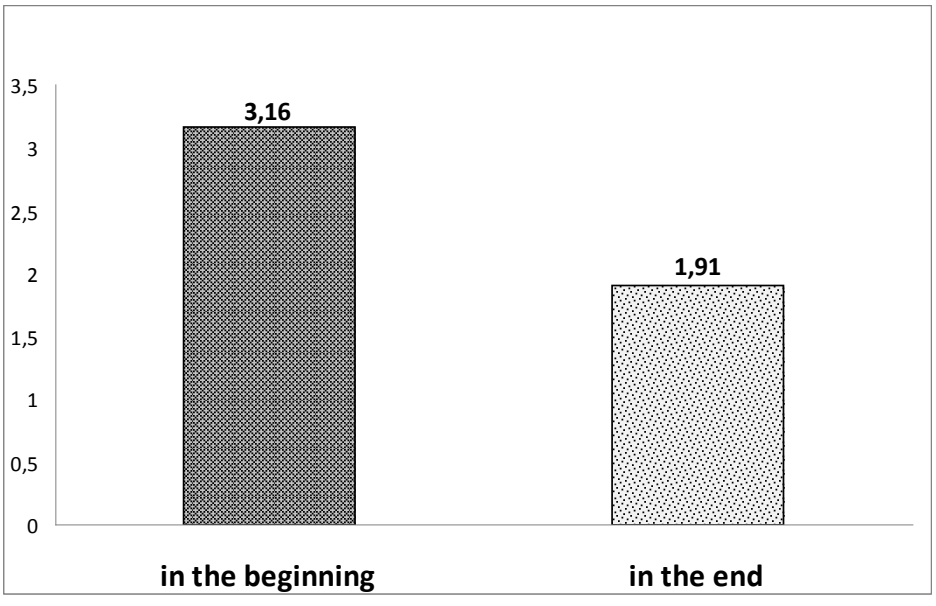

Fig.4. **Changes in „.Listening Response"** *Average value for all six children

5.V erbal Communication

The children had problems with the verbal communication during the first therapeutic horseback riding sessions. They took everything literally. When children didn't understand the words and the phrases they started to ask many questions. Their vocabulary was poor. The children improved their verbal communication at end of the therapeutic horseback riding program. This is proven by the results from the fifth index of the Childhood Autism Rating Scale All six patients had Moderately abnormal level at the end of the course because most of the speech was rationalized, rarely there was *echolalia*, and the vocabulary was enriched. These positive results are based on the fact that the horse helped the children to realize the casual relations as "I command! You obey!" What is more the horse was the object to which they addressed their commands. The positive emotions with the horse formed the need and the willingness to communicate (fig 5).

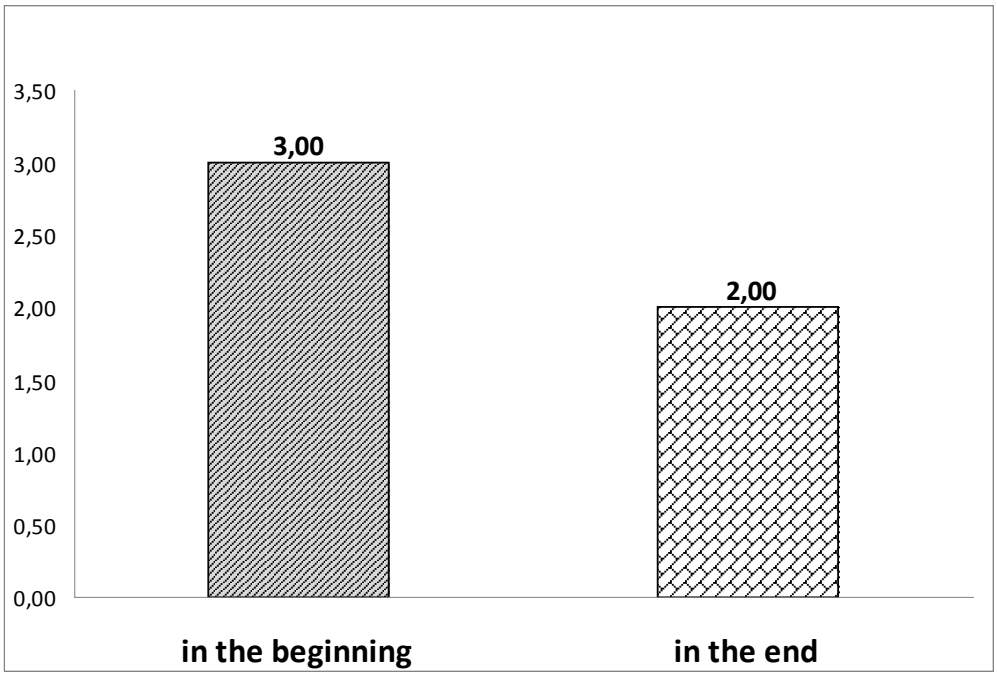

Fig.5. Changes in „.Listening Response" *Average value for all six children

CONCLUSION

The five-months pilot study which was held on horseback riding center “Han Asparuh” in Sofia with six children with autistic spectrum disorders proved that the therapeutic horseback riding course has a positive effect on their communication skills.Therapeutic riding in our study gives autistic children a sense of themselves, their bodies, and increased contact and interaction with the surrounding world. Autistic children quickly form attachments and relationships with the horse they ride, and this behavior is then expanded to include teachers, trainers, therapists, and family members. We consider that our methodology could be helpful for enriching the complex of rehabilitation of children with autistic spectrum disorders in Bulgaria.

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INFLUENCE OF HYDROKINESITHERAPY IN THE TREATMENT OF LUMBAR DISC DISEASE IN THE CHRONIC PERIOD

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Keywords: *hydrokinesitherapy, lumbar disc disease, test Kraus-Weber - static part.*

INTRODUCTION

Disc disease is a common disease, as in the last half of the XX century it reached epidemic proportions mostly in the developed countries like the USA, Great Britain, Germany, Netherlands and other. Disc disease largely disables patients and creates inconvenience in the performance of daily activities. About 30% of the sufferers develop a chronic pain, which leads to high prices of medical treatment and losses in economy [6].

The wide distribution and severity of disc disease are a good reason to conduct extensive research on the demand and application of proper treatment.

We study the influence of hydrokinesitherapy on the functional status of patients suffering from lumbar disc disease. The results obtained are compared with the results achieved by applying routine kinesitherapy. During the treatment course the status of each patient was monitored and the benefits from the applied kinesitherapy program were reported. The purpose was to restore the function of the affected portion of the spine and to prevent recurrence.

METHODOLOGY

Twenty patients with lumbar disc disease in the chronic period, divided in two groups, were monitored. The experimental group included 10 patients (5 women and 5 men, average age of 52.47 years), while the control group consisted of 10 patients (7 women and 3 men, average age of 52.79 years).

For the purposes of the study the muscle strength of monitored patients was evaluated twice in the beginning of the treatment and on the 10^{th} day after it. The static part of Kraus-Weber test was used, modified and described in detail in Bulgarian in another publication [2]. It included 9 isometric test positions, which the patient retained according to his capabilities. The retention time was measured in seconds. Increasing the values of this indicator provided information about the strength and endurance of the muscles forming the muscle corset.

All patients involved in the study were treated in Specialized Hospital for Rehabilitation – town of Hisar. The hydrokinesitherapy procedures were conducted in the pool of Gergana Spa Hotel. Patients from the experimental group were included in a ten-day kinesitherapy program conducted in the mineral pool. The target physical exercises applied to them in aquatic environment were with duration of 40 minutes and moderate intensity. The complex of exercises included: exercises to strengthen week muscles (back, abdomen and seat muscles); relaxation of trunc muscles; extension therapy; stretching exercises and active exercises using devices. Control patients were treated in the routine manner by ordinary ten-day kinesitherapy methodology [1].

The results obtained were processed statistically by paired t-test.

A p-value less than 0.05 was considered statistically significant.

RESULTS

The clinical characteristics of the studied contingent are presented on Table 1. Patients in the two groups do not differ by sex, age, body weight and disease duration.

The results from the monitored 9 test positions, objectifying changes in the muscle strength of both groups of patients with lumbar disc disease in a chronic period, are presented on Table 2.

Table 1. Clinical characteristics of the patients

Indicator	Experimental group n=10) X± SD	Control group (n=10) X± SD
Sex		
women	5 (50%)	7 (70%)
men	5 (50%)	3 (30%)
Average age (years)	52.47 (50-60)	52.79 (48-60)
Duration of the disease (years)	2 - 15	1 - 10
Body weight (kg)	80.80 (62-98)	83.24 (69-95)

X±SD– mean and standard deviation

Table 2. Changes in the muscle strength of monitored patients

Test positions	**Group**	**Start** **X ± SD**	**End** **X ± SD**
Test of hip flexor and abdominal muscles (1)	EG	18.0±6.1	21.0±6.9***
	CG	19.0±4.8	21.3±5.2**
	p	0.6	0.9
Test of abdominal muscles (2)	EG	17.8±6.8	21.4±7.1**
	CG	16.1±6.5	19.4±6.9***
	p	0.6	0.5
Test of the upper back muscles (3)	EG	13.1±5.1	16.2±4.6***
	CG	13.8±5.4	15.3±6.3**
	p	0.7	0.7
Test of the lower back and sciatic muscles (4)	EG	9.2 ±3.7	11.6±4.1***
	CG	11.4±3.5	11.9±3.6
	p	0.1	0.8
Test of the hip flexor (5)	EG	9.7±6.7	11.9±9.3*
	CG	6.5±5.1	8.60±5.1**
	p	0.2	0.3
Test of the left m. quadratus lumborum (6)	EG	7.7±2.7	9.2±2.4**
	CG	9.6±3.8	12 ±4.2**
	p	0.2	0.1
Test of right m. quadratus lumborum (7)	EG	8.2±3.0	10.2±2.2**
	CG	9.4±4.6	11.3±4.2**
	p	0.5	0.4
Test of abdominal muscles and hip flexor without fixation (8)	EG	13.5±5.2	15.6±4.8*
	CG	9.2±4.2	10.1±5.1
	p	0.05	0.02
Test of upper and lower back muscles and sciatic muscles without fixation (9)	EG	3.9±1.7	4.9±1.9*
	CG	6.7±3.1	6.7±2.5
	p	0.02	0.09

X – average values of the studied parameters; SD - standard deviation of parameter; *** p<0.001, ** p<0.01, * p<0.05 – significant differences for each group in the course of treatment compared to the baseline parameters; p- significant differences between the experimental group (EG) and control group (CG); HJ – hip joint.

Analysis of the results in the beginning of the treatment has found decrease in the muscle strength caused by the available pain symptoms that prevent the monitored patients to retain continuously in the test positions. Restrictions are most pronounced for the back, abdomen and seat muscles, as well as for the hip flexors.

After applying hydrokinesitherapy a significant improvement was observed in the muscle strength of all studied muscle groups.

The ten-day kinesitherapy in the control group also had a significant positive impact, according to the monitored indicators, but in terms of absolute values it was weaker compared to the values of patients in the experimental group. On the 10th day no significant improvement was observed in three test positions [4, 8, 9], objectifying the strength of upper and lower back muscles, seat and abdomen muscles, as well as hip flexors.

The results of changes in the muscle strength at the end of the treatment of the experimental and control group are presented on Figure 1.

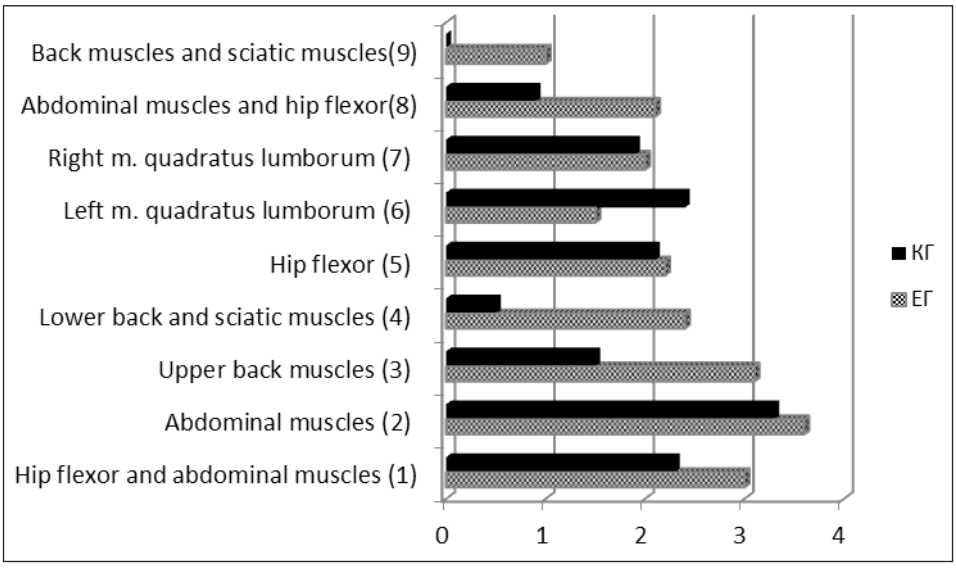

Figure 1. Changes in the average values of muscle strength, according to Kraus-Weber test, presented as a difference between the background values and obtained results at the end of the treatment in the experimental group (EG) and control group (CG); HJ – hip joint; the positive values show a change towards improvement.

Comparison between the groups in the course of treatment has indicated a significantly better status of the patients in the experimental group at the end of the treatment regarding the strength of back and seat muscles, abdomen muscles and hip flexors, which is associated with the better functional status of the spine, positive change in the posture and walking pattern of the patients.

DISCUSSION

This study found that the application of hydrokinesitherapy significantly improved the muscle strength of patients, whereas the routine kinesitherapy methods applied to the control group had a less positive effect without significant changes in the strength of the back and seat muscles, abdomen muscles and hip flexors.

It has shown that aquatic environment has many advantages: patients do not get fatigued after underwater physical exercises, which prevent the occurrence of pain after the procedures and lumbar pain is relieved thanks to the physical properties of water [7]. Noticeable changes are found in the posture of patients; they begin to keep their spine in the correct position, while sitting, standing and walking. The activities of daily life are not difficult to them and they begin to do them without needing any help, as it was before [8, 11].

It is obvious that hydrokinesitherapy increases the strength of muscles in the muscle corset [8, 9]. Doing

exercises in water enhances weak muscles, due to the natural resistance that exists during underwater physical exercises [3, 4, 5]. Load is greater than that when doing physical exercises on a hard surface using devices that cause resistance. Training in water is performed against resistance, which improves the balance, muscle tone, muscle strength and sensation [5, 7].

Applying hydrokinesitherapy to lumbar disc disease in the practice should not be ignored because it gives positive results and is well-tolerated by the patients. Aquatic activities are more interesting to the patients and improves their psycho-emotional tone [11]. In the experimental group of patients no negative changes and adverse reactions were observed, which makes hydrokinesitherapy a suitable method for the treatment of patients with lumbar disc disease.

CONCLUSIONS

The study shows that to achieve a positive effect on patients with lumbar disc disease a targeted kinesitherapy approach is needed. Hydrokinesitherapy has a significant positive effect on the muscle strength of patients with lumbar disc disease in a chronic period.

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STUDY ON THE EFFECT OF KINESITHERAPY ON MOTOR ACTIVITY IN PATIENTS WITH PARKINSON'S DISEASE

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Key words: kinesitherapy, Parkinson's disease

INTRODUCTION

Parkinson's disease (PD) is a severe chronic, progressive disease of the central nervous system. It is one of the most common neurodegenerative diseases of great medical and social importance because of its adverse effect on progressive disability and the limited therapeutic options. In Parkinson's disease establishes deviations of the motor act characterized by bradykinesia, rigidity, postural instability and resting tremor. They are caused by disorders associated with extrapyramidal structures reduced output of dopamine from substantia nigra. The etiology is not yet fully understood, however, recently achieved considerable success in detecting pathogenic mechanisms of the disease, which allowed the development of strategies for medical, neurosurgical and kinesitherapy (KT) behavior in the treatment of disease [3]. The variety of methods and means of kinesitherapy and their effectiveness warrant further expansion of their application in complex interdisciplinary approach to the treatment of the disease [6,7]. Objectification of the results of the KT requires in-depth research and evidence.

METHODOLOGY

For the period from May to August, 2013 three patients (two men and one woman) with Parkinson's disease in the Medical Center of the NSA "Gurgulyat» 1 were examined.

The first patient was a woman of 69 years old, height 174 cm, weight 51 kg, with duration of the disease 3 years, in stage 1 according the scale of Hohen M. and M. Yahr, assessment of daily activities according scale of Schwab and England - 90%. Patient № 2 is a man of 76 years old, height 174 cm, weight 90 kg, with duration of the disease 7 years, in stage 2 according the scale of Hohen M. and M. Yahr, assessment of daily activities according scale of Schwab and England - 80%. Patient № 3 is a man of 83 years old, height 174 cm, weight 72 kg, with duration of the disease 7 years, in stage 2,5 according the scale of Hohen M. and M. Yahr, assessment of daily activities according scale of Schwab and England -70%, tremor-rigid form of PD.

All patients were conducted an average of 20 KT sessions, an hour or two after taking the medication in the morning between 9.00 to 10.00 hours. Patients are taking medication, including dopamine agonists (Mirapexim) and combined drugs (Sinemet). The measurements were conducted at the beginning, after the tenth KT session and at the end of treatment. In each of the patients were performed outpatient two or three times a week through individual physiotherapy with musical accompaniment. All patients were instructed to continue the rehabilitation process at home.

We used the following test methods:

1. *Pulmonary function tests.* Held by portable Spirographs (Vitalograph Micro Spirometer, Vitalograph ltd, Ireland). Held by the starting position of the chair seat and then triple experience are taken into account the best values. It traces the changes in the following indicators:
   - Forced vital capacity (liters) - FVC (l)
   - Forced expiratory volume in 1 second (liters) - FEV_1 (l)
   - Forced expiratory volume in 1 second as a percentage of the estimated value - FEV_1 (%) Peak expiratory flow (l/min) - PEF (l/min)

These indicators of external respiration are adequately informative value.

2. *Test "Timed up and go" (TUG)* Description: The patient sits in the chair with his/her back against the chair back. On the command "go", the patient rises from the chair, walks 3 meters at a comfortable and safe pace, turns, walks back to the chair and sits down. Timing begins at the instruction "go" and stops when the patient is seated. Podsiadlo, D., Richardson, S.(1991) quantified the test by recommending timing (sec) the time between the command to start, till the buttocks touch the chair. Area of assessment are balance, functional mobility, gait, non-vestibular and vestibular disturbances. Age range - elderly adult: 65+ [9]. Study reported TUG times for apparently healthy elders between 8 and 11 sec according age groups: 60-69 years - 8,1 sec; 70-79 years - 9,2 sec; 80-89 years - 11,3 sec [11]. In our survey we used two modifications of TUG - TUG_1 and TUG_2. TUG_1(sec) - Test „Timed up and go" carrying full glass of water consequently with left and right hand. TUG_2(sec) - Same as TUG_1 with simultaneously counting back from hundred to zerrow in three.
3. *Ten meters walking test circumvention three obstacles (sec).* Description: Measured in a straight line distance of 10 meters. In the command "start" patient starts walking from the starting line towards the finish line surrounding three chairs placed two meters apart.

Scoring: The time taken for a patient goes the distance.

4. *Cadence for ten meters walking test* (*number of steps)* Description: Measured in a straight line distance of 10 meters. In the command "start" patient walk starts from the starting line towards the finish line. Scoring: Record the number of steps that the patient is doing for ten meters.
5. *Timed supine-to-sit task (sec)* Subjects rise from supine to sitting at the edge of bed, with use of both arms and legs, including grabbing the edge of the bed to facilitate rising.
6. *Timed sit -to stand task (sec)* Subjects rise from sitting to standing position.

RESULTS AND DISCUSSION

On Table 1. are presented the results of tests of motor activity in a patient №1. For the test TUG a decrease in the time for its performance between the first and third measurement was found - from 29.8 sec to 11.7 sec at the end of the study and is close to the standard values for the test in healthy adults (8,1 sec). In a recent study Schenkman M., Ellis T., et al. (2011) reported the following results for TUG according H&Y scale stage: for 1-1,5 H&Y stage - mean TUG 8,40 sec; for 2 H&Y stage - mean TUG 9,21 sec; for 2,5 H&Y stage - mean TUG 11,18 sec; for 3 H&Y stage - mean TUG 10,89 sec. In their study 136 patients mean age (y) 66,1, time since onset (y): 6,0 (5,12) performed TUG [10]**.** In another survey the authors explored the effect of two different KT methods in 16 patients with PD lived in home for elderly (on average 23 group KT sessions). TUG results in the beginning are 31 sec for the first group and 29 sec for the second group. At the end of the study are respectively 19 sec and 21 sec. [8]. Another unpublished study reported similar results for TUG time. After 20 KT individual sessions time for test performance decreased from 28,7 sec to 11, 3 sec**.**For the test $TUG_{1\ a\ decrease\ in}$ the time for its performance between the first and third measurement was found - for the left arm 14.4 seconds, for the right arm 10.4 sec and end of the study was on average 12.7 sec. In the three measurements, the performance of the test with the left hand is slower compared to the dominant right hand. In the first measurement, the time for TUG_2 is 34 sec due to simultaneous execution of multiple tasks by a patient, this test has the highest level of complexity. At the end of the study, the time decreases by an average of 20.3 sec (for left hand with 20.3 seconds for the right hand in 20.4 seconds). In this test recorded the largest improvement in terms of speed of execution. We believe that this result is due to acceleration and speed of response to the execution of the test, which is influenced by the coordination exercises used in the complex. **(Table 1.)**

In the test "Cadence for ten meters walking" a reduction of 19 to 14 number of steps from the beginning to the end of the study was found. Best response associated with improved balance and muscle strength of the lower limbs, which we believe is due to the exercises used in KT session. Walking is a basic human motor habit and the changes in it as a result of the disease are of significant importance for the self-servicing of PD patients. Petkov, I., Dimitrova, A., Dakova, M., (2007) used the test for their

Table 1.Changes in motor activity in the first patient

Measurement / Test	X_1	X_2	X_3	X_1-X_3
TUG (sec)	29,8	14,9	11,7	-18,1
TUG_1 (sec)	Left hand: 26,6	14,0	12,2	-14,4
	Right hand:24,9	14,4	13,2	-10,4
TUG_2 (sec)	Left hand: 35,0	15,8	14,7	-20,3
	Right hand:33,0	17,0	12,6	-20,4
10 m slalom walking test (sec)	18,0	11,0	10,4	-8,4
Cadence for ten meters walking test (number of steps)	19	19	14	-5,0
Timed supine-to-sit task (sec)	5,4	3,0	3,0	-2,4
Timed sit to stand task (sec)	2,1	1,8	1,7	-0,4

TUG(sec) – Test „Timed up and go";TUG_1(sec) – Test „Timed up and go" carrying full glass of water consequently with left and right hand;TUG_2(sec) – Same as TUG_1 and simultaneously counting. X_1 – first measurement; X_2 – second measurement; X_3 – third measurement

survey in patients suffering PD. The average values are approximately 20 steps per 10 m, which shows the specific change and reduction of the length of steps as a result of the disease. In the end of the study an improvement in this indicator was reported for both groups. The number of steps decreases respectively by 2,88 steps for group A and 5,56 steps for group B in mean values. The changes are statistically significant. The differences between both groups after 25 KT sessions are reliable and are due to an increased improvement in patients who have performed closed kinetic chain exercises [8]. In 10 meters walking slalom test also seen an improvement in performance. 18 sec at baseline to 10.4 sec after completion of a course of treatment. The speed of moving at the end of the study was 0.9 m/sec, which according to Studenski, S., Perera, S., Patel, K., et al. (2011) patients with movement speed over 0,8 m/s are independent in performing activities of daily living [12]. The increased speed of walking in conjunction with a reduced number of steps is a proof for faster onset of walking and increased walking endurance. A study conducted with 16 in-hospital patients with PD, mean age 71 years, H&Y stage 2-3, reported positive results after 15 individual daily KT sessions. Time decreases with 3,5 sec from 17 sec at the start to 13,5 sec in the end of the research [4]. Both body transfer tests (supine-to-sit and sit to stand) again showed improvement of results after 20 sessions in kinesitherapy. For the first test time of 5.4 sec. reduced to 3.0 sec. For the second test the improvement is negligible. In a survey the authors found similar results after applied kinesitherapy more distinguished for supine-to-sit task. They reported improvement of 1,8 sec for the first task and 0,8 sec for the second body transfer [4].

On Table 2. are presented the results of spirometry for the first patient before and after kinesitherapy. (**Table 2.)**

Standards used for comparison are provided for reference spirometric values adopted by the European Respiratory Society in 1993, the values are set according to the age, sex and height of the patient. Forced vital capacity is considered as an integral indicator of the total capacity of humans, in particular the respiratory function in a restrictive type of respiratory disorder decreased in value. The initial values of FVC (l) for the first patient are 2,74 liters, which is 89% of the normative value (3.07 l). Probably lower

values due to impaired respiratory mechanics because of the reduced mobility of the chest and spine and forward-flexed posture in patients with Parkinson's disease. After the treatment has been growth in FVC (l) with 50 ml. The other three indicators of spirometric study is also a trend towards improvement, but initial measurements show lower values than the normative and the likelihood of obstructive changes in the respiratory system - FEV_1 (%) is 70,0.

On Table 3. are presented the results of functional tests assessing the physical activity of the second patient with Parkinson's disease**. (Table 3.)**

Table 2. Changes in spirometric parameters in the first patient

Measurement Parameter	X_1	X_2	X_1-X_2
FVC (l)	2,74	2,79	0,05
FEV_1 (l)	1,93	1,94	0,01
PEF (l/min)	229,0	177,0	52,0
FEV_1 (%)	70,0	70,0	0

FVC(l) - Forced vital capacity (liters);FEV_1(l) - Forced expiratory volume in 1 second (liters); PEF (l/min) - Peak expiratory flow (l/min); FEV_1 (%) - Forced expiratory volume in 1 second as a percentage of the estimated value; X_1 – baseline measurement; X_2 – at the end

Table 3. **Changes in motor activity in the second patient**

Measurement Test	X_1	X_2	X_3	X_1-X_3
TUG (sec)	16,5	11,6	12,3	-4,2
TUG_1 (sec)	Left hand: 16,7	12,9	13,9	-3,3
	Right hand:16,3	13,2	13,0	-3,3
TUG_2 (sec)	Left hand: 17,3	13,7	12,5	-4,8
	Right hand:17,9	14,0	12,2	-7,7
10 m slalom walking test (sec)	12,5	11,2	10,7	-1,8
Cadence for ten meters walking test (number of steps)	15	14	15	0
Timed supine-to-sit task (sec)	6,7	5,2	4,6	-2,1
Timed sit to stand task (sec)	1,5	2,0	1,3	-0,2

TUG(sec)- Test „Timed up and go";TUG_1(sec) - Test „Timed up and go" carrying full glass of water consequently with left and right hand;TUG_2(sec) - Same as TUG_1 and simultaneously counting. X_1 – first measurement; X_2 – second measurement; X_3 – third measurement

In the test „Timed Up and Go" and its two modifications into account the reduction of the time for its performance between the first and third measurement. In TUG time decreased from 16,5 sec to 12,3 sec from beginning to the end of the study and is close to the standard values for the test in healthy adults (7-10 sec). Brusse, K. J., Zimdars, S., et al., (2005) studied 25 community-dwelling adults with PD, mean age 76 years, mean H&Y Stage Scale =2. Their average results for TUG were 14,8 sec [2]. The time of initial TUG_1 measurement decreases an average of 3,3 sec, both the left hand and the right-hand and at the end of the study was 13,4 sec. For $TUG_{2\ execution\ time}$ in the beginning was 17,6 sec due to simultaneous multitasking patient. At the end of the study time decreased on average by 6,3 sec (for left hand with 4,8 seconds and for the right hand with 7,7 sec). In this test recorded the largest improvement in terms of speed of execution. In the three measurements, the performance of the test with the left hand

is slower compared to the dominant right hand. We believe that this result is due to the acceleration and speed of response to the execution of the test, which is influenced by the coordination exercises used in the complex. Ten meters slalom walking test is performed for 12.5 sec at baseline. Improvement of 2 sec is reported at the end of the study. The speed of movement at the end of the study was 0.8 m/sec [12].

Both tests for body transfer showed improved results after 20 KT. For the first test - lying supine-to-sitting - time for performance of 6,7 sec reduced to 4,6 sec. For the second test - sitting to standing - the improvement is negligible. Does not account a change in the number of steps at the beginning and end of the study.

Table 4. shows the results of spirometry of the second patient before and after kinesitherapeutic procedures. Standards used for comparison are provided for reference spirometric values adopted by the European Respiratory Society in 1993, the values are set according to the age, sex and height of the patient. **(Table 4.)**

Table 4. Changes in spirometric parameters in the second patient

Measurement / Parameter	X_1	X_2	X_1-X_2
FVC (l)	3,26	3,32	0,06
FEV_1 (l)	2,56	2,58	0,02
PEF (l/min)	295,0	384,0	89,0
FEV_1 (%)	77,0	80,0	3,0

FVC(l) - Forced vital capacity (liters);FEV_1(l) - Forced expiratory volume in 1 second (liters); PEF (l/min) - Peak expiratory flow (l/min); FEV_1 (%) - Forced expiratory volume in 1 second as a percentage of the estimated value; X_1 – baseline measurement; X_2 – at the end

The initial value of FVC (l) for the second patient is 3,26 l, which is 83% of the normative value (3,95 l). After the KT sessions has been growth in FVC (l) with 60 ml. The other three indicators of spirometry have also a trend towards improvement, but initial studies show lower values than the normative and the likelihood of restrictive changes in the respiratory system. FEV_1 (l) and FEV_1(%) give us information mainly for clearence of medium and small bronchi and the status of the expiratory muscles. The second patient has improvement for FEV_1 (l) by 20 ml and FEV_1(%) increased by 3% at the end of the treatment. Peak expiratory flow (PEF l/m) is the peak volume rate of air exhaled during the first 100-200 milliseconds during forced exhalation. This is a sign that depends on the level of an input force in exhalation. In the second patient, there is a percentage of the estimated value improvement in peak expiratory flow from 65% to 85% at the end of the study. There is a trend towards improvement of all tracked indicators of external respiration, but the values remain lower than the reference.

In Table 5. we present the results of tests to studied activity of the third patient with PD. (**Table 5.)**

In performance test TUG a decrease in time for its implementation between the first and third measurement of 15.1 seconds at baseline to 14.7 seconds at the end of the study in the normative values for healthy adults (8-11 sec). This test is used to evaluate the mobility and requires both static and dynamic balance of the patient. In a few studies is discussed the problem of falls in patients with PD and the connection between performance of TUG and falling accidents. Foreman, K. B., Addison, O., et al., (2011) studied 36 patients with PD and reported TUG score for fallers 12,21 sec (7,42) and TUG score for non-fallers 7,94 sec (2,15) [5]. Advantage age (above 77 years) is precondition of increased

risk of falls and slowly walking. Balash, Y., Peretz, C., et al., (2005) reported higher results in their study. TUG score for fallers is 16,8 sec (10,1) and TUG score for non-fallers is 11,2 sec (5,2). Their patients were younger (mean age 69,7 years) then in the previous investigation [1]. At the time of initial TUG_1 measurement increased on average 2,3 sec, both the left hand and the right hand and at the end of the study was on average 16,8 sec. In the beginning of the study, the time for TUG_2 averaged for left and right hand 17,2 sec due to simultaneous multitasking patient. At the end of the study, the time increases by an average of 4.8 sec (left hand with 3,0 sec, for right-handed 6,6 sec). We believe that this result is due to a greater age of the patient, occurring faster fatigue, difficulty concentrating more on the performance of more than one task, and tremor-rigid form of the disease. There is no change in the result of 14,0 sec while performing 10 m walking slalom before and after the treatment. Both body transfer tests showed improvement after 20 KT sessions. Timed supine-to-sit reduced from 4,1 sec to 3,1 sec. For the second test improvement is 0,4 sec. The patient reduces the number of steps by 2 at the end of the study, which is probably a result of improved postural control.

On Table 6. are presented the results of testing for spirometric values of the third patient before and after kinesitherapeutic procedures. Standards used for comparison are provided for reference spirometric values adopted by the European Respiratory Society in 1993, the values are set according to the age, sex and height of the patient.(**Table 6.)**

Table 5. Changes in motor activity in the third patient

Measurement / Test	X_1	X_2	X_3	X_1-X_3
TUG (sec)	15,1	17,0	14,7	-0,4
TUG_1 (sec)	Left hand:13,8	16,0	17,6	3,8
	Right hand:15,1	17,6	15,9	0,8
TUG_2 (sec)	Left hand:18,0	17,0	21,0	3,0
	Right hand:16,4	21,9	23,0	6,6
10 m slalom walking test (sec)	14,0	14,2	14,0	0
Cadence for ten meters walking test (number of steps)	20	18	18	- 2
Timed supine-to-sit task (sec)	4,1	3,5	3,1	-1,0
Timed sit to stand task (sec)	1,5	1,3	1,1	-0,4

TUG(sec)-Test"Timed up and go";TUG_1(sec)-Test"Timed up and go"carrying full glass of water consequently with left and right hand;TUG_2(sec)-Same as TUG_1 and simultaneously counting. X_1 – first measurement; X_2 – second measurement; X_3 – third measurement

Before treatment FVC (l) is 3,10 l, which is 80% of the reference values (3.85 l). After the procedures increased with 120 ml and reaches 86% of the standard values. The third patient has an improvement in $FEV_{1(}$l) with 110 ml, which is 86% of the reference values. $FEV_{1(\%}$) increased by 9% at the end of the treatment course. Peak expiratory flow depends on the input effort at expiration. In the third patient, there is a percentage of the estimated value improvement in peak expiratory flow rate of 73 (l/min) at the end of the study, but the values are almost two times lower than the reference and points of weakness of the respiratory muscles and the need for targeted breathing exercises. There is a trend towards improvement of all indicators of external respiration, but the values remain lower than the reference.

Table 6. Changes in spirometric parameters in the third patient

Measurement / Parameter	X_1	X_2	X_1-X_2
FVC (l)	3,10	3,32	0,12
FEV_1 (l)	2,45	2,34	0,11
PEF (l/min)	193,0	236,0	43,0
FEV_1 (%)	74,0	83,0	9,0

FVC(l)-Forced vital capacity(liters);FEV_1(l)-Forced expiratory volume in 1 sec(liters);PEF(l/min)-Peak expiratory flow(l/min);FEV_1(%)- Forced expiratory volume in 1 sec as a percentage of the estimated value;X_1–start;X_2–end

CONCLUSIONS

Kinesitherapy improves overall physical activity of patients with Parkinson's disease in everyday life. Improvement of dynamic balance and coordination results in an improvement of locomotion, which is expressed by the increased speed of the walking with a longer stride. KT methods improve body transfer decreasing time for changing body position. We recommend including of targeted breathing exercises in KT procedures to improve respiratory function.

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PULMONARY FUNCTION – POSSIBILITY OF INFLUENCE FOR IN-HOSPITAL ACUTE STROKE PATIENTS

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Key words: *early physical therapy, acute stroke, breathing exercises*

INTRODUCTION

Several studies have shown that patients with stroke and hemiplegia develop restrictive pulmonary dysfunction as a result of paresis of the respiratory muscles [1,2]. This reduces patient's ability to deepen their respiration voluntary and to cough forcefully. Eventually the diminished movement range will decrease the mobility of the thoracic wall and increase stiffness, causing restrictive pulmonary dysfunction. This in combination of dysphagia leads to increase risk of pneumonia in acute phase and some studies suggested that the pulmonary function values decreased progressively with the time had elapsed since stroke onset [3]. In the long term other factors, such as an altered compliance of the musculoskeletal system and change muscle tone distribution of the respiratory muscles appear to be partly responsible for restrictive disorders. In practice this means that the lungs function of bed-bounded patients have to be checked daily [4].

Treatment should aim at optimal ventilation of the respiratory tract, to allow sufficient cerebral oxygenation, included that of the area affected by the infarct. It is assumed that physical therapists play an important role in optimizing pulmonary ventilation in patients with stroke [5]. However there has been no well controlled trial to back this up.

Several studies have investigating respiratory training with stroke conditions. Randomized controlled trials of inspiratory training by using feedback device were conducted in subacute and chronic stroke patients [1, 3, 6].

Purpose: To determine the possibility of impact on pulmonary function through using feedback tool for respiratory rehabilitation during the acute period in patients with ischemic cerebral stroke and appropriate methodology of physical therapy on the pulmonary function and functional status of patients.

MATERIAL AND METHODOLOGY OF THE STUDY

The range includes 18 patients in acute period - not later than 48 hours after the accident. Eight men and ten women of average age of 71,56 ± 7,83 years with light to moderate severity of National Institute of Stroke Scale (NIHSS) – 4 to 14 points and Glasgow-Liege scale 18 to 20 points have been monitored. All the patients were with ischemic stroke (computed tomography scan confirmed), 9 left and 9 right paretic sides. Fifteen of the patients had hypoesthesia, three had no sensory abnormalities. All the patients were able to understand instructions, perform commands and spirometry, without apparent cognitive impairments, decompensated diabetes or high functional class heart failure, no patient was overweight, none had scoliosis or any other abnormalities of the vertebral column, 4 were ex-smokers, 8 non-smokers and 6 smokers. The baseline characteristics of the patients are presented at Table 1.

The applied study methods are the following: functional respiratory evaluation – forced vital capacity (FVC), peak expiratory flow (PEF) were measured trought a portable spirograph (Vitalograph Micro Spirometer, Vitalograph ltd, Ireland). Inspiratory capacity (IC) measured with the device Coach2 Incentive Spirometer, measured in ml, rounded to the nearest 50 ml. Both studies are conducted in supine lying position with raised upper part of the trunk from 30° to 45°. All pulmonary function measurements

were taken after three attempts, the best achievement is reported. Trunk Control Test is used to study and assess the patient's motor function after cerebral vascular stroke. The test is suitable for use during the acute period, as the balance in standing is not taken into account [7]. It is a relatively simple test that examines 4 test movements: from supine lying – turning to the affected side, from supine lying - turning to the unaffected side, sitting from supine lying and maintaining the balance while sitting.

The feedback breathing device for inspiratory training (Coach2 Incentive Spirometer) was applied (after instruction and education) to all patients. Under the physical therapist's supervision the patient perform 5 repetitions in three positions – affected side lying, unaffected side lying and supine lying with upper body part between 30° and 45° degree. Separately by himself the patient perform 5 repetitions with 1 to 3 minutes rests between them, at least 4-5 times a day, every day of the week, for 10 days. After discharge the respiratory training with device continue as a home-based training. Indications for termination of the training are: change in the breathing pattern with inclusion of additional respiratory muscles, paradox breathing, severe fatigue or dyspnea; patient's desire to discontinue etc.

Physical therapy is applied to achieve an optimal level of functional recovery and to influence and

Table 1. Patient's baseline characteristics

n	18
age	71,6±7,8
gender	
male	8
female	10
paretic side	
left	9
right	9
smoking	
smoker	6
ex-smoker	4
non smoker	8
NIHSS score	8,3±2,4

Table 2. Findings of pulmonary function and TCT

parameter	before	after
FVC(l)	1,9±0,71	2,1±0,74**
PEF (l/min)	172,5±49,4	192,7±56,69*
IC (ml)	1126,4±586,7	1550,1±724,8**
TCT (points)	57,3±24,2	81,94±17,9**

Values are presented as mean ±standard deviation; FVC – forced vital capacity; PEF – peak expiratory flow, IC – inspiratory capacity; TCT – Trunk Control Test – total points

minimize risk factors for complications. Choosing the most effective therapeutic exercises depends on the determined deficits, needs and expectations of the patients. We group the applied exercises according to the baseline status and the motor activity, which is being facilitated or stimulated. From the activities in bed the following have been applied: positioning, use of proprioceptive neuromuscular facilitation (PNF) techniques to facilitate breathing and prolongation the exhale phase, use of sensory training to treat the superficial and deep sensitivity of upper and lower extremities, training to recognize the body parts, and orientation for left and right, self-assisted movements, learning and training transfer in bed, manual facilitation and stimulation of diaphragmatic and chest breathing, training in standing up from sitting, special attention on achieving symmetry of the body, transferring the weight with and without support of the upper limbs, gradual progression from assisted standing to independent standing and walking [8].

RESULTS

Values are reported as mean ± SD and presented on Table 2. Descriptive statistics to present patient's characteristics and tests for normality were checked. Student's t-test for paired sample was used for parametric variables and Wilcoxon t-test for nonparametric variables. The significance level was set at $p < 0,05$. Statistical analysis was performed using SPSS 19.0. The results conducted twice – before and after the physical therapy program are presented at table 2. The Trunk Control Test's points are presented as total score. At discharge significant improvement is observed for all parameters. The FVC values are improved by 0,2 l, PEF with 20,2 l/min, IC with 423,6 ml and TCT with 24,64 points.

DISCUSSION

Consequences of hemiparesis may include abnormalities in muscular tone, postural and motor control, that lead to inadequate functioning of the entire body and could compromise voluntary motor function. Spirometry test and inspiratory capacity are measured by volitional tests, in the sense that they require a patient to make a maximal effort and their interpretation depends of that effort. Stroke patients may theoretically perform badly, because the test depends on understanding and performance, although the more obvious manifestation of stroke concern motor skills, motor plans and motor control. That's why our patients were selected according to including criteria ability to understand instructions, perform commands and spirometry.

The FVC is considered as an integral indicator of the physical capacity and in particular – of the functional condition of the respiratory system [9] and in a restrictive type of respiratory disorder a decrease in value is observed. Probably lower values in our study are due to the impaired mechanics of breathing as a result of the cerebral vascular accident which is similar to the results of other authors [1]. The changes in FVC are likely to result of improved inspiration after training. Other authors also report an improvement in the spirometric indicators in stroke patients after conducting a targeted workout with an incentive breathing device, but their studies were held in a subacute and chronic period with a duration of 4 to 8 weeks [3, 6, 10].

PEF is the peak volume rate of exhaled air during the first 100-200 ms in forced exhaling and is an indicator depending on the extent of effort used to exhale. This is an important parameter for the effectiveness of cough mechanism, especially in patients with dysphagia. Cough requires coordinated activation of respiratory muscles (inspiratory and expiratory) and laryngeal muscles. Stroke can adversely affect cough function. This is demonstrated by studies showing a higher incidence of aspiration and chest infections in stroke patients with a weak voluntary cough [11], and a significant association between absent cough reflex in acute stroke patients and subsequent development of pneumonia [12]. Good evidence exist that respiratory muscle function is significantly impaired after stroke because of decreased corticorespiratory outflow from damaged cortex and thus result in a week cough with decreased ability to clear airways and increased risk of chest infection [1, 2]. Positive results on PEF probably due to the effect of training and motor control improvement of respiratory muscles. The using of device, include visual stimulation and feedback adjustment during inhalation, allows early involvement of basic principles of motor learning.

Breathing can be activated volitionally through corticospinal pathways or automatically through bulbospinal pathways. Volitional deep breathing is under control of the corticospinal pathways [13]. The reduced patient's ability to deepen their respiration voluntary and to cough forcefully may increase risk of pulmonary infection. Incentive inspiratory training involves the training of the specific muscles including diaphragmatic and intercostal muscles. The inspiratory capacity data in this study showed significant improvement with 423,6 ml. It is not clear if the increased inspiratory capacity is due to improved movement of the affected diaphragm or is due to compensation of the unaffected diaphragm. However, the improvement in the inspiratory capacity affects the ventilation in patients in acute period.

The appropriate assessment of patients in the acute stage of stroke allows the physical therapist early to decide which physical therapy method will be most efficient. Functional prediction models have been developed to identify stroke patients with different functional outcomes. TCT reliability and validity had been demonstrated in stroke patients and had its positive correlation with disability at hospital

discharge from inpatient rehabilitation measured with the functional independence measure (FIM) [14]. The ability to maintain sitting position is used to identify and determine functional recovery capacity [15]. The bigger number of points means a better status of the patient, with the maximum possible points 100. In the studied patients there is an increase in the total score at discharge from 57,3 points to 81,94 points. At discharge there was no patient unable to maintain balance while sitting, which is probably due to the application of physical therapy to influence the abdominal muscles (associated with functional activities in bed) and posture while sitting.

CONCLUSIONS

An intervention targeting stroke-induced central respiratory muscle disturbance may improve pulmonary function. Incentive inspiratory breathing device positively influence the dynamic pulmonary function in-hospital acute stroke patients. The early application of incentive inspiratory breathing device is possible in clinical settings. The applied methodology of physical therapy improves the overall physical activity of patients in clinical setting.

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MORPHOLOGICAL CHARACTERISTICS OF SHORT TRACK COMPETITORS

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***Keywords**: Morphology, somatotype, short track*

Short track like other dynamic sports requires multifaceted factors for its success. These range from anthropometric, physiological and functional, psychological and sport specific factors. One of these factors, that contribute for success in the sports events is body size and shape, or morphology. The importance of morphological optimization varies from sport to sport. The interconnection between the morphological characteristics and the successful sports presentation by registrating the anthropometric features of the body, confirming the dependence between structure and functioning is a subject of investigation from different authors. [2, 5, 7, 9, 12, 15, 16, 17, 18]

The data of the morphological characteristics of short track competitors are very scanty.

The aim of the present study is to make morphological characteristics of short track competitors and to define their somatotype and body composition.

METHODS

A representative sample of high trained short track competitors, consisting of ten female and ten male athletes were the subject of the investigation. The females are at age from 15 to 21 years old-average 18,5 years and the males – from 16 to 30 years, average 22,3 years. All athletes have performed their discipline for more than five years.

Anthropometric measurements were done on the investigated competitors. These include five body lengths, ten girths, seven bone diameters, body weight, strength of right and left hand and caliperimetry of fourteen skinfolds. Measurement were taken by a standart methodics, use in our country (P. Slunchev et al. 1996). [13] The following equipment were used in the study: stadiometer, flexible centimeter tape, Lange skinfold caliper, broad blade caliper bone caliper, digital weighting scale and hand dynamometer. All measuring devices are responding to the international standarts.

On the basics of a part of the measured anthropometric features, we calculated compossed parameters. characterizing the body composition: % body fat, absolute quantity of fat tissue (kg), lean body mass (kg), absolute quantity of muscle mass (kg), muscular circumferences of arm and tight (cm), Body Mass Index (BMI).

The somatotype of the athletes was defined by the Method of Heath and Carter (1980, 1992). [6, 15]

The results were worked out by the method of variance analysis.

The average values of the registered anthropometric parameters are displayed on table 1.

The body height as a main feature for the physique of the person, from which the rest of the anthropometric parameters depend, in different, but remarkable degree, is with average value 164,43 cm for women and 175,15 cm for male athletes, in comparison with European top roller speed skaters (short distance) which are with average height 166 cm for females and 177,3 cm for males, (Roller skating derived from the ice skates and have speed all over the world in the nineties). [8, 12]

The body weight of the investigated short track competitors is at average 57,16 kg for females and 70,35 kg for males and the values are lower than that of roller speed skaters (sport distance) – 58,3 kg for females and 73,2 kg for males.

The larger and heavier the athlete is the more weight he has to move and the more force he has to raise per push. So a large and heavy competitor has to spend more energy than a smaller and lighter athlete. In other words it means that the larger athlete has to train more for the same amount of power than a smaller one. [4]

A short statured athlete has agility benefits in the speed of movement and action. On the other hand a taller athlete may have benefits, because of the longer legs, he can increase his phase of pushing, and he does not have to take as many steps as a smaller one and would thus save energy. [4]

The length of the arm and the arm span are of the investigated short track competitors at average values 74,55 cm and 167,16 cm for female athletes and 78,15 cm and 176,61 cm.

The length of the leg is at average values 98,9 cm for females and 104,2 cm for male athletes and it does not differs from the values of high level sprinters (track and field) competitors.

Sports high intensive athletic events like the sprints in short track require powerful and efficient muscle contraction. An athletes ability to cover a distance in a short period of time is a factor of power and explosive strength of the muscles. [14]

Table 1

Parameters	FEMALES		MALES	
	$\bar{X}$	S	$\bar{X}$	S
Lenghts				
Height	164.43	6.57	175.15	7.21
Sitting height	86.4	3.50	92.35	4.98
Length of the arm	74.55	3.52	78.15	4.32
Length of the leg	98.9	9.50	104.2	6.22
Arm span	167.16	7.32	176.61	7.97
Circumferences				
Neck	31.6	2.39	36.9	3.52
Chest-relaxed	75.7	4.98	93.4	9.82
Chest-inspir.	83.4	3.96	99.2	12.50
Chest-expir.	71.2	4.12	89.25	13.25
Ins - Exp. difference	12.2	3.35	9.95	2.12
Waist	67.8	6.74	75.4	4.90
Upper arm - contr.	26.95	1.25	34.75	2.92
Upper arm - relax.	24.1	1.62	30.05	1.95
Contr. dif.	2.85	0.99	4.7	1.88
Forearm	22.5	1.05	26.8	1.22
Tight	54.6	4.00	56.45	4.25
Calf	34.4	2.67	36.1	3.51
Diameteres				
Biacromial	35.35	1.82	40.45	
Front-back chest	17.65	0.47	20.15	1.92
Horizontal chest	25.3	1.02	28.3	3.21
Bicristal. pelvis	26.6	1.12	26.2	1.07
Bitrochanter. pelvis	29.5	1.52	29.7	1.53
Elbow d.	5.98	0.48	6.86	0.75
Knee d.	8.55	0.66	9.72	0.62
Weight	57.16	6.98	70.35	10.2
Hand-grip strength				
Right	27.0	5.11	45.6	8.72
Left	24.8	4.95	41.7	6.95

The circumferences of the upper and lower extremities give an information for the development of the muscles and the quantity of fat tissue in these regions.

The mean values of the upper arm circumference contracted and relaxed are 26,95 cm and 24,1 cm for females, with contractile difference 2,85 cm. and 34,75 cm and 30,05 cm. for male athletes – contractile difference 4,7 cm., that informs for well developed muscles of the arm.

The circumferences of tight and calf, with mean values 54,6 cm and 34,4 cm for females, and 56,45 cm and 36,1 cm for males also give an evidence for good muscular development.

The circumferences of the chest relaxed, with maximal inspirium and with maximal expirium of the investigated athletes give information for very well developed chests, characterizing trained persons or those who practice sports activities from adolescence.

The analysis of the body composition (table 2) shows relatively low percentage of body fat 13,47% for the male competitors, compared with non athletes from the population that have 15%, but higher value of track and field sprinters, that have 6%, and European top roller speed skaters – 9,7%. For female athletes the mean value of body fat is 18,08% and is very near to the results of the European top roller speed skaters (short distance) – 17,6%. [8, 9, 11]

Table 2. Composed parameters, characterizing the body composition

(mean values)

(mean values)

Parameters	FEMALES		MALES	
	$\bar{X}$	S	$\bar{X}$	S
% Fat tissue	18.08	4.92	13.47	3.93
Absolute quantity fat tissue	10.38	5.12	9.64	3.59
Lean body mass	46.72	4.98	60.25	9.97
Absolute quantity muscular mass	31.20	4.21	39.70	13.21
Muscular circumference of upper arm	18.04	1.05	25.69	5\6.12
Muscular circumference of tight	48.06	3.28	49.41	4.38
BMI	21.09	2.25	22.73	2.51

Table 3. Mean values of the somatotype components

Parameters	FEMALES		MALES	
	$\bar{X}$	S	$\overline{X}$	S
Endomorphy	3.84	0.98	2.75	0.62
Mezomorphy	3.40	0.82	5.33	2.12
Ectomorphy	2.69	0.57	2.57	0.55

The lean body mass of the investigated athletes is with high values – 60,25 kg for males and for females - 47,72 kg. The absolute quantity of muscular mass again is high – 39,70 kg for males and 31,20 for females and this is the evidence for very well developed muscular system. The muscular circumferences of the upper arm and the tight - 25,69 cm and 49,42 cm for males, and 18,04 cm and 48,06 cm for female, also confirm the impession for well developed muscles, which are of great importance in the training process and for successful sports presentation.

The analysis of the body composition of the short track competitors shows that under the influence of the regular training process positive changes in the morphological structure of the body occur, characterized by reduction of the passive body mass and increase of the active (lean) body mass and especially the muscular mass.

The somatotype of the investigated athletes is with mean values 2,75-5,33-2,57 for males and can be qualified as balanced mesomorph, providing information for musculoskeletal body structure. For the female athletes the mean somatotype is 3,84-3,40-2,70, that marks central somatotype, characterized with equal development of the three of the components well developed muscular and sceletal body structure with moderate subcutaneus fat tissue and enlongment of the segments.

The mesn values of somatotype components are presented on table 3.

IN CONCLUSION as a result of the present study it can be assumed that the short track competitors are with highlighted athletic appearance, not very tall and heavy with relatively low subcutaneus fat tissue, well developed muscular-skeletal system, especially the muscles of the lower extremities and with well developed chest. But the question whether there is a specific morphological type for top short track competitor needs further investigation, in order to be useful for the selection and to help the training process for obtaining most successful sports presentation.

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POSTURAL CONTROL AND BALANCE REACTIONS IN PATIENTS WITH ISCHEMIC STROKE IN THE CHRONIC PERIOD

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Keywords: Static balance, Functional balance, Kinesitherapy, Ischemic stroke, Chronic period

NTRODUCTION

Postural control is the ability to retain the center of gravity of the body on the support surface while sitting and in standing position. It is a dynamic phenomenon which combines simultaneously mobility and stability of a necessary condition for lending and retaining the required body posture when is necessary to perform controlled and coordinated motor activity [11]. Impaired balance reduces the ability of independence in daily life [17]. Patients with stroke have limited physical activity that changes the sensorimotor control, postural control, the musculoskeletal system and the autonomous control. This creates progressive cardiovascular risk for development of disease, and predisposition to recurrent stroke [8, 13, 14]. Due to the long-lasting constraints, physical performance and the social adaptation of the patients has been hampered [2].

In stroke, abnormal postural response can not be due only to the unilateral sensorimotor dysfunction. It is known that stroke can reduce the vestibular function and that this may affect the postural reaction on both sides of the body with violation of the vestibulo-ocular reflex [5]. In patients with stroke is impaired ability for transferring the burden in swing phase. Patients have difficulties in maintaining upright standing position with the affected side, have difficulty controlling the muscles and difficulty to respond to proprioceptive feedback effect, providing additional balance difficulties. Balance in patients with stroke can be further aggravated by postural hypotension, adverse drug effects, mental status, abnormal vision, and other conditions associated with neuropathy, arthritis, and altered cognitive status [15].

The plasticity of the central nervous system is necessary to re-establish the balance while sitting and standing, in patients with stroke [10]. But still is not clear whether the improvements to sitting balance leads to an improvement in straightening, standing, sitting and walking [12].

Kinesitherapeutic means which in modern neurorehabilitation are often applied to improve the postural control, balance reactions and the daily capabilities of the patients with stroke, are using treatment within Bobath methods [3], stimulation of sensory function and biofeedback [19], various exercises, including dual task [9] and sling exercise therapy [6].

According to Gencheva, N., (2003) the exercises with Swiss Ball can significantly improve muscle strength and endurance, coordination of movement and balance control of the body, both in sitting and standing position [7]. In a study of the effect of the application of the kinesitherapeutic methodology with exercises on a Swiss ball, Dimitrova, A., et al., (2007) found a positive effect on the static balance in patients with ischemic stroke in the vertebral-basilar system in the subacute period [4].

The aim of this study was to investigate the influence of specialized kinesitherapeutic methodology (SKTM) on static and functional balance reactions in patients with ischemic stroke in the chronic period, which is developed on the grounds of the principles of motor control, motor learning and modern guidelines to neurodevelopmental treatment (NDT).

METHODOLOGY

In the study were included 11 patients with chronic right- sided (63.6%) and left-sided (36.4%) hemiparesis (Tabl. 1) after ischemic stroke within 3 months and one year duration of the disease. The patients studied were evaluated on performance of Berg Balance Scale (BBS) at the beginning of the 10th day, 1st month and 3 months. Performance of Berg Balance Scale has strong psychometric properties and that is valuable in the evaluation of clinical change of the balance after stroke [1].

The original test involves implementation of 14 tasks with elevated difficulty, reflecting the normal activities of daily living (rising from a seated position, taking an object from the floor, standing position on one leg, turning, reaching, step on the block). The first 5 assignments are used to assess the main balance capacity and the remaining 9 (6 to 14 assignments) include more complicated balance tasks. Evaluating the possibilities of the studied patients to maintain the balance while performing tasks with a gradual reduction in the support surface, with weight transfer of the body to turn and reach. The first task is performed by seating and ends with standing position on one leg. The assessment uses a 5 point scale (0-4) depending on the possibilities to perform a task. These levels are based on precisely defined criteria [18].

Tabl.1 Distribution by sex and hemiparetic side

Sex / hemiparetic side	Frequency	Percent	Valid Percent	Cumulative Percent
Man	5	45.5	45.5	45.5
Woman	6	54.5	54.5	100.0
Right-sided	7	63.6		
Left-sided	4	36.4		
Total	11	100.0	100.0	

Tabl.2. Descriptive characteristics of the patients by age, weight, height, a stage of functional recovery of Brunnstrom and Ashworth's test for spasticity at baseline of study.

Parameters	Minimum	Maximum	Mean	Std. Deviation
Age	53	76	65.00	6.372
Weight	60	82	71.27	7.072
Height	152	174	163.64	6.727
Brunnstrom-upper limb			3.73	.647
Brunnstrom-lower limb			4.36	.505
Ashworth-upper limb			2.182	.7508
Ashworthlower limb			1.636	.3931

The clinical characteristics of the patients are given in Table. 2, where the descriptive characteristics of the studied patients are specified by age, weight and height, the mean and standard deviation of the scores of the stage of functional recovery of Brunnstrom and Ashworth's test for spasticity at baseline of study. For presence of a homogeneity in the study, patients were selected by the following criteria: have not severe respiratory insufficiency, cardiovascular insufficiency (third functional class), uncontrolled diabetes mellitus, cognitive and memory disorders, acute thrombophlebitis, severe decubital ulcer, severe orthopedic disorders impaired coordination and gait, ischemic heart disease, malignancies, severe progressive neurological disorders. The patients gave a written consent to participate in the study. All patients were able to move around alone or with help, and without serious problems in communication.

The daily specialized kinesitherapy is with moderate overload. In the introductory part, the exercises are focused on preparing the body for the forthcoming exercises, a gradual adaptation of the cardiovascular system (chest and diaphragmatic breathing). The main part of kinesitherapy includes exercises to move from occipital lying to standing position, upper limb exercises and shoulder girdle control, lower limb exercises and control of the trunk, pelvis, and walking. The final part includes relaxation exercises for patients. After 10-day daily kinesitherapy, patients have made adaptations for home rehabilitation program for 3 months.

The resulting data were statistically processed using the descriptive analysis. Paired Samples Test is used to compare the parameters at the beginning of the 10 days, the 1st and 3rd month after kinesitherapy.

Tabl.3. Mean and standard deviation of the static and functional balance of the 1st day, 10 day, 1st month, 3rd month

	Mean	Std. Deviation	Std. Error Mean
static balance _1st day	1.2727	.79415	.23945
functional balance _1st day	1.4545	.84778	.25561
static balance _10 day	3.0227	.45352	.13674
functional balance _10 day	3.2909	.46358	.13978
static balance _1st month	3.5909	.35834	.10804
functional balance _1st month	3.7364	.29419	.08870
static balance _3rd month	3.9318	.11677	.03521
functional balance _3rd month	3.9545	.06876	.02073

Tabl.4. Paired Samples Test of the static and functional balance of the 1st day, 10 day, 1st month, 3rd month

Paired Samples Test

		Paired Differences - Static / Functional Balance					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
Pairs		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Static - functional - 1st day	-.18182	.34948	.10537	-.41660	.05297	-1.725	10	.115
Pair 2	Static - functional - 10 day	-.26818	.31644	.09541	-.48077	-.05559	-2.811	10	.018
Pair 3	Static - functional - 1st month	-.14545	.29534	.08905	-.34387	.05296	-1.633	10	.133
Pair 4	Static - functional - 3rd month	-.02273	.10090	.03042	-.09052	.04506	-.747	10	.472

RESULTS

Descriptive characteristics by age, weight and height of the studied patients are presented in Table 2. At the study start, have been introduced average values and standard deviation of scores along the stage of functional recovery by Brunnstrom and Ashworth spasticity test. From the values clearly appears that the patients are with mild damage after ischemic stroke, the assessment of the stage of functional recovery by Brunnstrom for upper limb is 3.73 for lower limb - 4.36, and the evaluation of the test for spasticity in Ashworth for upper limb is 2.18 and lower limb - 1.63.

It was found significant change in the mean and standard deviation of static and functional balance with the crisper changes in the value of 10 days (Table 3).

In Table. 4 presents the results of the changes in static and functional balance of the monitored patients. Performance of 1st day, 1st month and 3rd months are not significantly changed ($p > 0.1$). On the 10th day after the beginning of treatment the data were statistically significant ($p = 0.018$). The static balance is significantly lower than the functional improvement, at a value of significance of $p < 0.05$.

In Table. 5 shows the changes in the balance possibilities of the monitored patients being referred to the difference in performance between the 10th and the 1st day, 1st month, 10th day and 3rd month and 1st month. There is improvement in absolute values during treatment, but the statistical significance of the changes is not established.

DISCUSSION

From the present study establishing that SKTM has a tendency to improve static and functional balance in patients studied. To normalize the control between the unaffected and affected side of the body, are used exercises for transition from lying occipital position to standing position, self-taught in changing the initial position and gradual verticalization. The exercises for upper limb and shoulder girdle control normalize the control of movements of the upper limb, control of the health and the affected side of the body and facilitate the performance of the daily living activities.

Exercises for lower limb and control of the trunk and pelvis normalize the control of movement of the lower limb, control of the healthy and the affected side of the body, improve the balance reactions of the body, better coordination and consistency of the motor responses, improved static balance and the postural control (optimal position of the trunk and lower limbs), stimulate response in m.quadriceps femoris and facilitate walking. Walking exercises normalize control of the trunk and the upper limbs, normalize the control of the healthy and the affected side of the body, improve the balance reactions, better coordination and consistency of the motor response, improved dynamic control and facilitate movement. Similar results were indicated by other authors, arguing that the exercise of the unaffected upper limb during sitting, in which patients are trained to transfer the burden of the body (arm's length), have a positive effect on the seating balance [12]. The exercises in symmetrical standing and seating have a positive effect on the lateral distribution of the burden during these changing situations and the speed of implementation of these activities [16].

CONCLUSIONS

The applied by us methodology continued later as an exercise program at home, is with tendency to improve postural control and balance reactions in patients with ischemic stroke in the chronic period.

ACKNOWLEDGEMENT

None of the authors and their institution have received any commercial, financial support related to this study.

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INJURY INCIDENCE AMONG NON-PROFESSIONAL BULGARIAN FOLK DANCERS

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Key words: *Bulgarian folk dances, injury*

Bulgarian folk dances (BFD) are gaining wide popularity as a recreational activity. Only in Sofia there are over 65 clubs, each of them with groups in different grades – beginners, intermediate and advanced. Dancers say that the dance classes bring them positive emotion, decrease the work stress and oppose the negative sedentary lifestyle. Despite of all positive features of this physical activity, there are some injury aspects in dancing. In the literature there are no data about injuries in Bulgarian folk dancers.

The aim of our study is to determine the type, location and dissemination of the injuries among the dancers who practice Bulgarian folk dances (BFD).

Materials and methods. The studied group consisted of 154 dancers of both genders, aged between 18 and 45 years, practicing in 7 different dance clubs. The criteria for inclusion are: practicing BFD for 3 years and more, with two workouts weekly for 1 hour each. The method of the study is inquiry with closed questions about presence, location, mechanism and severity of the injuries.

Results and analysis.

Dissemination of injuries. Our inquiry showed that of 154 dancers there are 34% who had or have an injury related with dance classes (Fig.1). Lately, in Bulgaria, dancing became a popular recreational activity – there are schools for latino dances, contemporary dances, hip-hop and break, zumba, but most attended are Bulgarian folk dances. We didn't find literature data about dance injuries in Bulgaria, but there are plenty of results from foreign sources. In Sweden professional ballet company are reported 390 injuries by 98 dancers for 5 years [11]. In Norwegian National Ballet is held an inquiry to 41 dancers – 31 of them had an injury at least once [4], and in a contemporary dance school from 57 dancers 89% had one or more injuries related with dancing [3]. In breakdancing and hip-hop dance there is also a high percentage of injuries. Cho et al. (2009) inquired 42 professional break dancers – 40 of them reported at least 1 injury. There is similar tendency with hip-hop dancers – from 312 inquired 232 reported for 738 injuries [13]. Unfortunately there is an injury rate in the recreational dance. Tufferey et al. (1989) inquired non-professional morris dancers, which showed 129 dancers with injuries from 145. According to Steinberg et al.(2011) from 1336 non-professional female adolescent dancers between 8 and 16 years old 569 have some kind of injury.

Injury location. Our results from the inquiry showed that the most injured area in BFD is ankle (17%), followed by knee (12%), foot (6%), hip (1%), and low back area (2%) (Fig. 2). The sum of percentage is more than 100%, because there are some practitioners with more than one injury. This results are explained with specific dance elements – jumps, hops, etc. Another factor is possible anatomo-morphology diversion in dancers – misalignment of lower extremity, difference between length of lower extremities (leg lenght discrepancy), etc.

Most injuries are located in the lower extremities but there is also consistant amount of chronic low back pain complaints. This is not a surprise, because there is a repeatable stress in lower extremities during the number of rehearsals and performances. Even in breakdance and hip-hop dances, where the upper extremities take a great part in the dance moves, there is prevalence of low extremities' injuries [5, 10, 13]. According to Rothenberger et al. (1988) the most occurred injury in 726 inquired aerobic dancers is shin splints – 24.8%, low back pain – 12.9% and ankle joint injuries in 12.2%. In morris dancing there is mainly injuries in ankle, calves and back [21]. In ballet there are differences in researches. Nilsson et al. (2001) discover more knee, ankle and foot injuries, but Arendt et al. (2003) add there is

also a low back injuries. Ramel et al. (1994) consider in this contingent prevalent the low back pain, followed by ankle, foot and neck injuries. In irish dance there are mostly knee and ankle injuries [12,22]. There is an interesting study of Campoy et al. (2011) held with 500 participants in a huge dance festival with a number of different dances. According to inquiry results in ballet the most injured area is ankle (28.7%), in jazz and contemporary dances – thigh (27.5%) and hip joint (27.9%), step and folk dances=

- knee joint (43.1%). Steinberg et al. (2011) also report about most frequented knee injuries in non.professional adolescent (14-16 years old) female dancers. Our study extends and confirms the present literature data.
- Injury mechanism. According to Dagorov, N. (1998) we divide the sports injuries by the mechanism of the injury and pathoanatomic tissue changes to followed groups:
- first group – injuries received by an acute mechanical factor (hit, strong press, strong stretch caused by a powerful muscle contraction or irregular joint movement) leading to sudden break of tissue: fracture, tissue rupture or tissue compressing.
- second group – overuse injuries caused by repeatable physical overloading. The repeating of powerful muscle contractions, stretch of soft tissues or intensive friction between tissues cause interruption in cell processes. There are gradually developed pathological processes in the cell of dystrophia and degeneration type.

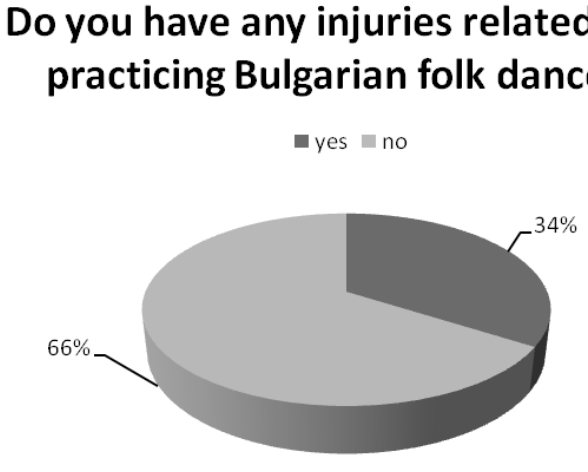

Fig. 1. Dissemination of injuries according to our inquiry.

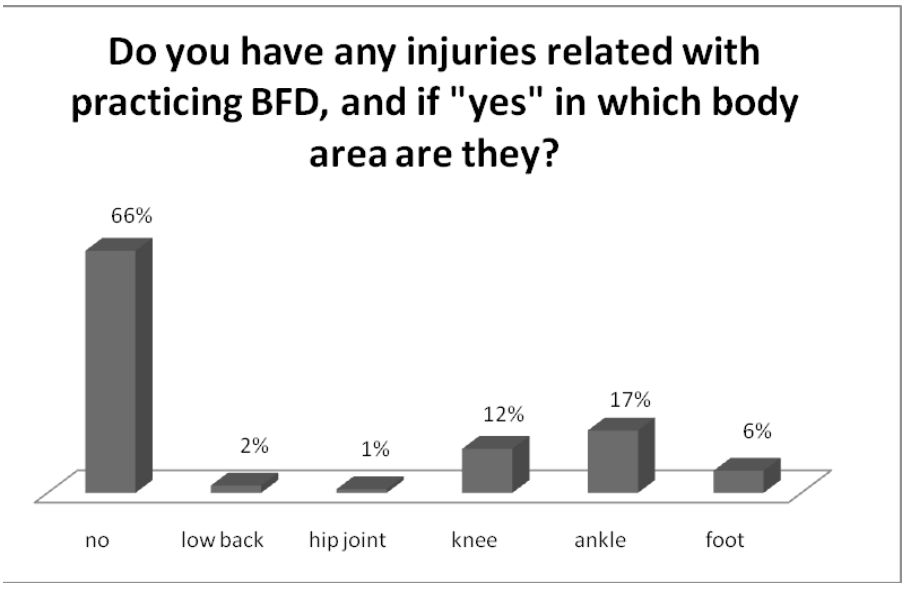

Fig. 2. Injury location according to our inquiry

There are 55% of our inquired Bulgarian folk dancers with overuse injury (Fig. 3). In literature there are different ratio between the two injury types. According to Nilsson et al. (2001) most injuries in Sweden professional ballet company are overuse injuries. The same result shows the studies of Hincapie et al. (2008), Walles et al. (2010) and Campoy et al.(2011). Our study also confirms that overuse injuries are more frequent than acute injuries.

Injury type. In BFD the most common type of injuries are the tendon injuries (26,4 %), followed by muscle injuries (20,8%) (Fig.4). The sum of percentage is more than 100%, because there are some practitioners with more than one injury. Because of the inquiry pattern of the study, there should be considered that the answers are self-esteem of the dancers. That's why it is appropriate to unite this problems as muscle-tendon injuries. In literature there is similar statements – strains, tendinitis and soft tissue injuries are the most frequent in dancers, no matter if professional or recreational [2, 4, 7, 20, 23]. According to Hodgkins et al. (2008) tendon injuries are often pursued by bone or ligaments injury. The research of Jacobs et al. (2002) shows that the acute hamstrings strains affects more tendons than muscles. This leads to bigger loss of training days. Despite of the low percentage of luxations (7%) and sprains (15%), we should pay attention to the evidence of relationship between ankle luxations and remaining instability, peroneal tendinitis [15] and increased risk of contralateral ankle sprain [9]. The presence of high percentage of muscle-tendon injuries could be related (to the) with the specifics of dance movement. Another risk for overuse injury is incorrect technique of performance of the dance elements.

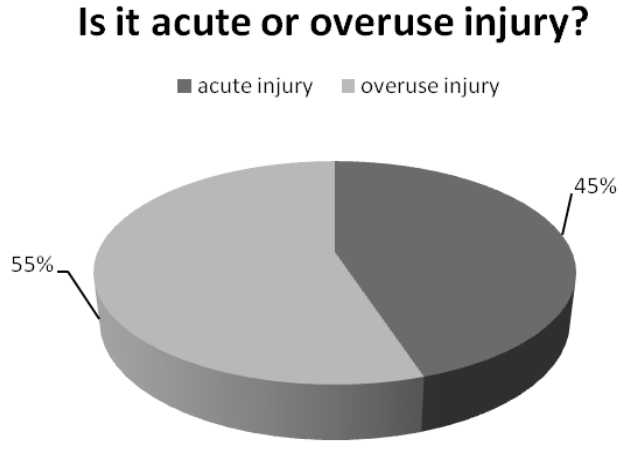

Fig. 3. Injury mechanism according to our inquiry.

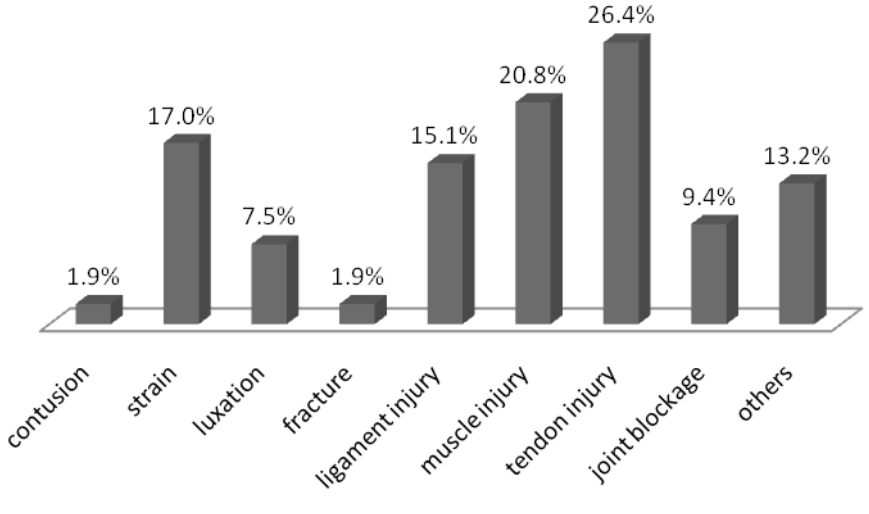

Fig. 4. Injury type according our inquiry

Severity of the injuries. The valuation of severity of the injuries is according to Dagorov, N. (1998). He divides sports injuries in 5 groups of severity based on the loss of training days:

- first group – lost no more than 4 training days (in the inquiry were marked as slight)
- second group – lost 5 to 15 training days (mild)
- third group – lost 16 to 45 training days (moderate)
- forth group – lost 46 to 75 training days (severe)
- fifth group – lost more than 76 training days (very severe).

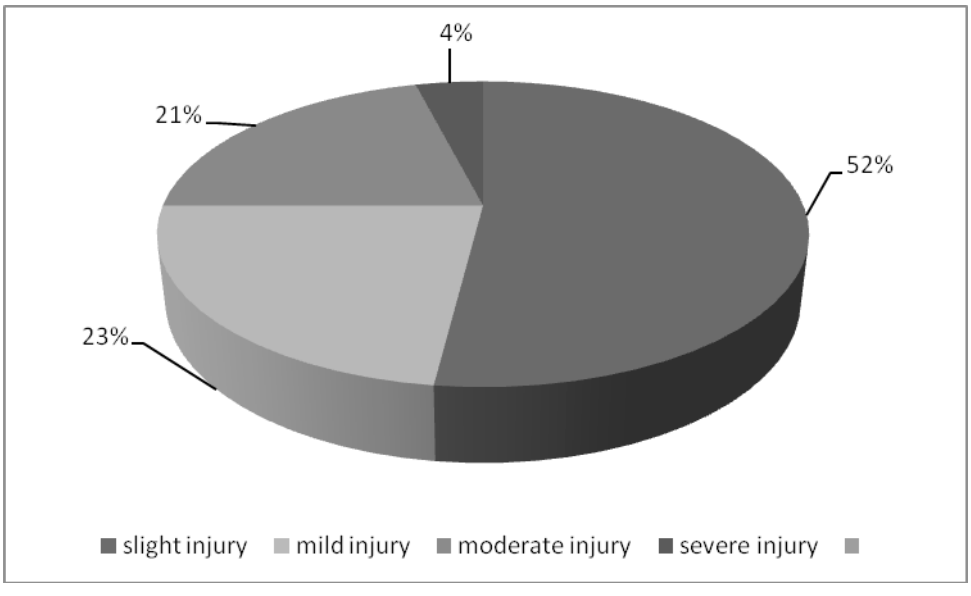

Fig. 5. Injury severity according to our inquiry.

In BFD there is prevalence of slight injuries (52%), followed by the mild (23%) (Fig.5). We should emphasize that the recreational BFD are held two times a week. This means even a slight injury is an about a fortnightly discomfort in the particular area.

Conclusions: About 1/3 of the inquired have sustained trauma related with the practicing of BFD. There is a prevalence of the tendons and muscular injuries in the area of the ankle and knee joint, more often by overuse. The injury severity is between slight and mild. Further studies are needed to determine risk factors for sustaining an injury among recreational BFD practitioners and also building of effective preventional programs.

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PREMENSTRUAL SYNDROME AND KINESITHERAPY DISTRIBUTION AND MANIFESTATIONS - A PILOT STUDY

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Key words: *Premenstrual syndrome, distribution, events.*

Introduction:

PMS is a complex of symptoms characterized by a variety of physical, mental and behavioral events occurring in the luteal phase of the MC. Symptoms are often mild, but can be moderate to severe and substantially affect daily activities. The duration of the events of symptoms varies from a few days to two weeks before the MC. Symptoms disappear with the onset of bleeding or immediately thereafter and there is no pattern in the follicular phase of the MC [24]. Usually women have the same set of symptoms from one cycle to the next (for Bulgaria missing data) [1].

The boundaries of this state is constantly growing, which means that it becomes a significant social problem affecting many women of working age. According to the World Health Organization (WHO) 199 million women have PMS for 2010. (5.8% of the female population). Up to 85% of ovulating women report that they have at least one or more symptoms of PMS, while 10% of them PMS is very heavy and requires serious treatment. Only 30-40% of these women seek help from a doctor (for Bulgaria missing data) [18].

The etiology of PMS is not less obscure for us, for the first time has been described by Robert Frank in 1931. There are many theories, but to date, none of them explains the whole range of PMS. This ambiguity offers many different treatment approaches. There is evidence of over 300 treatments for PMS treatment [3, 17]. The most commonly used therapies include drug treatment (hormones, antidepressants, inhibitors, diuretics, analgesics, vitamins, nutritional supplements, etc.) operations in extremely severe cases (hysterectomy with bilateral oophorectomy) and alternative medicine (massage, Chinese medicine, various therapies, exercises, etc.).

According to the authors, Lori M.Dikerson et al., Some of the recent studies, there are more than 200 symptoms associated with PMS. The most common are: fatigue, increased hunger; irritability and anger, depressed mood, anxiety and a feeling of tension, labile mood; swollen and painful breasts (mastodynia), back pain, lower back, swelling and pain in the abdomen, swelling of the extremities, weight gain and more. [21].

For diagnosis conclusion PMS, there are no specific laboratory tests. Rather, they are made to exclude other diseases. The following diagnostic criteria for defining and describing PMS are established [21]:

1. The presence of at least one or more psychological and somatic symptoms (depression, temper tantrums, irritability, anxiety, social withdrawal, swelling and pain in chest, abdominal bloating, headache, nausea, etc.) which are present in the last three menstrual cycles.
2. Symptoms to occur at specific times in the luteal phase (premenstrual) to decrease or disappear shortly before cycle or occurrence of bleeding. There are no symptoms during the follicular phase (before ovulation) of MC.
3. Documentation of the occurrence, persistence and disappearance of the symptoms of PMS symptoms in a daily diary from five to ten days before the cycle for two consecutive menstrual cycles.
4. Symptoms are not due to other diseases.

Until now, the pathogenesis of PMS is unknown, therefore the guidance of scientific studies are very diverse. The most common symptoms of PMS, quality of life associated with premensrtual violations, distribution and variation over time, the relationship between physical activity and premenstrual disorders, the impact of bad habits, etc are studied.

Several authors prove the positive impact of systematic aerobic exercise as a potential basis for reducing PMS [4, 19, 22, 28, 29, 31, 33]. According to Elizabeth R.Bertone-Johnson et al. it is very important to maintain a healthy body weight through regular physical activity to reduce PMS, because obesity is a risk factor for its development (missing data for Bulgaria) [7]. Many authors study the impact of stress on PMS. Analyzes show exacerbation of symptoms and high perception of stress. Burden of responsibilities, exercise, insomnia are potent stressors (missing data for Bulgaria) [2, 12]. No less is the impact of harmful habits.

Cigarette smoking, especially in adolescence and young adulthood increases the likelihood of women developing moderate to severe PMS [8, 34]. Tobacco use is associated with a shorter and irregular cycle [23, 30]. In another study held in 2000 from De Ronchi is found that there is a connection between the PMS and mood disorders, including anxiety, panic disorder, and depression. [5] The incidence of depression in patients with CMD is greater than healthy women [9, 13]. No less important is the established correlation between PMS and dysmenorrhea [11]. Overall, a negative impact of PMS symptoms on their daily lives is inspected to the most of the women. (for Bulgaria missing data) [16]. According to Pinar G. et Haywood A. PMS affects not only women but also their families and society (for Bulgaria missing data) [26, 14]. PMS is a common problem for young girls, which adversely affects the thermal degradation performance and emotional well-being [25].

HYPOTHESIS:

According to the literature the average rate for European countries PMS is 30-50% [12, 15, 27]. General trends in diet, hipodinamiya, obesity, increased levels of stress, bad habits, etc. suggest that the incidence of PMS in Bulgaria is similar to that observed in Europe. But due to lack of sufficient information in Bulgarian literature, we set out to provide data on the scope and scale of the problems associated with PMS.

MATERIAL AND METHODS

95 students at NSA «V. Levski» specialty Kinesitherapie, Tourism and Sports Animation from I-IV course were surveyed during the academic year 2013/14. The surveyed women are in age of 20 to 30 years, in good general condition with normal gynecological status. Two girls were excluded from the statistical processing of the results, due to the use of hormonal contraception. Based on existing data PMS produced a specialized survey consisting of two parts, which investigated the presence and severity of PMS, and general health status. The first part of the questionnaire includes specific questions that reveal the presence or absence of PMS. The second part of the questionnaire included questions about general health, physical activity, nature of work, etc.

Data were processed with the computer program SPSS 19.0. One-dimensional distribution of the signs is done.

RESULTS

The average age of the surveyed students was 22.2. The earliest age of onset of menstrual cycle of the researched contingent is 11 years, and the latest - 16 years, the exception is a girl matured cycle of 25 years due to organic causes. The average age at onset of first menstruation was 13.7 years, which is no different from the current literature of the country.

Seventy (73.3%) of the respondents reported the presence of premenstrual syndrome, eleven (11.6%) of them reported that they do not know of its presence, and fourteen (14.7%) indicated that they have premenstrual syndrome (Figure 1).

The order of the frequency of the most common psychiatric symptoms among respondents is as follows: exasperation and irritation, increased tendency to conflict - 71 women (74.7%), feelings of anxiety and tension - 67 women (70.5%), emotional lability - 62 women (65.3%), fatigue and a noticeable lack of energy - 58 women (61.1%), reduced concentration - 29 women (30.5%) and inability to get out of bed - 35 women (36.8%).

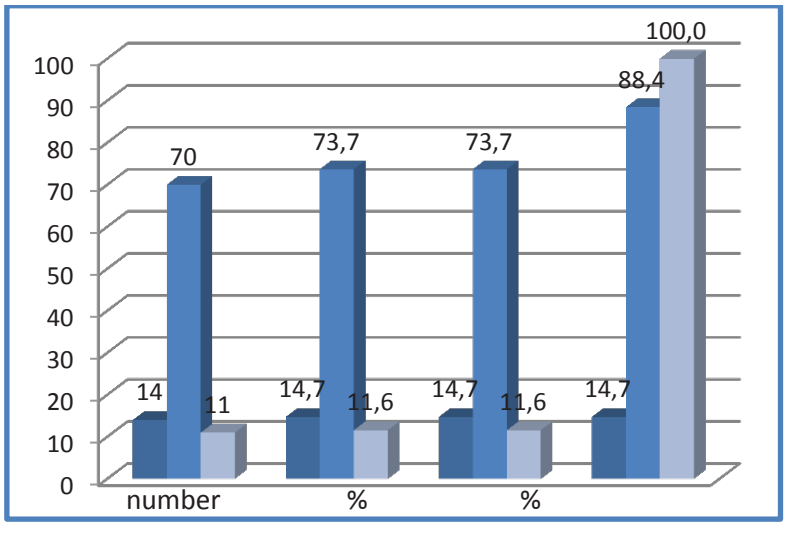

Fig. 1. Presence of premenstrual syndrome

The distribution of somatic symptoms are as follows: pressure and chest pain - 86 women (90.5%), lower abdominal pain and swelling before and during the menstrual cycle - 81 women (85.3%), increased cravings for sweets food - 77 women (81.1%), pain in the lower abdomen, covering the lumbar and sacral area before and during the menstrual cycle - 70 women (73.7%), headache - 25 women (26.3%) , nausea, vomiting - 11 women (11.6%). The majority of women with PMS have a combination of several symptoms.

The frequency of somatic and psychological symptoms is presented in Table 1.

Tabl. 1. Frequency of somatic and psychiatric complaints PMS

SOMATIC	%	MENTAL	%
Mastodynia	90,5	Irritability	74,7
Pain and bloating low down	85,3	Anxiety and tension	70,5
Increased hunger to carbohydrates	81,1	Emotional lability	65,3
Abdominal pain, and lumbal area covering	73,7	Fatigue and lack of energy	61,1
Headache	26,3	Inability to get out of bed	36,8
Nausea, vomiting	11,6	Reduced concentration	30,5

DISCUSSION

From the results we can deduce some important summaries and trends.

The most common age of onset of menarche is between 12 and 14 years, which is similar to the existing data in Bulgarian and European literature. The survey reveals a high percentage of respondent girls with presence of PMS. In each of them a different pattern of manifestation of symptoms is observed,

so you need a personal approach to the characteristics of the women. Disturbing is the fact that a large percentage of girls surveyed believe their symptoms are normal for MC and that is an inevitable part of life. Due to this fact a necessary consultation with a specialist is not considered and they ask for the „self." This requires awareness-raising activity and responsibility towards health for a better understanding of the problem PMS. The leading factors that are confirmed to have a relation to PMS are mainly related to poor nutrition hipodinamiya, daily stress, increased rates of obesity, low awareness of PMS. The most common somatic symptoms of PMS are: mastodynia pain and bloating low down, and increased carbohydrate cravings. Irritability, anxiety and frustration, and emotional lability resulting from psychotic symptoms [6]. The results do not differ significantly from the literature. The wide variety of symptoms and high percentage of pain in premenstrual period explains the uncontrolled use of painkillers, contraceptives, NSAIDs and others, despite numerous side effects [10, 20]. This neglect of the problem entails the risk of a number of consequences. It is therefore necessary to broaden and deepen the research on women's health, especially in the premenstrual period. The persistence of psychotic symptoms in PMS period should be taken into account in determining the therapeutic approach.

CONCLUSION

Undoubtedly, lifestyle, daily stress, hipodinamiya, conventional attitudes and beliefs are a small part of the factors influencing the health of women and the premenstrual appearances. Women with PMS compared to those without PMS, need specific care and comprehensive measures for prophylaxis and the possibility of absence from work. Today's professionals need physical therapists to know and understand well the problem PMS and how it affects the health and quality of life. Given the many side effects of drug therapy, severe surgery, massage and exercise are increasingly attracting the attention of specialists and women [32]. Aspects that determine the PMS are varied, so we believe that its detailed exploration, development and use of new physical resources will contribute to the treatment.

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INFLUENCE OF PHYSIOTHERAPY ON ENDURANCE OF CHILDREN WITH POOR POSTURE

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***Key words**: postural deformities, endurance, physiotherapy*

INTRODUCTION

The reasons that lead to a postural deformities are different. Reduced physical activity and lack of healthy muscle corset is one of the main reasons for reducing the values of the endurance indicator in children. [1] Studies show that almost 40 % of children and adolescents can't hold their body upright in standing position. The reason is long hour spent sitting- on desk or on the computer [2]. Very important for child health prevention is- the development of appropriate recommendations for practice, annual meetings with school management and training of primary school teachers and physical education teachers, about the conditions in which children have to work, the right body position on working time and making corrective exercises during times of general objects. This will create the conditions for a correct motor habit and thus would lead to a reduction of postural deviations. Without regularly conducting specialized correctional gymnastics would not be possible to achieve effective results. [1]

PURPOSE : The purpose of this study is to evaluate the influence of physiotherapy exercise on endurance stand in static and dynamic mode in children from the first grade with postural disorders

MATERIALS AND METHODS: This study was conducted in the period 2012/2013 55"Petko Karavelov" Sofia city. Subjects are 40 first-graders with postural disorders in the frontal and sagittal plane between the ages of 7 and 8 years old, grouped randomly. They were divided into 2 groups-experimental group (children, which is conducted physiotherapy exercise) and control group (children who is not conducted physiotherapy exercise). Students from the experimental group were divided into three groups. Classes are held two times a week for 35 minutes within one semester (4 months). Detailed studies were made at the beginning and end of the experimental period. The tests included are:

Test of endurance Matthiass stand (Debruner, H., Hap, C., 1999).

Created our test to maintain correct posture in sitting position, which includes two phases- dynamic and static [1]. The starting position is seating on the chair. Child mobilize muscles to correct posture and download the longitudinal axis of the spine (dynamic phase). Use tactile stimulation in the performance of the test (the child touches the palm head investigator whose hand is over his head and stimulates the download). Horizontal and stable position of the pelvis in this test enhances the child's active correction of bad posture while sitting. After training in the proper execution of the exercise we pass to the static test phase - hold at the correct position within 30 seconds. Monitor the implementation and reporting the results as follows:

If a child manages to adjust and maintain the correct position of the body while sitting on a chair for 30 sec. recognize sufficient endurance sitting posture.

If the child fails to adjust and maintain the correct posture while sitting in a chair for 30 sec. recognize the weakness of posture while sitting.

Created our test for endurance in posture walking by analogy test of Matthiass [1].Starting position is standing with his hands on. Walking is performed in a circle with a diameter of 10 meters, the movement is clockwise. Research stands in the middle of the circle and observe whether the child was able to keep the correct position of the body when walking:

- If the child is able to maintain the correct posture when walking for 30 seconds. recognize sufficient endurance posture while walking.
- If the child fails to maintain the correct posture when walking for 30 seconds. recognize weakness posture while walking.

The results of the experiment were compared with children who were not conducted correctional gymnastics.

RESULTS

The follow-up results showed improved functional performance. Significantly improve the durability of the stand in dynamic and static mode.

The results from test Mattiass endurance stand before treatment showed that the average strength of the stand (diagr.1) according to test Mattiass, are X1 = 17.79 sec. children of experimental group and X2 = 14.54 sec. in control group. The difference between the rates in the two groups (X = 3,25sek) is statistically significant (α <0,01) in favor of experimental group.

In the final results averages experimental group are 28,61sek. Which shows a significant improvement in the durability of the stand.

In considering the results of control group is found that the average values are increased by only 1,19 sek.

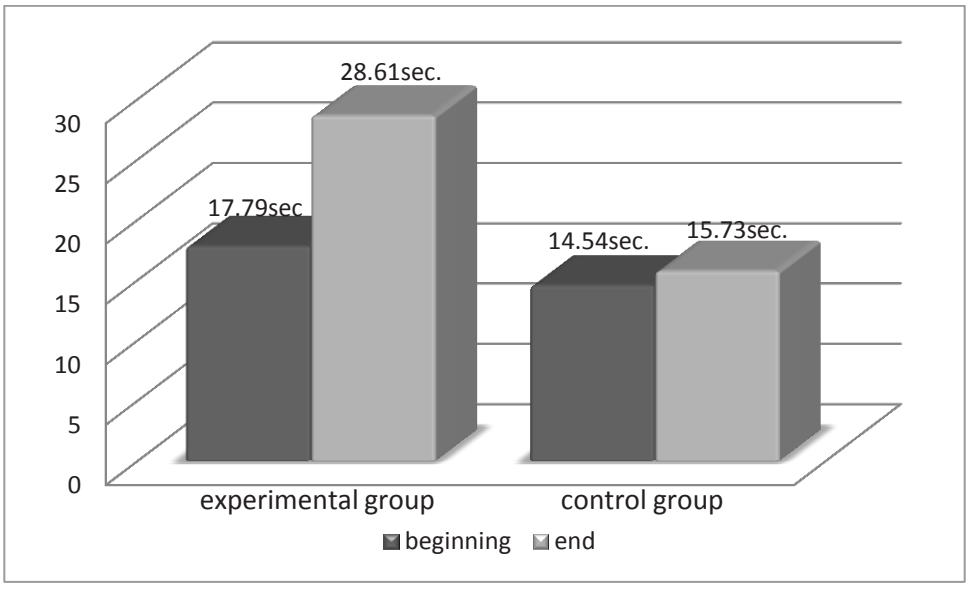

Diagram 1. Test results of Mattias (sec).

Test results to maintain correct posture while sitting position (diagr.2) at the beginning of the experiment show weakness stand in both groups. Average values of the experimental group are X1=18.92 sec, While control group- X2=17.74sec. (α> 0,05; p = 0,178).

At the end of the experiment reported a substantial improvement (with 11,15sec) endurance posture while sitting and normalization of the indicator experimental group (X1 = 30,07sec.). Children from control group percistence established weakness posture while sitting (X2 = 17,47sec.). Reported a worsening of results 0,27sec., Compared with the initial data (<α 0.001; α = 0,00001).

The results of our modified test Mattias for the Study of durability of the stand when walking (diagr.3) show slightly better averages early in experimental croup- X1 = 13.71 sec. Against control group- X2 = 11,70sek (α = 0,01).

At the end of the experiment, it is found statistically significantly greater improvement (α <0.001) the durability of the stand when walking in experimental group (X1 = 25,24sek.) compared control group (X2 = 13,30sek.).

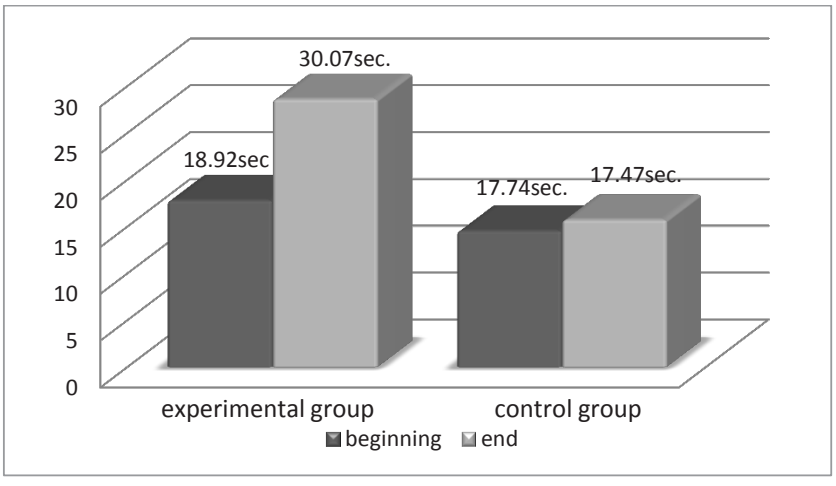

Diagram 2. test results to maintain correct posture while sitting (sec).

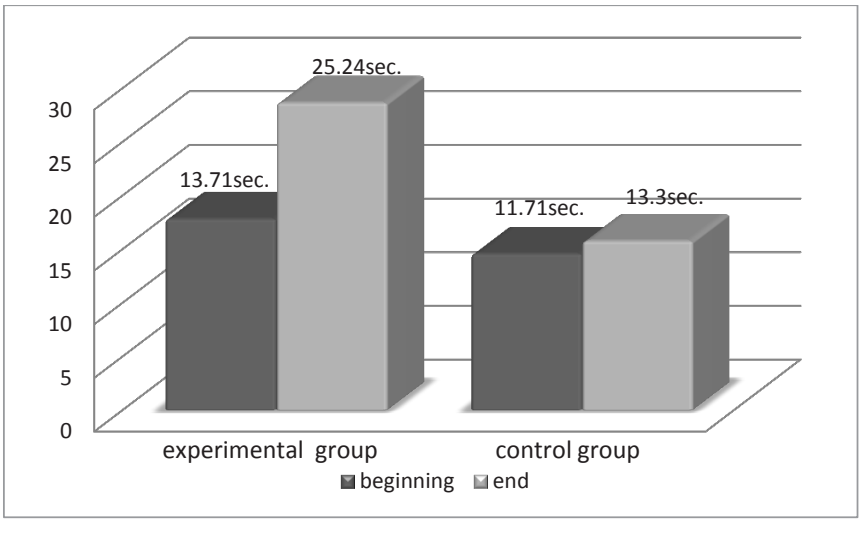

Diagram 3. Results modified our test Mattias for the Study of durability of the stand when walking (in sec)

CONCLUSION

In children involved in activities in physiotherapy, there is a marked improvement in postural control, correction of bad posture and improve functional performance than children do not participating in physiotherapy.

The results obtained show that the appended our work have a positive effect on children with postural disorders, improve the durability index and facilitate the normalization of the stand.

DISCUSSION

The human body is a dynamic system and the motor must be examined both in static and in dynamics. Specialized method of physical therapy includes correction of the pathological habit of driving posture, build right motor habit to maintain posture in different body positions and automate this habit in motor dynamics.

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KINESIO TAPING CONCEPTION IN THE COMPLEX PHYSIOTHERAPY OF SHOULDER PAIN SYNDROMES

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Key words: *kinesio taping, physiotherapy, shoulder pain.*

Kinesio tape is an elastic therapeutic tape used for treatment of sports injuries and a variety of other disorders. The main properties of the Kinesio tape are: elasticity (the degree of stretch approximates the elastic qualities of human skin), 100% cotton fibers (allow evaporation of body moisture), acrylic glue, applied in a wave-like pattern (assists the lifting of the skin and moisture to escape), wearable, resistant to water, allows normal movement.

The proposed benefits of Kinesio tape include alleviating pain in acute and chronic pain syndromes, removing congestions in blood circulation and lymphatic drainage and reducing the edema, improving muscle function by regulating its tone, correcting the direction of movement, supporting joint function by stimulation of proprioception and neuro-sensory stimulation with movement, increasing stability. Consequently, the range of application is very wide, from follow-up treatments, reducing inflammation or accumulation of fluid, correction of posture, and treatment of symptoms caused by overuse or as prophylactic measure.

Two theories may provide insight in how Kinesio taping works. One theory posits that it increases blood circulation in the taped area by increasing the space between the skin and muscles and reducing the compression on local pain receptors and muscle spasm, and this physiological change may affect the muscle and myofascial functions after the application of Kinesio taping [1]. Another theory suggests that Kinesio tape stimulates cutaneous mechanoreceptors at the taped area, and this stimulation may affect the range of motion [6]. Therefore, muscle functioning could be improved with Kinesio taping by regulating muscle tone.

The purpose of this study is to determine the efficacy of Kinesio taping and specialized physiotherapy in the complex treatment of shoulder pain syndromes.

MATHERIAL AND METHODS

Eleven subjects (8 male and 3 female; mean age 31.3) with shoulder pain were treated with Kinesio taping, as a part of a specialized physiotherapy program (Table 1). All subjects are players (volleyball, tennis, beach tennis) who have symptoms of shoulder pain and compression syndromes, without history of previous injury (e.g. fracture). Response to the treatment was evaluated by assessment of the pain-free active range of motion (in angular degrees) and visual analog scale (VAS) for pain intensity.

Kinesio taping technique:

The application of the tape was pointed to alleviate pain, stimulate muscle function and increase muscle activity, and to correct the joint position and provide increased joint stability. The taping applications we used were: Y strip for m.supraspinatus (from insertion to origin) (Fig. 1), Y strip for m.deltoideus (from insertion to origin) (Fig. 2) and application of mechanical correction technique (with tension on base) (Fig. 3).

The main goals and therapeutic techniques and exercises were to:

- ✓ Modifying joint tracking and reinforcing full movement
  - Manual mobilization techniques
  - Mulligan's mobilization with movement (MWM) (Fig. 5)

- ✓ Develop balance in length and strength of shoulder girdle muscles
  - Stretch shortened muscles - pectoralis major, pectoralis minor, m.trapezius – pars descendense, m.levator scapulae.
  - Strengthen and train scapular stabilizers – m.serratus anterior, m.trapezius – pars ascendense and pars transversa and mm.rhomboidei (Fig. 6).
  - Strengthen and train rotator cuff muscles and m. biceps brachii (Fig. 7).
- ✓ Develop Muscular Stabilization and Endurance
  - Alternating isometric resistance to the scapular muscles in open-chain positions (side-lying, sitting, supine), so the patient learns to stabilize the scapula against the outside forces. (Fig. 8).
  - Alternating isometric resistance to the humerus while the patient holds against the changing directions of the resistance force. (Fig. 9).
  - Closed-chain stabilization exercises. (Fig. 10, 11).
  - Muscular endurance training by increasing the amount of time the individual holds the pattern against the alternating resistance (*The goal at this phase was stabilization for approximately 3 minutes).*
- ✓ Functional training
  - Functional activities training – first under controlled conditions, then under more challenged conditions. (Fig. 12)

RESULTS

The therapeutic application of the Kinesio taping showed significant reduction of pain intensity and subjective complaints in the end range of motion and immediate notable improvement of pain-free active range of motion.

With pain intensity 5.34 (range from 3 to 6 VAS) at the beginning of therapeutic course (Chart 1), the level of pain significantly decreased after the first application, and at the end of the treatment period reached a value of 0.2 (VAS).

Results of the study showed also significant improvement of the pain-free range of motion (Chart 2). Shoulder flexion has increased from 89.6° (at the beginning of the therapeutic course) to 97.8° after the Kinesio tape application, and reached 174.5° at the end of the treatment course; shoulder abduction has improved from 83.1° (at the first testing) to 88.7° after the Kinesio tape application and to 171.3° at the final assessment. The results of shoulder rotation measuring showed 58.8° external rotation and 53.4° internal rotation at the initial examination, improvement to 66,5° and 58.9° (respectively) after the Kinesio tape application and achieved 78.9° and 77.5° at the end of the treatment course.

DISCUSSION

Kinesiology tape is distributed in over than 60 synonyms [4], different concepts and techniques are available. There is little evidence based literature on the effectiveness of Kinesio taping [5, 8] with claims for positive effect on circulation of the lymphatic system, muscle function and pain levels and positive effect on proprioception and correction of joint malalignment [3].

According to some researches mobilization with movement and Kinesio taping may be an effective and useful treatment in range of motion augmentation of subjects with rotator cuff lesion and impingement syndrome or impingement shoulder syndrome [7].

In the study of Kaya, E., et al (2011) has been found that Kinesio tape is more effective than the local modalities at the first week and has similar effectiveness at the second week of the treatment. So according to the authors Kinesio taping may be used in the treatment of shoulder impingement syndrome especially when an immediate effect is needed [2].

Data from our study also showed a beneficial role of Kinesio taping application in painful shoulder due to impingement and rotator cuff injury immediately after application, and this positive effect persisted to the end of the treatment course.

A.  B. 

Fig. 12. Functional activities training – shoulder flexion (A) and extension (B) v resistance.

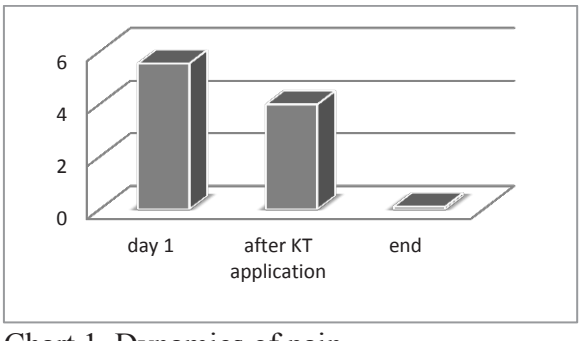


Chart 1. Dynamics of pain.

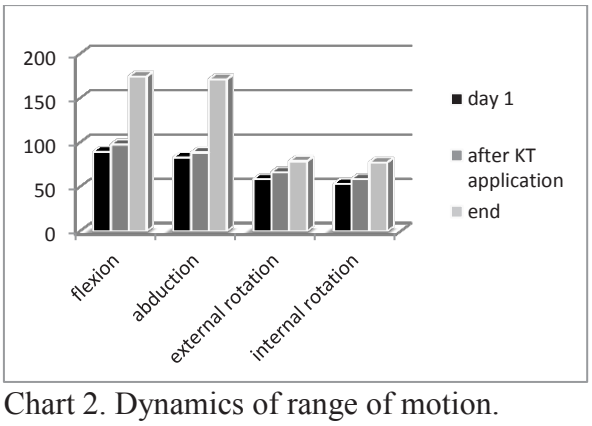
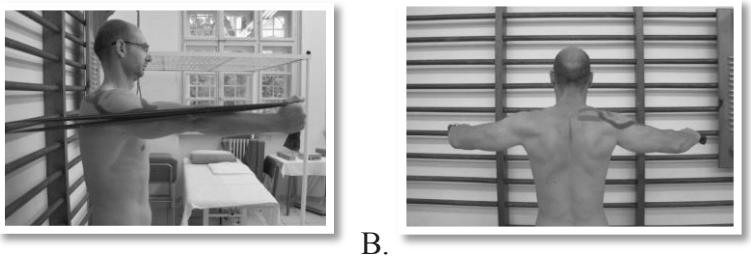


Chart 2. Dynamics of range of motion.

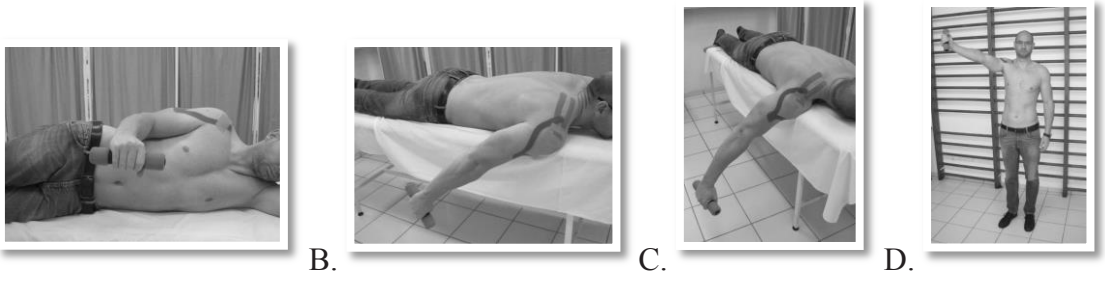
Fig. 4. Completed Kinesio taping application.

Fig. 5. Mulligan's mobilization with movement (MWM).



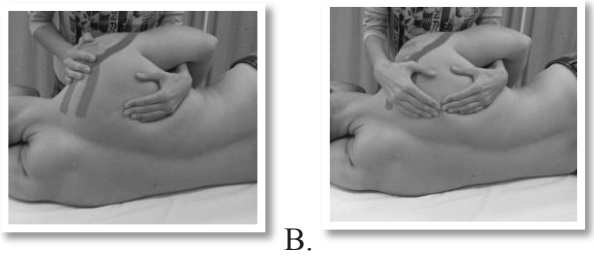
A. B.

Fig. 6. Open-chain resistive training of scapular muscles. A. Protraction of the scapula. B. Retraction of the scapula.



A. B. C. D.

Fig. 7. Open-chain resistive training of rotator cuff muscles. **A**. Shoulder external rotation. **B.** Shoulder extension. **C.** Shoulder horizontal abduction. **D.** Shoulder scaption with external rotation.

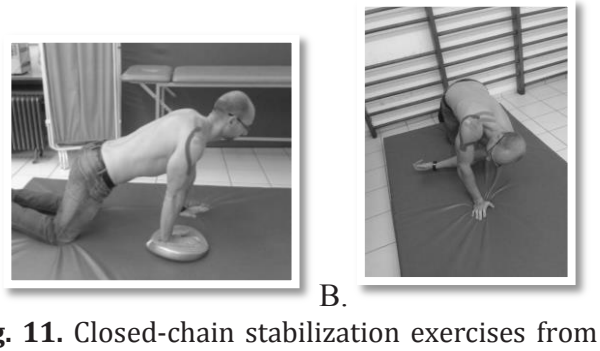


A. B.

Fig. 8. Resistive training of scapular stabilizers. **A.** Elevation/ Depression of the scapula. **B**. Protraction/ Retraction of the scapula.

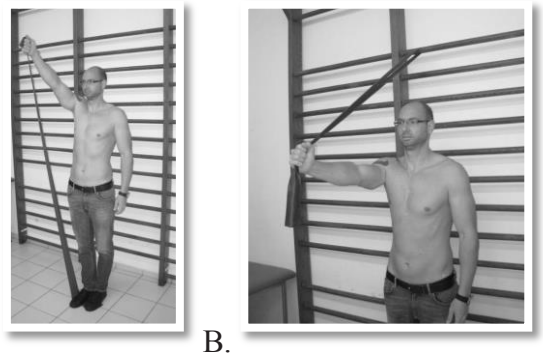
Fig. 9. Alternating isometric resistance to the humerus– rotator cuff stabilizing function training.

Fig. 10. Closed-kinematic chain exercises for training of the dynamic stabilization of the shoulder with a graded, alternating isometric resistance by therapist.



A. B.

Fig. 11. Closed-chain stabilization exercises from all four position - moving the body forward (A), rotating the body (B).



A. B.

Fig. 12. Functional activities training – shoulder flexion (A) and extension (B) with elastic resistance.

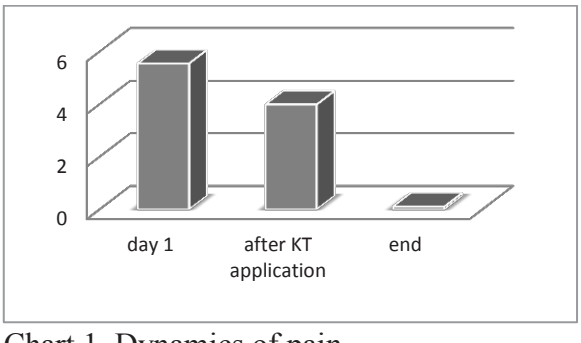


Chart 1. Dynamics of pain.

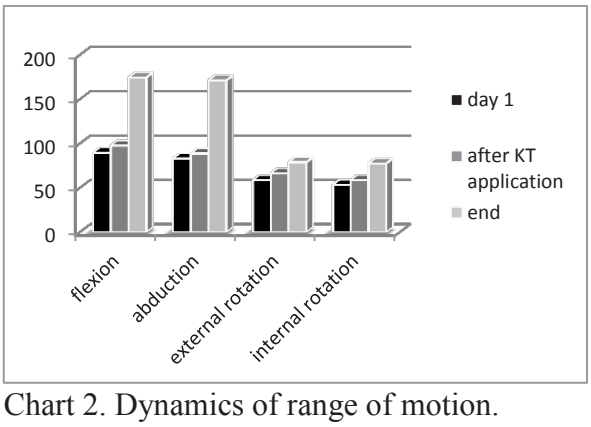


Chart 2. Dynamics of range of motion.

CONCLUSION

: Although there are no strong evidences regarding the isolated effect of Kinesio taping, it may be an alternative treatment option in the complex physiotherapy of patients with shoulder pain syndromes. Further researches are planned with a larger sample size, with more outcome measures related to the pain and functional outcome and with long-lasting effects of the method, to be followed.

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MEDIO-LATERAL STABILITY WITH COMMUNITY-DWELLING PHYSICALLY ACTIVE AND INACTIVE OLDER WOMEN - A CROSS-SECTIONAL STUDY

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National Sports Academy ''V. Levski'' *physical activity, dynamic balance evaluation, medio-lateral stability, elderly women*

Physical activity and exercise can prevent the onset of pathology and system impairments that lead to disability and increased risk for falls [21].

Stand-alone exercise programs that emphasize multiple exercise categories are effective in reducing important physical risk factors associated with falls in relatively healthy groups of older adults [30] and also can improve balance-related outcomes [1, 16, 26].

The capacity to control one's balance while leaning or bending is essential for many activities of daily living, and this capability affects balance ability and increase the likelihood of older people falling during these activities.

Many authors suggest that deficits in postural balance is related to the control of medio-lateral stability, an increased risk of falling, falls and subsequent hip fracture. [3, 7, 12, 19, 20, 23]. Control of lateral stability may be an important area for fall-preventative intervention in an ambulatory and independent elderly population [13].

The Multi-Directional Reach Test (MDRT) appears to be a reliable and valid assessment tool for dynamic balance and limits of stability in the antero-posterior and medio-lateral directions of those aged 60 years and over [17].

Statistically significant improvements in balance ability were observed for exercise interventions compared to usual activity [9, 17].

The objective of this study is to determine whether a specialized exercise program for fall prevention will demonstrate superior performance in limits of stability assessed using the MDRT to a regular exercise program or no exercise for the community-dwelling elderly women.

The aim of the study is to compare proactive balance measure in healthy older women who participated in exercise programs (for fall prevention and for health) or no exercise.

METHODS

Participants.

A total of 150 healthy, community-dwelling, adult women between the ages 60 and 84 years were included in this center-based cross-sectional study. Residents of the Sofia city area who attended group exercise programs or living in their homes were invited to participate in this study. Participants who expressed their willingness to take part in the study, and met the inclusion criteria were included in the analysis. Written informed consent was obtained from all older adults prior to inclusion.

Individuals were eligible to participate if they were age 60 years or older, able to ambulate independently with or without an assistive device, living in the community independently.

Since only few men volunteered to participate in the study, they were excluded from the analysis.

Women with known neurological, musculoskeletal, or cardiopulmonary complications that might interfere with safe participation were excluded as well as women who presented absolute or relative contraindications for exercise training.

In addition, an individual was excluded if she had cognitive dysfunction (Mini-Mental Status Examination score <24).

Subjects were categorized in one of three groups based on their current participation in exercise program for fall prevention, structured exercise program for health, or no exercise program.

Additionally, the inclusion criteria for the exercise groups are the 75 percent adherence rate and the non-participation in other group exercises.

Furthermore, the no-exercise group participants must not participate in any regular or structured exercise programs, including walking.

MEASURES

Demographics

Information on participants includes demographic and health characteristics, including age, body weight, body height, living situation, self-reported fall history, self-perceived health status, use of medication, physical activity level, functional balance and fear of falling. A summary of all participant characteristics by group are provided in Table 1.

Multi-Directional Reach Test (MDRT)

Proactive balance was assessed using the Multi-Directional Reach Test (MDRT). The MDRT is a reliable and valid tool for measuring the limits of stability and is in correlation with the Berg balance scale (BBT) and Timed Up and Go (TUG) [17]. It is used to assess subjects' voluntary postural control or margins of stability (how far patients are able and/or willing to lean away from a stable base of support in multiple directions).

The MDRT was carried out asking the subjects to perform maximal reaches with outstretched arm forward, to right, to left, and leaning backward, with feet flat on floor. After demonstration by the tester, participants were given one practice trial and two test trials.

INTERVENTIONS

The specialized physical exercise group (SEG) implements a single multicomponent exercise intervention for fall prevention. The regular physical exercise program (REG) carries out an exercise intervention for function and overall health status. The study also includes a no exercise group (NEG) performing their regular physical activities.

The SEG group did a range of exercise types including balance, gait, strength, coordination, functional skills, endurance and flexibility. The REG carried out different exercise types including balance, gait, strength, endurance and flexibility.

Core components of physical exercise program for health are also key components of exercise program for fall prevention.

The exercise program for fall prevention includes a multi-component balance training focused on dynamic balance and gait, multi-sensory training, balance-recovery reactions, postural strategies (ankle, hip and step), dual-task performance (a cognitive task) and functional activities.

One-hour classes were held three times a week. Individuals participated in programs with moderate intensity for more than one year.

DATA ANALYSIS

Descriptive statistics to present patient's characteristics and tests for normality were checked. Independent *t* tests were performed for the normally distributed variables, including age, body weight, body height, living situation, self-perceived health status, use of medication, physical activity, functional balance and fear of falling, MDRT. Mann-Whitney *U* tests were performed for the non–normally distributed variables, including number of falls (past 12 months), MDRT (only right reach). The significance level was set at $p<.05$. Statistical analysis was performed using SPSS version 19.0.

RESULTS:

No differences were found among groups for any of the variables except total number of falls experienced in the previous 12 months (comparison between the non-exercise group and the other two groups) and Berg balance scale (comparison between specialized and no exercise group). By group definition, the adequate physical activity performed by the sedentary group was significantly lower than the exercise groups (refer to Table 1).

The exercise groups performed significantly better than the no exercise group on the forward ($p<.001$ and $p<.01$, respectively) and backward ($p<.001$) reach components of the MDRT.

Additionally, the specialized exercise group scored significantly higher than the regular exercise group and the no exercise group on the forward and lateral reach ($p<.001$) components of the test.

There was no statistically significant difference between the exercise groups on backward reach and the regular exercise and no exercise groups on both the right and left components of the MDRT. Multidirectional Reach test scores for groups are presented in Table 2.

Table. Descriptive statistics for the groups and their measurements for balance and fear of falling

Characteristic	SEG % (n=43) X± SD	REG % (n=36) X± SD	NEG % (n=36) X± SD
Age, yr X (SD)	72.28±6.01	**71.64±6.4**	72.67±6.69
Height, cm ‡	158.78±5.31	160.03± 6.23	158.64±5.25
Weight, kg ‡	69.76±10.35	69.53± 10.47	67.36±10.36
BMI, kg/m^2 ‡	27.9 ± 4.18	27.08 ± 3.26	26.78 ± 4.03
Living alone	53.49 (23)	44.44 (16)	55.56 (20)
Falls (past 12 months) †	37.21 (16)	38.89 (14)	**44.44 (16)**
Health is fair or poor (%)	2.33 (1)	8.33 (3)	8.33 (3)
Use of a mobility Aid	4.65 (2)	2.78 (1)	2.78 (1)
Sedative, psychotropics	11.63 (5)	19.44 (7)	22.22 (8)
Symptoms of dizziness	34.88 (15)	33.33 (12)	30.55 (10)
MMSE (30/30)	26.51±1.56	26.39± 1.38	26.64± 1.53
Physical activity (adequate) ¶	16.28 (7)	16.67 (6)	0 (0)
Berg balance scale (pts.)	53.07 ± 2.37	50.25 ± 3.32	**49.31** ± **3.43**
M-FES (pts.)	8.70 ± 1.37	8.96± 1.02	9.14 ± 1.14

Data expressed in means ± SD or percentage. Significant differences between the groups are indicated in bold. SEG specialized exercise group; REG regular exercise group; NEG no exercise group; MMSE - modified Mini-Mental Status Examination, M-FES - Modified Falls Efficacy Scale; ‡ SEG (n=37); REG, NEG (n=22); Student t-test, †Mann-Whitney; (adequate) ¶ - 150 minutes of moderate-intensity aerobic physical activity throughout the week.

Table 2. Multidirectional Reach test scores for groups

Outcome Measure	SEG n=(43) $\bar{X}$(±SD)	REG n=(36) $\bar{X}$(±SD)	NEG n =(36) $\bar{X}$(±SD)	p_a	p_b	p_c
MDRT (cm)						
Forward Reach	26.28 (4.93)	21.08 (6.13)	18.01 (6.24)	*<.001*	*<.01*	*<.001*
Backward Reach	17.41 (4.68)	13.72 (5.07)	11.57 (4.17)	*<.001*	*<.001*	0.084 N.S
Left Reach	17 (4.75)	12.21 (4.70)	11.40 (4.01)	*<.001*	0.437 N.S	*<.001*
Right Reach	16.30 (4.22)	12.58 (4.29)	11.51 (4.07)	*<.001*	0.282 N.S	*<.001†*

Values are reported as mean ± SD. (cm) – centimeters. SEG (specialized physical exercise group), REG (regular physical exercise group), NEG (no exercise group). Group differences: (†Mann-Whitney, Student t-test), p_a - SEG/NEG, p_b - REG/NEG, p_c – SEG/REG. p .01, p .001 significant; N.S., not significant.

DISCUSSION

Findings suggest that active older women (participants of both exercise programs) demonstrated greater limits of stability on the antero-posterior directions than the no exercise group. These results are probably due to the specificity effect of applied exercise programs [2, 25].

The exercise groups implemented a range of balance exercise which focused on static and dynamic balance (lateral or medial weight shift, on heels or on toes combined with volitional arm movements and movements of the trunk, leaning or bending) in sitting, standing and walking. Additionally, exercises for strength, power, especially for the lower extremities and for the trunk muscles were included.

According to Newton (2001) scores on forward reach were influenced by the activity level, while scores on backward reach were influenced by the fear of falling [17].

The findings of our study are consistent with Newton (2001) (refer to table 1). Physical activity performed by the sedentary group was significantly lower than the exercise groups.

No significant differences were noted between the groups for M-FES scores (fear of falling) **(**refer to Table 1**)**.

A possible explanation of discrepancy between the results of Newton (2001) and our findings may relate to the differences in sample characteristics and the low fear of falling.

According to Hill (1996), the normative scores for the M-FES test are the score of 9.8 (range 9.2 – 10) for the sample of healthy women (mean age 74.1±4.0) [8].

The findings of this study revealed that a specialized exercise group demonstrates superior performance than both the exercise and the no exercise group on the forward and lateral reach components of the test.

Training is focused on the improvements of the ability to safely move the center of gravity outside of one's base of support (training to the limits of postural stability through the increase in the complexity of the task, through the change of the direction and speed of execution). Additionally, the walking upwards and downwards in natural conditions (mountaineering) is included in the fall prevention program.

Although the regular exercise group performed static and dynamic balance exercises, less focus was placed upon the use of multi-sensory training, balance-recovery reactions, proactive balance, postural strategies, dual-task performance and functional activities.

This may explain the difference between regular exercise group performance and the specialized exercise group's performance.

According to Jin-seok Oh, Jin-hong Park (2013) the factors significantly affecting the female elderly's left and right dynamic balance include sensory information literacy (sense of sight-somesthesia) and lower limb muscle strength, which had an explanation ability of 22.3% [10].

The results of this study are in agreement with the findings of Hakim (2004). He compared MDRT for elderly individuals participating in Tai Chi, in structured exercise classes, or in no exercise program. According to him, the Tai Chi group scored significantly higher than both the exercise and the no exercise groups on the forward, backward and left components of the MDRT [6].

Zheng (2013) demonstrated that strategic targeted exercise could produce more beneficial effects on balance and proprioception function than conventional exercise alone in elderly people [32].

The outcomes of our study are consistent with the findings demonstrating that a multicomponent exercise program that focuses on functional balance specific exercise has a potential to increase postural steadiness in active community-dwelling subjects [5, 22].

A number of authors [27, 29, 31] show that strategic targeted exercise is superior to conventional exercise alone for elderly people.

Many authors have suggested that deficits in postural balance is related to the control of medio-lateral stability, to the increased risk of falling [3, 12, 23], falls and subsequent hip fracture [7, 19, 20].

The lateral reach test [24] and the control of lateral stability [14, 15] are able to discriminate between healthy elderly and fallers.

Medio-lateral control is required in a variety of functional activities such as changing direction, stepping sideways, backwards, and stepping on and off stairs and for the tasks related to the obstacle avoidance [22].

A decline in medio-lateral stability with age has been well documented by several studies. A study of Nitz (2003) using data from the lateral reach tests demonstrated a decline in medio-lateral stability for women aged 60 or higher [18].

According to Tantisuwat (2014) the 60–79 year group demonstrated significantly lower limits of stability in the forward, leftward and rightward directions compared to the 20–39 year group [28].

The results of Maki (1994) suggest that control of lateral stability may be an important area for fall-preventative intervention in an ambulatory and independent elderly population

[13].

From a prevention or health promotion perspective, this is an important group a well-screened group of older people with identified mild balance dysfunction to target [31].

The subjects under study are highly functional, with mild balance dysfunction (Functional Reach Test cut off score of less than 26 cm) [4], with low to moderate fall risk (Berg balance cutoff score of less than 46 points) [11].

These data suggest that the multicomponent and balance specific exercise program for fall prevention has a potential to increase limits of stability in the anterior and bilateral directions, which are important determinants of risk for falls for active community-dwelling subjects.

CONCLUSIONS.

The results of this study indicate that participation in the community-based exercise programs was associated with better anterio-posterior stability than the no-exercise group of elderly women.

A specialized physical exercise group provides additional benefits in medio-lateral limits stability that may be important for fall prevention for active elderly women.

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A PLACEBO EFFECT OF A LOW-CALORIE DIET?

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Key words: obesity, anaerobic-lactic, diet, BMI, fat tissue

INTRODUCTION

According to a study of the National Centre of Social Health in 2010-2011 30% of Bulgarian students aged between 6 and 19 were overweighed and 12% were obese. The data for the countries in the Euro zone were even more alarming: between 36. 9% and

56. 7% of women and between 51% and 69. 3% of men were overweighed and obese [25]. The percentage of sedentary people among them is also high. There is a greater risk for the group of obese young people of diseases with a high social impact morbidity such as type 2 diabetes and cardiovascular disease [12, 17]. At the same time there is no complex methodology, which to combine healthy diet and physical training and to be aimed exclusively for the treatment of these problems. In our opinion we can use the methodology we developed to solve some of these problems.

There are a number of studies treating similar topics [2, 3, 4, 6, 7, 8, 9, 13, 14, 15, 16, 18, 20, 21, 22, 23]. Despite the fact that there are studies of daily regimens consisting of different combinations of resistance exercises and negative energy balances, we did not find anywhere a description of a methodology similar to ours. In our opinion, combining a schedule of resistance training workouts of anaerobic-lactic type with a low-calorie diet is an entirely new approach for treating obesity.

METHODOLOGY

14 healthy adults of both sexes aged between 19 and 45 with BMI > 27 participated in the study. They were randomly assigned to 2 groups – one experimental and one control. We estimated the theoretical daily energy expenditure for every participant the following way: we used the Miflin et al. [36] methodology to estimate the theoretical energy expenditure in rest and after that using the Levine and Kotz [12] methodology we calculated the theoretical daily energy expenditure.

The experimental group subjects followed a diet with the theoretically estimated energy balance, but they were told they were put on a calorie-deficient diet. The control subjects knew they were following an energy balanced diet. The diet consisted of 55-60% of carbohydrates, 15-20% of protein and 25-30% of fats for both groups.

The physical training schedule for every participant had the following parameters:

1. Duration – 8 weeks;
2. Workouts duration – 30 min;
3. Frequency– 3 times a week;
4. Intensity – about 70% of the maximum, determined as a subjective feeling of muscle failure [12-15 repetitions];
5. Density and volume – 3 repetitions of a circuit training program, consisting of 10 exercises with 10 – 15 sec. resting periods between them.

We created a schedule of circuit workouts consisting of 10 resistance exercises performed with 10-15 sec. resting periods between them – time enough for the subjects to move from one working station to the next. The idea behind this was to achieve maximum density of the training sessions combined with a great variety of exercises in order to keep the interest and the motivation of the participants elevated.

We tried to use (as far as it was possible if take into account the bodyweights of the participants) complex, basic exercises, which involved big muscles and muscle groups in order to increase as much as possible the energy expenditure. In addition these exercises are very uneconomical, with low values of the Coefficient of Useful Action [35] and great amounts of energy substrates have to be chemically decomposed for energy. These substrates are oxidized only partially during the activity and their remainders are decomposed during the rest periods. Thus these processes spend a lot more energy then the aerobic exercises [34].

Before we switched to abovementioned training methodology, we had put the subjects on a two-week endurance training program consisting of 30 min. jogging or cycling workouts 3 times a week. The goal was to increase the overall fitness of the participants.

The following components of the body composition were estimated and compared for each participant twice - once in the beginning and once at the end of the study: body mass, Body Mass Index (BMI) and the proportion of fat tissue.

RESULTS

able 1. *Variation analysis*

Group	Measure	Body mass	% fat tissue	BMI
1	Range	49.80	11.50	9.20
1	Minimum	93.20	33.40	30.60
1	Maximum	143.00	44.90	39.80
1	Mean	112.98	39.38	34.62
1	Standard error	8.91	1.83	1.46
1	Standard deviation	21.83	4.49	3.58
1	Variance	476.74	20.16	12.81
2	Range	42.90	21.10	10.70
2	Minimum	87.80	27.00	30.40
2	Maximum	130.70	48.10	41.10
2	Mean	105.87	39.55	34.85
2	Standard error	7.11	3.38	1.94
2	Standard deviation	17.43	8.27	4.74
2	Variance	303.65	68.42	22.51

Table 2. ANOVA

		Total Mean squares	DF	Mean square	F	Significance
Body mass	Between groups	151.94	1.00	151.94	0.39	0.55
	In the groups	3901.96	10.00	390.20		
	Total	4053.90	11.00			
% fat tissue	Between groups	0.08	1.00	0.08	0.00	0.97
	In the groups	442.88	10.00	44.29		
	Total	442.97	11.00			
BMI	Between groups	0.16	1.00	0.16	0.01	0.93
	In the groups	176.60	10.00	17.66		
	Total	176.77	11.00			

We conducted variation analysis of the studied variables (table 1). In order to check for differences between the groups for each variable we conducted a standard test for differences in mean values – ANOVA (table 2) [27, 29, 29]. We did this test to verify the success of the randomization of the groups. We considered the data met the assumptions of the test (approximately) [27, 29, 29]. Based on the results shown on the table we could conclude that with 95% confidence there are no differences between the initial means of the studied variables between the groups – so the randomization was successful.

We presented the changes in the studied variables (figures 1-3). The differences in all 3 parameters were far greater for the experimental group than for the control one.

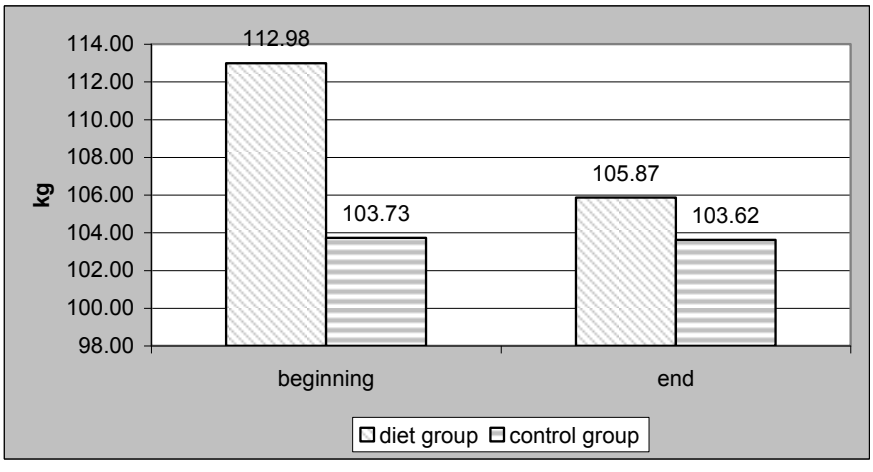

Fig. 1. Changes in body mass

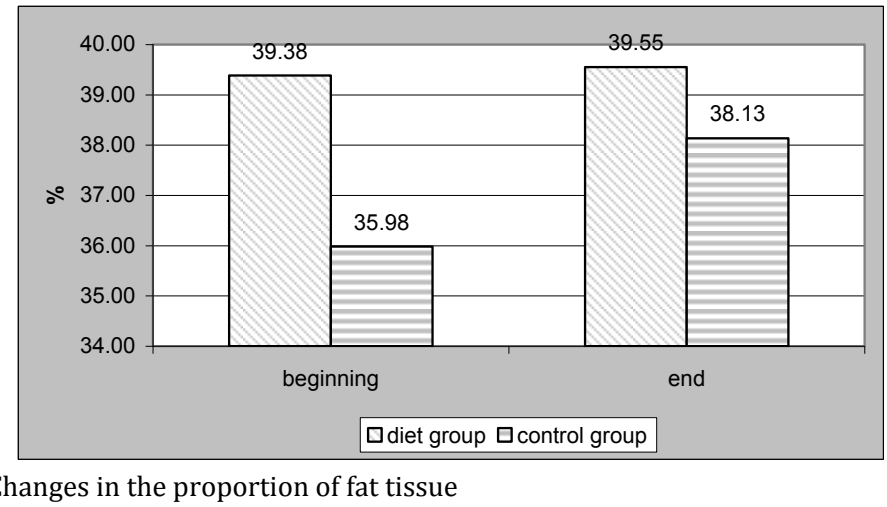

Fig. 2. Changes in the proportion of fat tissue

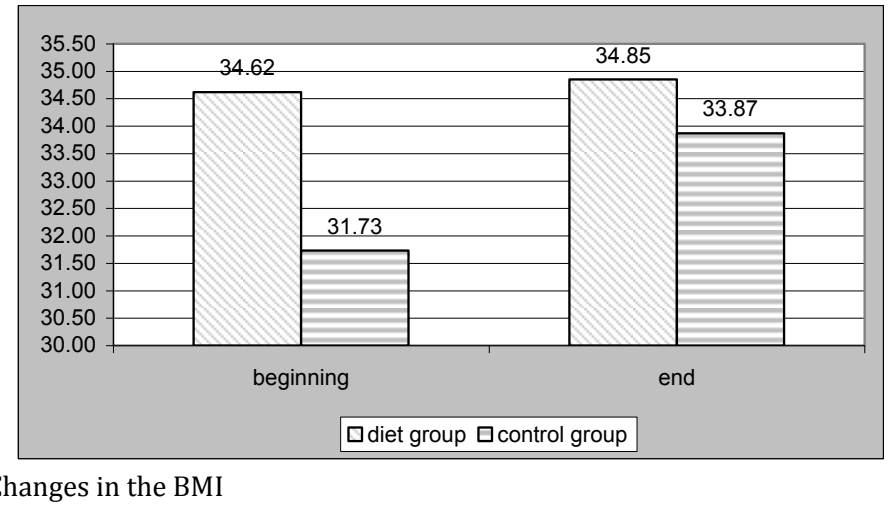

Fig. 3. Changes in the BMI

We used t-test for paired samples [30] to calculate the statistical significance of the differences between the values of the studied variables in the beginning and at the end of the experiment (tables 3 and 4). As seen the differences were significant only for the experimental group participants and greater than the control group ones for all variables.

Table 3 . Paired Samples t-test for group 1

	Mean	Standard deviation	Standard error	t	Significance
Body mass	9.25	5.26	2.15	4.31	0.01
%fat tissue	3.40	0.97	0.40	8.57	0.00
BMI	2.88	1.50	0.61	4.70	0.01

Table 4. Paired Samples t-test for group 2

	Mean	Standard deviation	Standard error	t	Significance
Body mass	2.25	4.89	2.00	1.13	0.31
%fat tissue	1.42	2.88	1.18	1.20	0.28
BMI	0.98	1.28	0.52	1.88	0.12

DISCUSSION

We cold not detect any differences between groups in the beginning of the experiment for all the studied parameters. The significance of the differences for the experimental group may be considered an evidence for the existence of a placebo effect as a result of the imaginary low-calorie diet. There are some possible biases in the construction of the study, though, which could have led to skewed results: 1. there is a possibility of overtraining for the participants of the experimental group, 2. there is a possibility of under eating for the participants of the experimental group and 3. there is a possibility of taking diet enhancing drugs for the participants of the experimental group. There was a probability for the occurrence of such biases due to the fact the participants were not monitored 24/7 during the experiment. Even though we expected a reduction in the body mass and fat tissue to occur in the control group as a result of the physical activity alone, we found no significant differences for that.

CONCLUSIONS

Ignoring the possible biases during the course of the study, we consider the significance of the results in the experimental group an evidence for the existence of a placebo effect as a result of the imaginary low-calorie diet;

We did not find convincing evidence for the sufficiency of the physical activity of anaerobic-lactic type for losing weight;

Further studies are necessary to test the hypothesis of the existence of a placebo effect in dieting.

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EFFECT OF SEAS APPROACH ON STATIC MUSCLES STRENGTH IN CHILDREN OF PRIMARY SCHOOL AGE

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***Key words**: posture, physical therapy*

NTRODUCTION

It has been known for a long time that functional deviations of posture can progress to skeletal deformity. For treatment of all pediatric posture deviations is to maintain function and prevent symptoms in the short- and long-term.

Body holding is a dynamic stereotype that through special conditions and motor reflexes provides static and dynamic proper body position in space. Body holding is determined by the habitual posture in standing and walking [6, 8, 9]. Good posture is much more than merely „standing straight", it is the use of all parts of the body with proper balance, with ease and grace [5]. Good posture is essential for prevention, early diagnosis and timely treatment of different abnormalities [6, 8, 9].

Physical activity and sport are undoubtedly an extremely important factor for the overall harmonious development of the body, raising its mental and overall performance. All known ancient maxim states: „A sound mind in a sound body." [2].

Physical therapy is a main factor in prevention and treatment of spine deformities. Long term Bulgarian experience shows conclusively that special physical exercise as correctional gymnastics are an irreplaceable tool in treatment of posture deviations. Increased attention is placed on them due to the increasing number of spine deformities in recent years among children and students [6, 8, 9].

Prerequisites for posture deviation are poor/bad living conditions in which the child lives, poor nutrition, poor general health - repeated or long continued infections and others diseases, leading to the total weakening of the body. Other prerequisites are poor working conditions, often associated with a wrong sitting pose. Therefore, they are found in children with unsuitable for child's height desk or chair and table for work; in children who often do physical activity that develops one specific set of muscles rather than the whole body; beginning to work from an early age in poor posture etc. The important factors influencing the development of posture deviation are anatomical and physiological impairment of the musculoskeletal system, the weakness and fatigue of the nervous system [6, 8, 9].

All these prerequisites are reinforced during school life when children are forced to stay longer in a static position. As a result of spine muscle fatigue of the child at the end of work time the child begins to look for a position that decreases the static tension in the muscles. This posture is repeated every time when muscles are tired and at the end it becomes a vicious conditional reflex and a dynamic stereotype - i.e. to a poor habitual posture of the spine, commonly called the „fatigue posture" [6, 8, 9]. In order to realize more clearly the differences between good and poor posture, look at the Figure 1.

All-around development, which is gained by strengthening all the muscles of the body through active play-climbing, throwing balls, running, jumping, skipping, shouting-lays the foundation for a good posture. But if the child is to learn the habit of good posture he must not only gain all-around development but must also strengthen the muscles that have the most to do with holding the body in good balance [5]. These are:

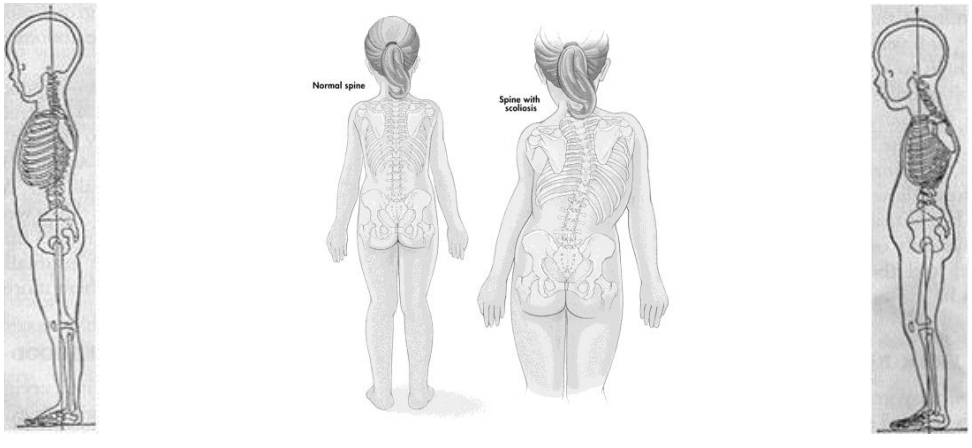
(1) The muscles of the abdomen - The lower abdominal muscles should pull in and flatten the lower part of the abdomen. When a baby first begins to walk, his abdomen extends farther than his chest, but gradually, as he grows older, his abdominal muscles should become stronger and should pull in

and flatten his lower abdomen more and more, until finally his abdomen extends no farther than his chest. Figure 1 (good posture) shows in general how the abdomen should be held by a child about 5 years old [5];

(2) The muscles of the buttocks – When the buttock muscles arc well developed, they help to straighten the lower spine and keep the child's back from becoming too hollow. As the child grows older he can learn to use them in this way and to strengthen them [5];

(3) The muscles of the shoulders and of the upper trunk – The muscles of the shoulders and neck and those of the upper trunk help to hold the chest high and the chin in. Many a child who has plenty of opportunity for free play does not use these muscles enough because of the lack of fences and trees to climb and bars to swing on. If these muscles are to be strong enough to hold the child's chest up in good position, they must get plenty of exercise [5];

(4) Certain leg muscles that hold the feet in good position - Proper use of the feet is necessary if the child's body is to be held in good balance [5].



Good posture	Poor posture
This child stands at his full height, with his weight on the balls of his feet.	This child stands in a slumped position, with his weight on his ankles and heels.
He holds his head high, with his chin in.	He holds his head forward, with his chin out.
His chest is high, and his shoulder blades do not slick out in the back.	His chest is flattened and sunken and his shoulder blades stick out in the back.
His abdomen is drawn in.	His abdomen is relaxed and sags.
The curves of his back are slight.	The curves of his back are too great.
His knees are straight.	His knees are slightly bent.

Fig.1. Differences between good and poor posture (represents a child about 5 years old). [5,15]

It is important to use the natural tendency of children to exercise, as an inexhaustible source of health, strength and energy for their development; to plan proper physical activity; modern methods and technologies for education have to be used [12].

The habit of holding the body in balance and good posture in sitting, walking and standing is learned gradually as the child learns to control his body and it must start from an early age, because it will be the base for the proper functioning and will develop the child's organism in the upper stages of growth and development and their adequate life realization [10].

Strength is defined as the ability of human beings to overcome external resistance or counter it by their muscular efforts. The magnitude of muscle strength depends on many factors - age, sex, fatigue, mood and functional status of the nervous system, disorders and diseases, and others. It changes during the day - in the night and early morning hours it is lower but in the afternoon it reaches the highest level. Due to these fluctuations muscle strength should be measured at the same time and under the same

conditions. By systematic exercises and workout muscle strength increases on account of the increases muscle mass and new conditional reflex connections, providing more perfect coordination in muscle work. During the period 6-10 years muscle strength has a steadily upward development [2].

There are very few papers on an alternative rehabilitation approach for posture deviation in Bulgaria. Considering the international literature there is information of Scientific Exercise Approach to Scoliosis (SEAS), which is not so popular in Bulgaria.

SEAS is an acronym for "Scientific Exercise Approach to Scoliosis". The name indicates that this approach is based on scientific principles. The SEAS method originates from the Lyon approach where a number of the basic characteristics to the approach had already been developed. This includes: improving the patient's awareness of their deformity, autonomous correction by the patient (***active self-correction***), the use of exercises to stimulate a balance reaction. In the SEAS approach the two main treatment objectives are active self-correction as well as the improvement of spinal stability. The self-correction component can be defined as the search for the best possible alignment within three dimensional spatial planes, which are obtained autonomously by the patient [1, 11].

The aim of the present study is to explore the effects of physical therapy training program based on SEAS on static muscle strength in children with postural deviations.

METHODS

Design and Participants

The study was performed through a 5-months controlled trial. All assessments were made at baseline and after the intervention (5 months).

Study subjects were 30 children ages 7 and 8 years old (of which 17 girls) with idiopathic posture impairments and idiopathic low-degree spine deformities (29 of the 30 children were with scoliotic impairments).

At the beginning of the second semester of 2013-2014 an examination for spinal deformities of children from 68 SOU in Sofia was performed. Studied children were aged 7-8 years from first and second grade. After informed consent of the parents and initial research, the children were divided into two groups - experimental (15 children) and control (15 children) with corresponding posture and spine deviations, age and sex.

The experimental group (EG) included 15 children in mid age 7.5 years (7 girls and 8 boys). Children from this group had held two sessions of physical therapy a week for 45 min for 5 months.

The control group (CG) included 15 children in mid age 7.6 years (6 girls and 9 boys). Children from this group were without treatment.

Two groups had theirs physical education classes from school program which were led by general education teachers, rather than a physical education teacher, which reduces their effectiveness in terms of physical development.

The first years of school, namely primary school age, form human motor culture in general. Then, the period from I to IV grade is where all the prerequisites (physical and mental) to accelerate the motor development lie. Kids love the different motor activities. It is therefore necessary to use a variety of methods and apply various tools to maintain and stimulate the activity, attention and their interest. However, if the applied tools are repetitive and under standard conditions, children quickly get bored and tired. By implementing a correct dosage and properly set pace, amplitude and start position exercise's exercise and effect can be adjusted. With their help the therapist can solve different kinds of problems [2].

Training program

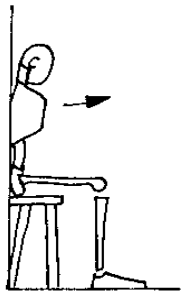
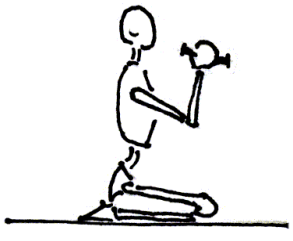
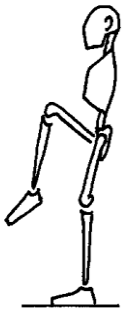
The physical therapy training program was based on SEAS (there were no mirrors). Training frequency was two weekly sessions of 45 min for 5 months. We used special exercises strengthening the main muscle groups, which maintain the good posture. This was aimed at reducing the effect of less ergo-

nomic school environment and hypokisnesis that leads to a weakening of the same muscle groups.

According to Romano et al. (2008) in SEAS "becoming aware of body posture and defects of posture is obtained through visual (mirror) and tactile (contacts in the various postures) biofeedback and rehabilitator guidance." In our experimental physical therapy training program we used tactile biofeedback and rehabilitator guidance, but no mirror.

Our physical therapy program included exercises for active self-correction on the three spatial planes (asking the patient to perform an active self-correction movement and to hold it for the entire duration of isometric contraction - at least 10 seconds of the chosen muscles); for spinal stability; for muscle strength (weight lifting – 1 kg, but it's done only if he/she is able to maintain the active self-correction while exercising); for static and dynamic trunk balance (The bad posture in children can result in problems with balance, coordination and upper body strength [4].). All these exercises are designed to train the patient to maintain autocorrection even in unfavorable conditions of attention (Table 1).

Table 1. SEAS exercises

		
Sitting with your back against a wall. Perform active self correction trying to detach the rib hump from the wall without loosing the active self correction.	*Starting Position:* Kneeling with the buttocks on the heels. *Upper limbs:* Flexed, with the hands leaning on the thighs grabbing the weights. *Spine:* Upright. *Lower limbs:* Flexed. *Execution:* Raise the flexed arms, with the elbows forward, the arms are parallel with the floor and the forearms are in plumbline to the floor. *Duration:* 10 sec.	Standing. Lift one leg bending your hip. Then slowly turn on tiptoe of the supporting leg. Development of balance reactions Proposed exercises are always done in Active Selfcorrection, even on unstable planes, developed with growing difficulties

Instruments and Assessments

To determine the existence of posture and spine deviation and objectify the results of physical therapy the following methods were used: expert body view (done by physical therapist in Frontal and Sagittal Plane and documented with standardized photos) and 1-5 Kraus-Weber test for static strength endurance of the muscles (Fig. 2).

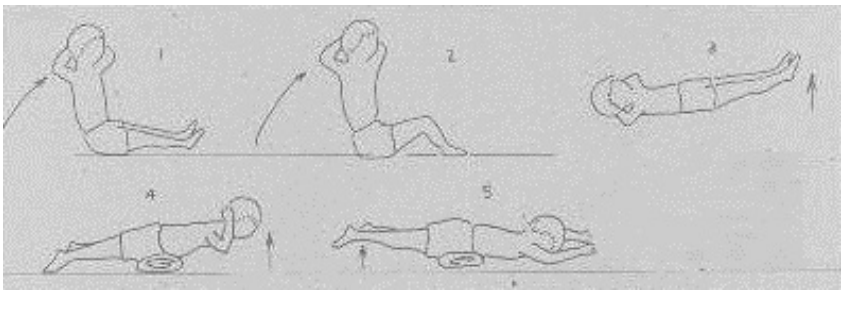


Fig. 2. Kraus-Weber tests, Source: http://www.ihpra.org/chapter_3.htm; accessed January 6, 2010

Children in both groups were administered the Kraus-Weber test for static strength endurance of specific muscle groups: upper back, lower back, abdominal, hip flexor. In 1940, Dr. Kraus worked with Dr. Sonya Weber, a fellow Austrian émigré at Columbia Presbyterian, in the hospital's Posture Clinic for children, which she had established to treat children with posture problems. Drs. Kraus and Weber developed their six Kraus-Weber tests (also known as K-W tests) to measure (in seconds) their patients' level of strength in the back, stomach, and hip muscles used to hold the body erect. We used five of Kraus-Weber tests (1-5) [7]. Each test is done until failure, and if the child holds more than 60 seconds the researcher stops the test.

Kraus-Weber Tests 1-5 (Fig. 2).

Tests 1 and 2, *Abdominals and Abdominals Minus*: These tests determine the condition of the abdominal muscles. Failure in either or both tests means that the abdominal muscles area is dangerously weak and the subject is unable to lift his own weight, the weight with which it must live, work and play.

Test 1: Position: Lie down on the back, legs straight, feet held down, hands behind neck. **Action**: Push upward to a half sitting position (45°) and hold until failure or 60 sec.

Test 2: Position: Lie down on the back, knees bent, feet held down, hands behind neck. **Action**: Push upward to a half sitting position (45°) and hold until failure or 60 sec.

Test 3, *Psoas*: This test determines the condition of the lower abdominal muscles and the hip flexors. These are the muscles used for running, jumping, skipping and even standing erect. They are the muscles most vital in defense, offense and even physical survival.

Position: Lie on the back, hands behind neck. **Action**: Lift both legs up 8-10 inches from the floor, hold until failure or 60 sec.

Tests 4 and 5, *Upper and Lower Back*: This tests the strength of the upper and lower bock muscles. Failure in these areas shows that the motor-ability of the body is tragically underdeveloped.

Test 4: Position: Lie face down. Place small pillow under hips. Lower body held down, hands behind neck. **Action**: Lift upper body off floor and hold until failure or 60 sec.

Test 5: Position: Lie face down. Place small pillow under hips. Upper body held down, head resting on hands. **Action**: Lift lower body from hips and hold until failure or 60 sec [7].

Statistical Analyses

Means and standard deviations (SD) were used as descriptive statistics. Normality of distributions of data for EG and CG was evaluated with Kolmogorov-Smirnov Test. Changes in static strength endurance were analyzed with a paired sample *t* test. Comparison between EG and CG were analyzed with independent samples *t* test. SPSS 10.0 version was used and 95% confidence interval (CI) was maintained for all analyses. The significance level was set at $P \leq 0.05$.

RESULTS

Table 2 represents statistical results - descriptive data on children's Kraus-Weber tests (time in seconds) and comparisons in and between groups.

DISCUSSION

Successful application of SEAS is reported to adolescent patients [11] and adult patients with idiopathic scoliosis [14].

Prevention and early treatment are the best ways to preserve health. Appropriate early treatment of posture deviations will prevent, stop or correct progression of the spinal deformity. Hawes and O'Brien (2006) concluded: "Spinal curvatures can routinely be diagnosed in early stages, before pathological deformity of the vertebral elements is induced in response to asymmetric loading".

On the other hand we did not find information about applicability of appropriate elements of SEAS to children of primary school age. That's why our experiment was performed with a study group of

children ages 7-8, who in the contemporary Bulgarian healthcare system are neglected without prophylactic examination for posture deviations and spinal deformities. Before the experiment, there is no statistically significant difference between the static strength endurance of EG and CG measured with Kraus-Weber tests (Table 2).

Table 2. Statistic Results

K-W tests	Group	Experimental Group n	Mean (±SD)	*pa*	Control Group n	Mean (±SD)	*pa*	*pb*
Test 1	Initial	15	25,01 (18,6)	0,160	15	32,56 (21,6)	0,152	0,314
	Final		31,67 (16,2)			27,25 (18,4)		0,492
	d		6,66			-5,31		
Test 2	Initial	15	17,67 (14,7)	0,001***	15	22, 93 (14,6)	0,89	0,333
	Final		35,4 (16,2)			22,5 (13,5)		0,025*
	d		17,73			-0,43		
Test 3	Initial	15	16,51 (12,1)	0,017*	15	24,9 (19,2)	0,085	0,166
	Final		27,93 (17,8)			18,33 (12,9)		0,102
	d		11,42			-6,57		
Test 4	Initial	15	27,11 (19,2)	0,014*	15	29,13 (19,0)	0,277	0,775
	Final		42,6 (18,6)			25,77(14,2)		0,009**
	d		15,49			-3,36		
Test 5	Initial	15	32,87 (22,5)	0,129	15	41,03 (22,0)	0,039*	0,323
	Final		45,6 (18,5)			30,53 (19,9)		0,041*
	d		12,73			-10,5		

Notes. SD = standard deviation; d – difference; *pa* – significance of differences by each group compared to initial values, *95% CI*; Student T test; *pb* – significance of differences between groups, *95% CI ; *p<0.05, **p<0.01, ***p<0.001;*

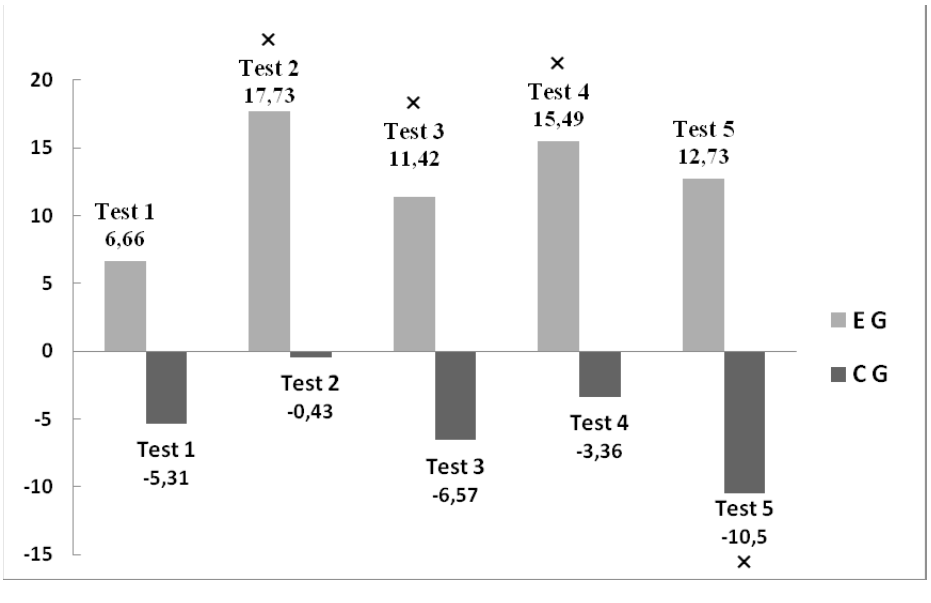


Fig.3. Changes in static muscles strength (s) by group: comparison of the experimental (treatment) group (EG) and control group (CG) on mean change scores in 1-5 Kraus-Weber tests (sec) during experiment; Ï- significant changes (p<0,05)

After physical therapy we found significant improvement (Table 2) in tree of the examined five muscular groups for the experimental group (K-W tests 2, 3 and 4). This indicates improvement in strength of abdominal muscles (p < 0,001), hip flexors (p = 0,017) and upper back muscles (p = 0,014) in EG. May be

children in EG didn't demonstrate improvement on K-W test 5, because on the first test 5 (33%) of them reached the maximal possible result of 60 seconds and they held this result on final test.

Fig.3 shows improvements in static muscular endurance by the EG in the studied muscles and muscle groups. Significantly improved test results in the final study of EG (tests 2, 3 and 4) with an increase by approximately 6,7 to 17,8 seconds than in the initial study ($p<0,05$).

In the same period in the control group there are no significant changes except decline in one of Kraus-Weber tests (Test 5). Without therapy children in CG did not succeed even in staying on the same strength level. Children of CG worsened the strength of their lower back muscles and in the final examination their results in this region were significantly worse in comparison with EG ($p = 0,041$). The Fig.3 shows changes for the control group and decrease in the value of static muscular endurance (Test 5) in the lower back muscles.

CONCLUSIONS

The applied physiotherapy methodology to students from first and second grade, suitable for individual age-sex characteristics of children contributed substantially to the static strength endurance of the major muscle groups responsible for maintaining correct posture. Even in this early age physical therapy based on SEAS is applicable and beneficial.

As a result of the applied physical therapy to the experimental group, statistically significant improvement of static strength endurance of the abdominal musculature, hip flexors and upper dorsal musculature in children was reached and change for the worse in the strength of their lower back musculature was prevented.

Appropriate early treatment of posture deviations will prevent, stop or correct progression of the spinal deformity and contribute to children's health in the future.

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CONTROL ON SPORTS PERFORMANCE BY DINT OF EXPRESS-COMPLEX TEST IN APPLIED KINESIOLOGY

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INTRODUCTION

Fatigue toward the end of a prolonged sporting event may result as much from dehydration as from fuel substrate depletion. Exercise performance is impaired when an individual is dehydrated by as little as 2% of body weight. Losses in excess of 5% of body weight can decrease the capacity for work by about 30% (Armstrong et al. 1985; Craig and Cummings 1966; Maughan 1991; Sawka and Pandolf 1990).

Sprint athletes are generally less concerned about the effects of dehydration than are endurance athletes. However, the capacity to perform high-intensity exercise, which results in exhaustion within a few minutes, is reduced by as much as 45% by prior dehydration corresponding to a loss of only 2.5% of body weight (Sawka, Young, Cadarette, et al. 1985). Although sprint events offer little opportunity for sweat loss, athletes who travel to compete in hot climates are likely to experience acute dehydration, which persists for several days and may be serious enough to have a detrimental effect on performance in competition.

Dehydration impairs both physical and mental performance in all types and levels of sport, yet it can be avoided (or at least minimized) by appropriate drinking strategies. Before we explain what those are, here a bit of background physiology.

Exercise produces heat. Prevention of overheating occurs by transfer of heat to the skin by vasodilation of the cutaneous circulation, and by the cooling effect of evaporation of sweat. Exercise causes body fluid losses from moisture in exhaled air as well as from sweating. Although sweat rates are highest under conditions of high-intensity exercise in heat and high humidity, total fluid losses can be appreciable in very prolonged events, whatever the conditions. Unless fluid losses are replaced by drinks, sweating causes progressive depletion of circulating blood volume, leading to hypo hydration (commonly called dehydration) and a thickening of blood. This places a strain on the cardiovascular system, with a rise in heart rate in order to maintain adequate blood flow to exercising muscles and vital organs. As blood volume depletes, blood flow to the skin is reduced. As a result, sweating decreases and heat dissipation from the skin is impaired, causing body core temperature to rise, potentially leading to heat stress, collapse and even death.

Even low levels of dehydration have physiological consequences. A loss of 2% bodyweight (just 1kg for a 50kg person) causes an increase in perceived effort and is claimed to reduce performance by 10-20%. A fluid loss exceeding 3-5% bodyweight reduces aerobic exercise performance noticeably and impairs reaction time, judgment, concentration and decision making - vital elements in all sports, from pole-vaulting to football. A particular issue for boxers is that dehydration increases risk of brain injury.

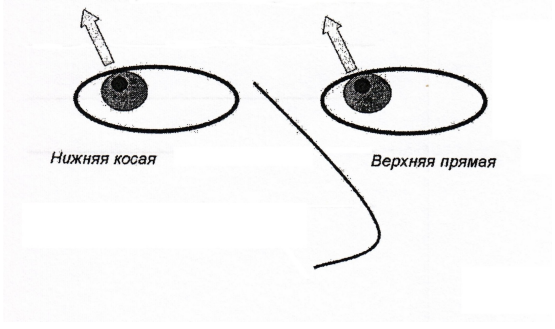
The aim of the research is to apply the express complex test in applied kinesiology to establish dehydration of the body before sports activity as well as to correct functional condition.

MATERIAL AND METHODS

The experiment was conducted with 20 men - football players. Studies were performed 40 min - 1 h before the training.

Express complex test in applied kinesiology involves two tests – 1st test vestibular-ocular reflex for dehydration and 2nd test for the general level of the microelements.

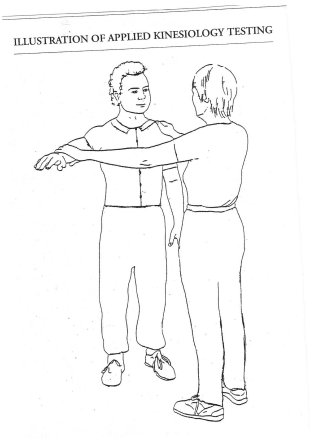
1st test vestibular-ocular reflex for dehydration in applied kinesiology



Eyes look right and up.

Therapeutic location: second, third and fourth finger is placed on the navel.

2nd test for the general level of the microelements



Therapeutic location: dorsal side of wrist.

The results of testing corrected dehydration through the adoption of water or beverage of microelements (Izostar).

RESULTS AND ANALYSIS

The study data show reliability to express complex test in applied kinesiology.

At 100% of athletes found dehydration. Of these, 45% had a need for adoption of clean water, and the remaining 55% - the adoption of a special mineral drink. Control testing conducted immediately before the commencement of training, which showed that the achieved correction of the condition.

We recorded subjective imputation of exercise according to visual analogue scale (0-10 points) within three workouts. Register that the range recovery dehydration is within 70-95%. This gives reason to look for other causes of dehydration of the body, which may be related to diet and the regime of everyday athlete.

CONCLUSION

The express-complex test in Applied Kinesiology allows for correction of dehydration and recovery of the functional sports activity of the body. Applied Kinesiology is a new system to overcoming the problems of sports performance.

Using a wide range of tests applied kinesiology can help to specifically detail the reasons for the reduction of sports performance. The test results will allow to fully customize specific recovery of the athlete, but it will be the subject of future research.

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SLEEP QUALITY OF A GROUP STAYING IN ANTARCTICA – OBJECTIVE AND SUBJECTIVE MEASUREMENTS

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INTRODUCTION

Sleep characteristics during a stay in Antarctica is much discussed but less studied. This is due to the unfavorable conditions in which Antarctic Base personnel reside and still the cumbersome equipment used for sleep study. With the advent of microelectronics in practice, portable devices were created that allow exploring the parameters of sleep in extreme conditions without excessive load on respondents. Actigraphy is such a non-invasive method of monitoring human rest/activity periods. A small actigraph unit, also called an accelerometric sensor [7], is worn by the patient to measure motor activity. Usually the person's activity is measured on the wrist by an actigraph in a wrist-watch-like package. The unit continuously records the movements it undergoes.

Sleep actigraphs are useful for determining sleep patterns and circadian rhythms. They may be worn for several weeks at a time. Contrary to polysomnography, the patient remains movable and does not necessarily need to be located in a laboratory while the required data is being recorded. This permits the patient to stay in his or her natural sleep environment or to be studied relatively easy in non-natural (extreme) conditions. Sleep actigraphs are also more affordable than performing a polysomnography and, therefore, they can be an advantage as well, particularly when conducting large field tests [8].

Actigraphy has been actively used in sleep-related studies since the early 1990s. The technique offers reliable results with an accuracy that is close to those of polysomnography (above 90%) [5]. It is more extensively used in academic research and is being increasingly employed in new drug clinical trials where sleep quality is seen as a good indicator of quality of life. Actigraphic usage in Antarctic studies is still limited [4], but is to be expanded.

The characteristics of sleep in Antarctica are mostly studied during the Antarctic winter [9, 2, 6]. Sleep disturbances at this time are priority associated with low environment illumination [1, 3], which alter the circadian rhythm. Bad sleep quality may also be a result of winter depression [10] induced by low light conditions. Our purpose was to check the sleep properties during Antarctic Summer when there was too much sunlight. The main goal of this article was to compare subjective and objective sleep quality.

METHODOLOGY

Medically screened (especially for sleep disturbances) adults (N = 7, age = 52 ± 22 yr) were recruited for participation in the study. A written informed consent was obtained from the subjects after reviewing the study protocol. The local ethics committees approved the study. The subjects took part in the second stage of the project „Traveling through different time zones, Jet Lag and sleep disorders during combined change of altitude and latitude", № 232/30.05.2011. They spent 10 days at the Bulgarian antarctic base on Livingston Island in the South Shetland Islands - St. Kliment Ohridski during the Expedition.

The study design was as follows:

- Chronotype determination of the subjects by means of Chronotype questionnaire;
- To determinate the extent of Jet Lag upon arriving in Ushuaia, Argentina by questionnaire method. (Filled in two consecutive days);
- All the time people filled in three types of questionnaires - sleep diary and psychological state

questionnaire - SAM (Self-esteem, activity, mood);
- Every night were conducted sleep efficiency, amount of awakenings and active movements by individual actigraphy system - ActiSleep Sleep Monitors;
- To determinate the extent of Jet Lag upon arriving back in Sofia by the same Jet Lag questionnaire method. (Filled in two consecutive days).

Assessment of the data from the questionnaires gives an idea of subjective sleep parameters. The following sleep parameters were estimated by means of actigraphic monitors:

- Sleep Period Time (SPT), defined as time of sleep onset to the end of sleep, including all sleep epochs and wakefulness after sleep onset;
- Wakefulness After Sleep Onset (WASO), defined as time spent awake between the sleep onset and the end of sleep;
- Total Sleep Time (TST), defined as SPT minus WASO, normal is 7-9 h/24h;
- Sleep Latency (SL), defined as time between turning off the lights to the first epoch of any sleep, normal is 10-20 min.;
- Sleep Efficiency (SE) - was calculated as TST divided by SPT and TST divided by the time in bed. Normal is approximately 85 to 90%.;
- Arousal Index (ArI) – number of awakenings per hour SPT, normal ArI ≤ 5.

Their dimensions give an indication of the objective characteristics of sleep. In the present study only part of the collected data was assessed. Only objective sleep parameters calculated from actigraphy and subjective data from subject's SAM psychological state questionnaire were compared.

RESULTS

The SAM questionnaire consisted of 27 states and reveals mental performance. For its evaluation scores of self-esteem, activity and mood (30 pairs of opposite states, evaluated in the balls from 0 to 10) were summed. For the purpose of this paper we were interested presumably in the states daytime sleepiness and fatigue.

All of the participants (100%) showed subjective sleep problems during the nights spent in Antarctica. They had bad feelings equal to 50% or more with respect to daytime sleepiness and fatigue. Table 1 represents the percent of answers that were higher than 5 (evaluated in the balls from 0 to 10).

Tabl. 1. Percent of answers higher than 5 (from 0 to 10) for daytime sleepiness and fatigue states.

Subject's initials	Percent of answers - sleepiness	Percent of answers - fatigue
DB	50	63
AS	75	50
GP	100	75
JJ	100	100
KN	88	100
RZ	63	50
IA	63	63

For three of the subjects (depending on available personal ActiSleep Sleep Monitors) this subjectively reported bad sleep quality was validated by actigraphy. Figure 1 represents row actigraphic data for one of the subjects.

All three measurements of the night movements surprisingly provided us with normal sleep picture. Objectively measured sleep parameters showed normal sleep quality during nights spent in Antarctica. All of the sleep parameters were in physiological norms.

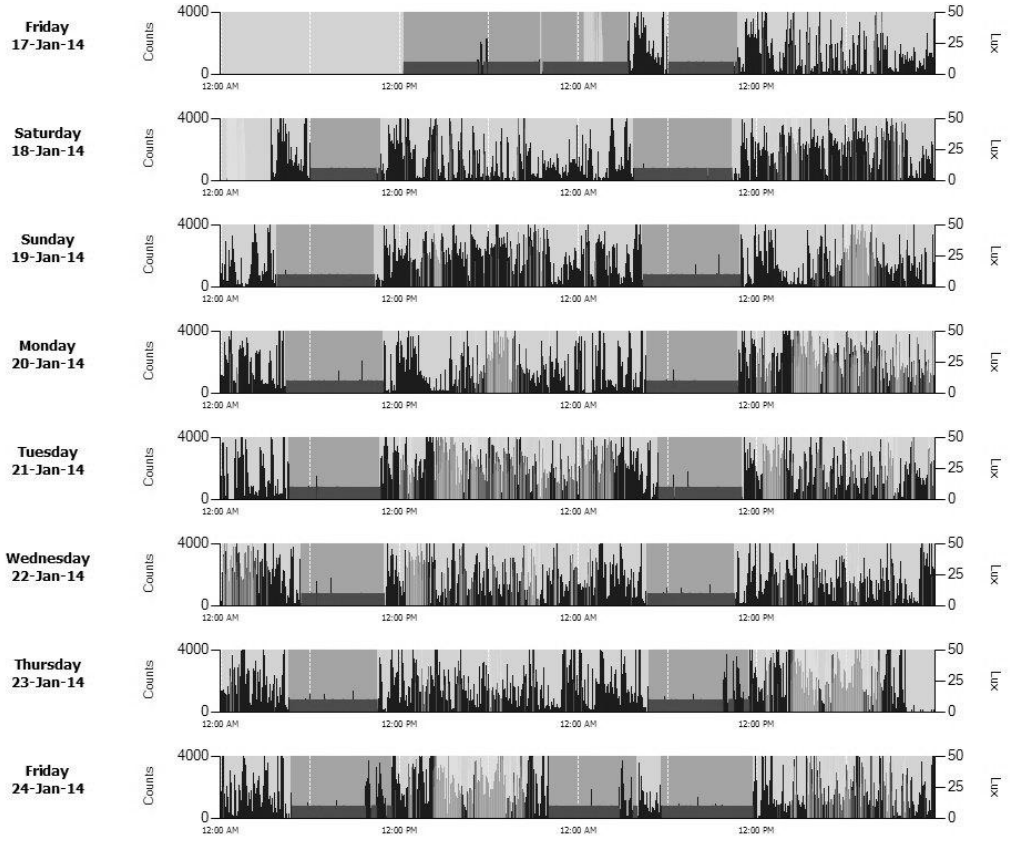

Fig. 1. Normal Actogram (n=1)

Tabl. 2. Average sleep actigraphic parameters (n=3)

Parameter	Average	Standard deviation
SPT (Sleep Period Time), h	7.22	0.34
WASO (Wakefulness After Sleep Onset), h	0.92	0.41
TST (Total Sleep Time), h	6.28	0.15
SL (Sleep Latency), min.	15.9	1.08
SE (Sleep Efficiency), %	86.92	5.31
ArI (Arousal Index), #/h	1.46	1.10

Assuming that 80% of daily sense of a person is sleepiness hence we may conclude that the other 20% of this state is alertness. Therefore, we compare the percent of daily alertness of the given subject with hi percent of SE during the night.

Pearson correlation analysis of the percent of SE and the percent of daytime alertness (DA) on the one side, and daytime sleepiness (DS) on the other, gives the following result: SE/DA r= 0.83; SE/DS r= -0.83.

The correlation coefficient ranges from −1 to 1. A value near 1 implies that a linear equation describes the relation between SE and DA. When SE increases, DA increases. A value of −1 implies that all data points lie on a line - DS decreases as SE increases (Fig. 2).

The correlation analysis showed that the dependence of DA from SE is big enough and when SE is normal (more than 85%) the DA should be normal (more than 80%). The dependence of DS on SE is also big but counterpoint. So when SE is normal (more than 85%) the DS should be also normal (smaller than 20%). The analysis shows that the percent of DS should be smaller as normal objectively SE is measured. In the case of three actigraphic study the results showed the opposite - bigger DS percent. This gave us the reason to assume that this is due to the subjective sense of poor quality sleep.

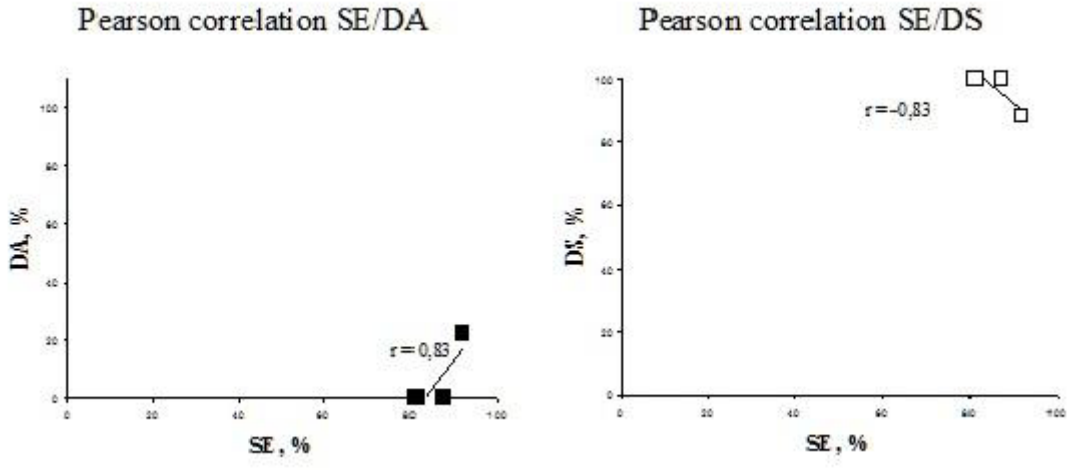

Fig. 2. Pearson correlation analysis SE/DA and SE/DS (n=3).

DISCUSSION AND CONCLUSIONS

Objective parameters obtained by the actigraphy parameters indicate normal sleep quality, in contrast to subjective, which shows disturbed sleep. This is probably due to the described by other researchers vivid dreams during a stay in Antarctica. This can increase the subjective feeling of wakefulness during the night sleep and, moreover, to explain the feeling of DS.

Of course, further research and a collection of large sleep parameters database in these extreme conditions is needed. Only then conclusions may be made about the pattern of sleep in Antarctica.

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DYNAMIC STABILITY IN ADULTS WHO HAVE LEARNED TO PRACTICE PANEURHYTHMY

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INTRODUCTION

A continuously greying society is confronted with age-related health problems that threaten both the quality of life of fall-prone individuals as well as the high treatment costs of fall-related injuries [10]. Reasonable and effective recreational physical activities with a view to proactive approach are needed to be investigated, assessed and promoted in this area in order to influence age-related changes in dynamic balance.

Activity and fitness levels (muscle strength, endurance, and flexibility) decline through the years from 30 to 60 years of age [8, 10]. Most of the studies on dynamic balance have been limited to older adult populations and populations with considerable impairments in balance [15]. The research of balance performance that has been done with older adults is valuable, but little research has been done with the middle aged population in these areas [8]. People aged 30-60 represent a population in transition from greater activity to lesser and are reported to manifest joint and muscle strength changes observed in a typically aging population [English, 2008]. Activity decline over these years in the lifespan is generally considered to be a slow decline. Older adults who perform functional tests at levels that place them in high risk categories may have slowly declined over years to this level of performance [8].

Identification of deterioration of balance as soon as it occurs in younger people allows earlier interventions to target specific impairments and decrease fall risk [11]. Addressing overall fitness with patients in the middle age years while also addressing the primary complaint, will help them continue to function at a higher level as they age and possibly diminish the chances they have of suffering a fall related injury in later life [English, 2008]. Prevention of significant performance decline in the middle aged years may have a positive impact on function and fall prevention in the older adult years [English, 2008]. Knowledge of expected performance may serve as possible motivation for people to remain active and prevent declining participation throughout aging [8].

Although many risk factors for falls have been identified, intervention trials have found that the effects of exercise as a single falls prevention intervention are comparable to those from multifaceted interventions [Sherrington et al., 2011].

Paneurhythmy is a Bulgarian system of musical rhythmic physical exercises performed in the morning in the open. It is a circle form of pair exercises integrating music, movements, thought, speech (poetry), philosophy and interaction with nature in a harmonious unity. Paneurhythmy is executed for about 75 min every day (play time 60 minutes) in the period between March, 22nd - September, 22nd, when nature is in uplift [4, 7]. It is an aerobic activity and, for physically active healthy adults the intensity is low or moderate. The relatively slow and always smooth and light movements of Paneurhythmy lead to practically, no traumatic injuries and a conscious control over the movements. The exercises resemble dance and are played in standing position; involve almost all the muscles and joints in the human body and improve the locomotion and balance [4]. The pace of performance is slow and even. The physical exertion is almost constant in every practise session; therefore it is possible to estimate the strain bear ability in the cases of players who have health problems. The Paneurhythmy is enjoyable to practice and it is appropriate for a wide range of age groups. It is suitable not only for people of middle age but also for children and for elderly people [5].

The purpose of this study was to evaluate FSST and Fig-8m performance in young and middle-aged individuals. We aimed to compare dynamic balance in physically active adults (dealing with Paneurhythmy or other types of physical activity).

METHODS

Participants. A total of 116 subjects (99 females, 17 males) volunteered to participate in the study. They were typical healthy people 20-60 years old. The participants' general demographic characteristics are presented in Table 1. Table 2 presents descriptive statistics of general demographic characteristics of subjects by age groups.

Table 1. Descriptive statistics of general demographic characteristics of all subjects

Characteristic	**PANG** (n=66) Mean (± SD)	**CG** (n=50) Mean (± SD)
Age, yr	40.2 (11.56)	38.72 (10.68)
Height, cm	164.5 (8.23)	167.7 (7.59)
Weight, kg	67.28 (15.19)	70.52 (15.32)
BMI, kg/m^2	24.9 (5.56)	24.97 (4.72)
Physical activity	7.81 (1.09)	7.65 (1.41)
Sex (women) %	86.4	84.0
PANG – Paneurhythmy training group; CG – control group.		

Table 2. Descriptive statistics of general demographic characteristics of subjects by age groups

Characteristic	**PANG** (n=66) Mean (± SD) or %		**CG** (n=50) Mean (± SD) or %	
Age group	2	4	1	3
	20-39 (n=**27**)	40-60 (n=39)	20-39 (n=30)	40-60 (n=20)
Age, yr X (SD)	28.3 (5.29) ⅄	49.15 (5.1)	31.3 (5.57) ⅄	49.85 (5.47)
Height, cm	168.0 (9.17) *	162.0 (6.57) * …	168.8 (8.30)	166.0 (6.20) …
Weight, kg	63.51 (14.93)	69.90 (15.0)	69.18 (16.31)	72.52 (13.85)
BMI, kg/m^2	22.26 (3.4) *	26.73 (6.05) *	24.17 (5.01)	26.19 (4.08)
Physical activity, MBQ 7.91 (1.15) 7.74 (1.06)			7.45 (1.60)	7.96 (0.98)
Sex (women) %	74.1	94.9	80.0	90.0
*PANG - Paneurhythmy training group; CG - control group; MBQ – total result of Modified Baecke Questionnaire; Data expressed in means ± SD or percentage. Significant differences between the compared groups are indicated *, ñ and … ; Student t-test.*				

Age subgroups were named: PANG-2 (20-39 years old); PANG-4 (40-60 years old); CG -1 = (20-39 years old); CG -3 (40-60 years old).

Design. A cross sectional design with data gathered at one point from a convenience sample was used. A total of 116 subjects volunteered to participate in the study. Study subjects were divided in two groups: experimental ((EG, n= 66) just finished participation in a 5-6-month course of Paneurhythmy training for beginners and control group (CG, n= 50) dealing with other types of physical activity. All they were divided in youngest (20-39 years) and middle-aged groups (40-60 years).

Subject Inclusion Criteria: willingness to participate, age between 20 and 60 years, a full understanding of the study procedures, relatively good health (no history of any illness contraindicating exercise or limiting participation in the moderate intensity exercise program).

Subject Exclusion Criteria: Subjects were excluded if they had any significant general health problem or orthopaedic problem that would keep them from fully participating in the research protocol.

METHODOLOGY OF INTERVENTION

PANG: just finished course of Paneurhythmy training for beginners organized indoors in evening. Participants hadn't practiced Paneurhythmy before the course. The exercise training classes were arranged 1 time (100 min) or 2 times (each 90 min) a week respectively for 5 or 6 months (October – March or April). It included consecutively learning and training of the exercises, songs, names and basic humanistic message of all Paneurhythmy exercises. All classes were leaded by certificated Paneurhythmy instructors. They also kept an attendance record for each of the participants. PANG includes only participants with not less than 50% attendance at Paneurhythmy training.

Instruments

Four Square Step Test (FSST) protocol. The equipment: a stopwatch and 4 canes. The square is formed by using 4 canes resting flat on the floor. Canes were 50 cm long. The subject stands in square number 1 facing square number 2 (fig 1). The aim is to step as fast as possible into each square in the following sequence. Square number 2, 3, 4, 1, 4, 3, 2, and 1. This sequence requires the subject to step forward, backward, and sideway to the right and left. The score is recorded as the time taken to complete the sequence. The stopwatch starts when the first foot contacts the floor in square 2 and finishes when the last foot comes back to touch the floor in square 1. The instructions to the subject were identical to given by Dite & Temple (2002). The sequence was then shown to the subject and the practice trial was given to him. Two trials are then performed, and the better time (in seconds) is taken as the score. A trial is repeated if the subject fails to complete the sequence successfully, loses balance, or makes contact with a cane during the sequence. In this study all subjects were able to face forward during the entire sequence and didn't need to turn before stepping into the next square. All subjects wore their preferred (comfortable) shoes.

Walking in a Figure of eight (Fig8Wm) protocol (modification based on Frandin et al., 1995 and Johansson & Jarnlo, 1991). Participants wore comfortable shoes and walked once walk the course as fast as possible without „missteps" in the space between two adjacent pairs of concentric circles, the inner with a radius of 75 cm and the outer of 90 cm (which gives a 15-centimetre step width). Fig.2 represents the walking path of F8m (arrows illustrate the direction of the walking path and diameters of circles). The ***Fig8Wm*** measure was verbally explained and demonstrated to study participant prior to performance (without practice trial). Participants started the walk from lateral part of one of the cones and asked to stop after return to the starting position. Two trials are then performed, and the better time (in seconds) is taken as the score. A trial is repeated if the subject did step on or outside the lines of circles.

Physical activity was measured with total activity index of Modified Baecke Questionnaire - Baecke (Pols et al., 1995) (in Bulgarian).

Statistical Analyses. Analysis of data was performed using SPSS software. The means, ranges, standard deviations and standard errors of measure were calculated for each of the tests studied. These data were analyzed as a whole group and all subjects by age cohort divided 20-39 and 40-60. Differences between all groups (CI 95%) were compared with independent sample *t* test to determine significant differences in performance between the cohorts after testing for normal distribution (Kolmogorov-Smirnov test).

RESULTS

Homogeneity of general demographic characteristics by groups. No differences were found among compared (in table 3 and 5) groups for any of the variables except height and BMI (PANG-2 to 4: subject

in 2 were heir, with lower BMI, younger group), age (CG-1to PANG-2: subject in 1 were older) and height (CG-3 to PANG-4: subject in CG-3 were heir). Refer to Table 2 for descriptive statistics.

.

Table 3. FSST test scores for all subjects by age group

Measure **FSST** (sec)	**PANG** (n=66) Mean (±SD)		**CG** (n=50) Mean (±SD)		
					p_b
Age group 20-39 40-60	 PANG-2 (n=27) PANG-4 (n=39)	 7.59 (0.94) 7.85 (1.13)	 CG-1 (n=30) CG-3 (n=20)	 7.98 (0.99) 8.72 (2.3)	 0.141 *n.s.* 0.120 *n.s.*
p_a		0.342 *n.s.*	0.183 *n.s.*		

PANG – Paneurhythmy training group; CG –control group; Group differences: (Student t-test, 95% CI), p_a *– 20-39/40-60 age subgroups;* p_b *– PANG/CG; n.s. – not significant. Data expressed in means ± SD. Lower FSST values are beneficial.*

Table 4. FSST scores (sec) compared to the published data

Present test scores			English, (2008)		Dite&Temple (2002)		Whitney (2007)
	PANG Mean (±SD)	**CG** Mean (±SD)	Mean (±SD) (n=101)		Median		Mean (±SD) (n=27)
Age group	(n=66)	(n=50)	Age group		Age (mean)		Age <65
20-39	7.59 (0.94)	7.98 (0.99)	30-39	4.8 (0.8)	74	8.7 (healthy) (n=27)	12.4 (4.2) (vestibular)
			40-49	5.2 (1.3)		12.01 (non-multiple falls) (n=27)	
40-60	7.85 (1.13)	8.72 (2.29)	50-60	5.2 (1.1)			

PANG – Paneurhythmy training group; CG –control group.

Table 5. Modified figure of eight walking test (Fig8Wm) scores for all subjects by age group

Outcome Measure **Fig8Wm** (sec)	**PANG** Mean (±SD) (n=66)		**CG** Mean (±SD) (n=40)		
Age group					p_b
20-39	8.61 (0.89)	(n=27)	9.65 (1.57)	(n=23)	0.008 **
40-60	9.15 (1.17)	(n=39)	9.61(1.93)	(n=17)	0.274 *n.s.*
p_a	0.038 *		0.938 *n.s.*		

PANG – Paneurhythmy training group; CG –control group; Group differences: (independent sample t test), p_a *– 20-39/40-60 age groups;* p_b *– PANG/CG; n.s. – not significant; * p<0.05, ** p<0.01. Lower Fig8Wm values are beneficial.*

The results for **FSST** indicated that the mean score for younger CG was 7.98±0.99 and for middle-aged CG were 8.72 ±2.3 sec, respectively. Score for FSST younger PANG was 7.59±0.94 and for second age

PANG were 7.85±1.13 seconds. There was no significant difference between groups for FSST (table 3).

The results for **Fig8Wm** indicated (table 5) significant difference ($p<0.01$) between younger age subgroups (PANG-2 and CG-1, respectively in behalf of PANG-2) and significant difference ($p<0.05$) between PANG age subgroups (younger and middle-aged in behalf of younger)

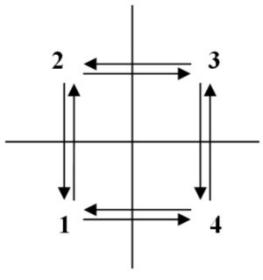

Fig. 1

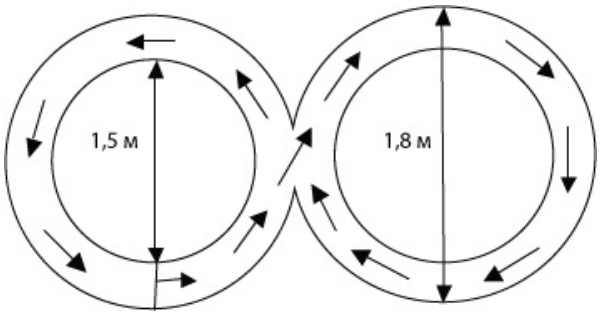

Fig. 2

DISCUSSION AND CONCLUSIONS

This study evaluated the dynamic balance in physically active adults dealing with Paneurhythmy or other types of physical activity. Dynamic balance was assessed with FSST and Fig8Wm performance in young and middle-aged individuals.

Activity, fitness levels (muscle strength, endurance, and flexibility) and balance_decline through the years from 30 to 60 years of age [8, 10]. There is a statistically significant decline in performance on the FSST from the fourth to the sixth decades of life [8]. Slow performance of the FSST is related to a higher risk of falls in older adults [6].

The findings of this study revealed that there was no significant difference between groups for FSST (refer to table 3). According English (2008) FSST showed a significant difference in the 40-50 groups. The differences were noted in the FSST between the 30 and the 50 year and it would seem that during the 40s a decline begins that is seen as significant in the 50s when compared to performance in the 30s [8]. The current sample of 116 subjects demonstrated a mean FSST score of 7.59 - 8.72 (table 4) which are faster than that of healthy older individuals and group of individuals with a vestibular disorder who had a documented balance deficit [6, 15]. The performance of subjects in this study (PANG and CG) was substantially lower than that reported by English and colleagues. One reason for this difference could be that in this study some persons had some health problems (not contraindicated for moderate physical activity) and many of them hadn't height fitness level. All the healthy subjects in the 30 -60 year old age group tested in this study were able to complete the FSST in less than 10 seconds that points good balance abilities and low fall risk. The Fig8Wm test showed a significant difference in the younger age subgroups (PANG-2 and CG-1, respectively on behalf of PANG-2) and significant difference between PANG age subgroups (younger and middle-aged on behalf of younger) (table 5). May be significant difference PANG-2 and CG-1 is connected with their difference by age (subjects in CG-1 were mean 3 years older). But such kind of connection is not investigated out of scope of this study.

Interestingly for the same groups (younger) FSST didn't differ – may be FSST is less sensitive for this age group (20-39) or probably Paneurhythmy training which requires group moving in circle (curved-path locomotion) trained this unusual ability and more specific test (Fig8Wm test) cached this in PANG-2. In older adults curved-path walking (measured by the F8W) involves different cognitive processes compared with straight path walking [13]. Cognitive flexibility and set-shifting processes uniquely contributed to how individuals navigated curved paths [13]. A controlled study established following significant positive psychological changes after beginner course of Paneurhythmy: decreased level of state anxiety, trait anxiety, perceived stress, negative emotions, aggression and depression; at the same time there are increased positive emotions, subjective happiness, self-esteem, hope, general self-efficacy, optimism, resilience, sense of coherence, life satisfaction and improved quality of life [4]. Adding years to

life and life to years may require two distinct and different approaches, one physical and the other psychological. Successful ageing is not only about the maintenance of health, but about maximising one's psychological resources, namely self-efficacy and resilience [Bowling & Iliffe; 2011]. Large randomised study shows that only the psychological approach to successful ageing independently predicted future quality of life in older adults [1]. Paneurhythmy is unique practice that combines physical and psychological approach to human health and wellbeing.

A study [3, 4] found out that there were significant improvements in the dynamic balance resulting from one season (6 mounts: March - September) practice in Paneurhythmy. The experimental group contained 22 to 68-year-old people (n=68), who had practiced Paneurhythmy for at least 1 year (average 9 years) before the experiment. The results of dynamic balance by age group are presented in Table 6.

Table 6. Balance test scores (FSST and Fig-8WT) by age group before and after 6-monts Paneurhythmy practice outdoors; adults (n=68) (by Chervencova, 2013b)

Outcome Measure	Age groups (years)	Mean Age (years)	n	Before 6-monts PAN *Mean (*±SD)	Number PAN *Mean (*±SD)	After 6-monts PAN *Mean (*±SD)	p_a
FSST (sec)	22-37	31.24	20	8,65 (1,98)	63.38 (44.15)	6,95 (1,26)	***
	38-53	47.68	25	9,18 (1,8)	73.8 (37.12)	7,53 (1,21)	***
	54-68	60.91	22	10,15 (1,52)	79.4 (47,73)	8,06 (1,32)	***
Fig8Wm (sec)	22-37	31.24	21	10,53 (1,89)	63.38 (44.15)	7,89 (1,27)	***
	38-53	47.68	25	11,66 (2,27)	73.8 (37.12)	8,57 (1,26)	***
	54-68	60.91	22	12,51 (2,34)	79.4 (47,73)	9,45 (1,57)	***

PAN - Paneurhythmy ; Number PAN - number practices of Paneurhythmy in 6-monts; p_a *– before/after Paneurhythmy practice; **** p_a *<0.001*

There is evidence that both practice and training of Paneurhythmy improves static and dynamic equilibrium [4]. Table 7 presents characteristic features of Paneurhythmy that explain its strong effect on balance training [4].

he practice of Paneurhythmy has possibilities to improve or maintain other important factors for good balance in late ages: leg strength, endurance, flexibility of leg joints and agility. In this area more researches are needed.

Falls prevention exercise should be targeted not only at those at high risk for falls, but at the general community as well [14]. It is economical to recommend general community a wide range of appropriate balance training physical activities, which are effective in early prevention, are cost-effective and attractive enough to become ongoing exercise.

Optimal physical and psychological development in late life will depend largely on the experiences of individuals during *middle age.* Midlife is likely to be a critical period for development of cognitive reserve which may delay or offset early physical or cognitive decline in old age **[Willis, Martin, Rocke,** 2010]**. So it is important to explore changes in middle-aged and offer them** a wide choice **of effective exercise programs and practices to prevent illness and promote health.**

Table 7. Characteristic features of Paneurhythmy connected with balance training (by Chervencova, 2013a)

PANEURHYTHMY FEATURES CONNECTED WITH BALANCE TRAINING	
Position of the body	standing position without support and that requires balance
Specific gait	always stepping on toes first (changes the BOS and lifts total body's COM)
Dynamic balance exercises	progressive reduced support base, executed with all body (and legs) movement towards/backwards translating COM or movements of extremities - shift COM in the anterior-posterior, mediolateral, up-down or more complex directions
Base of support	reduced in very different configurations (some shapes of BOS reduce stability in anterior-posterior, mediolateral or more complex directions) and this trains better balance
Moderate or high challenge to balance	groups with different equilibrium abilities persons with lower balance abilities can unaided to facilitate execution of too difficult for them exercises
Surface	for beginners: in hall with hard flat surface real Paneurhythmy practise (more challenging for balance): outdoors on meadow/ glade which is not so flat (there are always some unusual roughness), nor hard (because of the grass)
Dual- and multi-tasking balance exercises	serious cognitive engagements with wade range of cognitive tasks: practitioners gradually have to pay attention and coordinate their movements to more surroundings (coordination with music, partner, terrain, distance to the next coupes, consciousness of geometric adjustments like all circle, straight lines and even more complex and challenging figures; ignore from distractive outside stimuli)

Notes: BOS - base of support; COM - total body's centre of mass.

TPaneurhythmy seems to be a promising physical activity to keep in fit locomotion and balance and prevent bone loss, because it improves balance and is save weight bearing exercise for physically active middle-aged and older persons. It may directly prevent the decline in physical functioning and mobility. Paneurhythmy is extremely economical and inexpensive since it does not require any special outfit, equipment or sport terrain [5]. Paneurhythmy is enjoyable [2, 4], socializing and with wide and powerful positive influence on psychological state also [17, 4]. All this improves motivation and increases potentiality Paneurhythmy to be maintained regularly for a long time period which is very important for every prophylactic exercise program.

Paneurhythmy is a unique Bulgarian exercises system appropriate for adults like recreational physical activity with a view to proactive approach to influence age-related changes in balance.

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FEATURES OF SOMATIC DEVELOPMENT OF BULGARIAN CHILDREN DEPRIVED OF PARENTAL CARE RECEIVING INSTITUTIONAL CARE

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***Key words**: somatic development, anthropometry, height, weight, children deprived of parental care*

INTRODUCTION

There are more than 8000 children living in orphanages in Bulgaria, experiencing institutional care, which has had a far-reaching impact on them. An orphanage provides shelter, food and care for children, who have lost their parents, was abandoned or neglected. Institutionalized children come mostly from families with low socioeconomic status.

Children who have spent an extended period of time in institutional care are often developmental delayed and retarded in growth due to physical and emotional deprivation. The life at home is associated with various limitations, including malnutrition.

The growth and development of children are affected by many factors, which interact with each other on the basis of determining the pattern of growth of the individual. Childhood crucial determinants of growth are nutrition and morbidity.

There are insufficient data to clarify the question whether the growth of children growth by institutions follow the pattern characteristics of the general population of the same age in Bulgaria.

Aim: The aim of this study was to clarify the impact of institutionalized care on the somatic development of children deprived of parental care in Bulgaria.

METHODS

A cross-sectional survey was conducted on the anthropometric status of school children enrolled in eight homes for children deprived of parental care in Bulgaria. The sample size included 171 children of both sexes aged between 7 and 14 years. Permission for the study was obtained from the school authorities prior to commencement of the study.

Different body measurements were registered following the guidelines proposed by the ISAK - height, weight and some girths (chest, arm relaxed, forearm, thigh, and calf).

Standard statistical methods were used for calculating mean values and standard deviations (SD).

Statistical significance between means was tested by independent samples t-test ($P \leq 0.05$).

RESULTS AND DISCUSSION:

Physical growth and development are associated with consequential changes in body size, structure and proportions of the body. The most commonly used indicator of children's growth and development is the height. Several factors can affect this morphological indicator, but among them fundamental are heredity and nutritional status.

The height of the boys and girls, raised at homes for children deprived of parental care (HCDPC), normally increased between 7 and 14 years (Table 1). The mean values of height of the investigated sample of children were compared with reference data for the general population [2] in the appropriate age range for both sexes (Fig. 1). The results indicated statistically significant lower height of children from HCDPC as compared to data for their peers from the general population in all age groups and in both sexes.

These results are not unexpected, since numerous studies on children raised in institutions in other countries also establish a similar decline in growth [4, 5, 6, 7, 8, 9, 10, 11, 12, 13], due to physical retardation.

Table 1. Mean values and standard deviations of anthropometrical parameters of children deprived of parental care

Boys								
Age group/ Anthrop. parameters	**7** n=11	**8** n=10	**9** n=16	**10** n=18	**11** n=13	**12** n=13	**13** n=12	**14** n=8
Height	114,8 ± 7,7	120.4 ± 5.8	125.9 ±5.1	130.2 ± 7.7	139.6 ±6.0	145.0 ± 4.7	151.2±8.7	152.5±13. 7
Weight	19.1±2.1	21.7±2.6	23.7±3.2	26.2±4.7	31.4±4.4	32.7±4.3	38.9±7.0	40.5±12.8
Chest girth	56.6±2.5	59.2±2.2	59.1±3.4	63.2±8.6	66.5±4.1	66.2±4.2	70.4±6.8	74.4±8.9
Arm girth	16.2±0.9	16.7±1.0	17.6±1.6	18.1±1.5	19.6±1.9	19.5±1.6	21.6±1.7	21.8±3.2
Forearm girth	16.4±1.1	17.3±1.3	17.8±1.2	18.1±1.3	19.5±1.6	19.3±1.2	21.3±1.9	21.8±3.1
Thigh girth	35.3±2.6	35.8±2.5	35.9±3.3	38.6±4.2	41.4±3.4	40.2±3.0	44.3±3.4	41.7±5.3
Calf girth	22.5±2.0	23.5±1.7	24.5±2.0	25.1±2.1	27.4±1.9	27.2±1.5	29.4±2.4	29.3±3.4
Girls								
Age group/ Anthrop. parameters	**7** n=8	**8** n=9	**9** n=8	**10** n=9	**11** n=15	**12** n=7	**13** n=8	**14** n=6
Height	114.0 ±3.9	122.4 ± 7.1	127.9 ±9.0	128.3 ± 3.9	138.1±7.7	143.8 ±4.6	148.0±6.7	147.2±4.2
Weight	18.9±0.4	21.5±4.5	25.2±5.4	24.7±3.1	31.4±5.3	33.5±4.9	37.5±7.2	41.3±4.2
Chest girth	54.9±3.0	56.5±4.3	60.8±7.5	60.7±3.8	65.4±6.8	66.8±6.8	68.8±6.2	70.9±7.3
Arm girth	16.6±0.7	16.6±1.5	18.0±1.4	18.1±1.7	19.5±2.1	19.5±1.8	22.0±3.0	22.0±0.6
Forearm girth	16.2±0.6	16.5±1.5	17.7±1.8	17.9±1.4	19.2±1.8	19.0±1.8	20.7±1.8	21.3±0.4
Thigh girth	35.8±1.6	35.9±3.9	40.3±3.1	39.9±4.0	42.0±3.8	43.4±4.1	46.2±7.7	48.4±3.8

The comparison between the mean values of height in both sexes showed no statistically significant differences across the age range. This result means that by 14 years of age difference between the sexes regarding this somatic indicator is absent (Table 1).

Studies regarding the general population in Bulgaria [1, 2] demonstrated earlier sexual differentiation of this indicator occurring after 12 years. The lack of sexual dimorphism in terms of height at the age of 14 in the children from institutions most likely is due to the delay in their general somatic development.

The results of the anthropometrical measurement confirm that the height of children from HCDPC follow the general growth patterns, but is observed delay as compared to their peers from the general population. The reasons may be explained both with the influence of hereditary factors as well as the living conditions in these institutions.

Body weight is an anthropometric indicator, which is dependent on a number of factors, including nutrition and level of physical activity. It is well known that the growth is very adaptive process and it may be delayed by a nutritional deficiency. The adequate and health nutrition is the exception rather than the rule in Bulgarian HCDPC [3]. Systemic malnutrition may affect the body weight of the children in earlier years of their life and later may influence the other morphological parameters as height, girths**,** etc. Therefore, it is important to establish how the living condition at HCDPC has influenced their growth in terms of body weight.

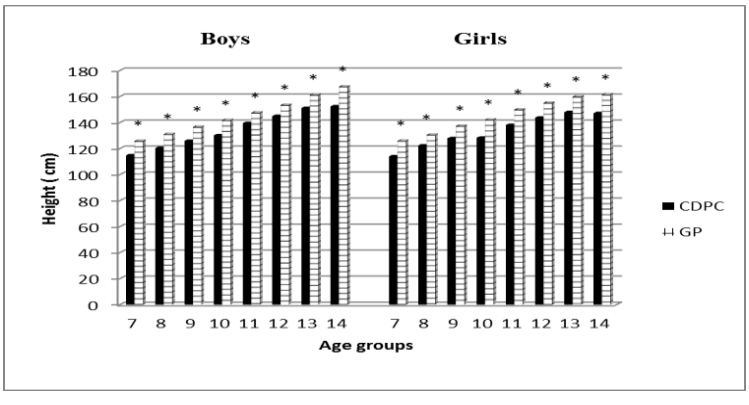
The results suggest that weight followed the consequential changes associated with growth and development of the children (Table. 1). Differences in body weight between the children receiving institutional care and their counterparts from general population [2] were statistically significant in the whole age range and in both sexes (Fig. 2). The studied boys and girls from HCDPC delayed significant in their growth in terms of this anthropometric indicator. The reasons for the lag of weight can be explained

mainly by factors such as malnutrition, low level of physical activity, socio-economic conditions and psychological comfort.

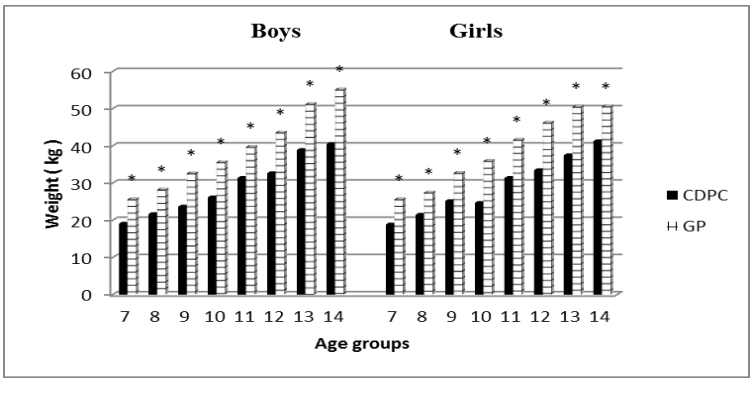
Additionally, for more complete evaluation of the somatic features of the children from HCDPC, were measured body girths - chest, arm, forearm, thigh and calf (Table. 1).

As compared to their peers, living in family background, the children from HCDPC showed lower mean values of their chest girths in all age groups and in both sexes (Fig. 3).

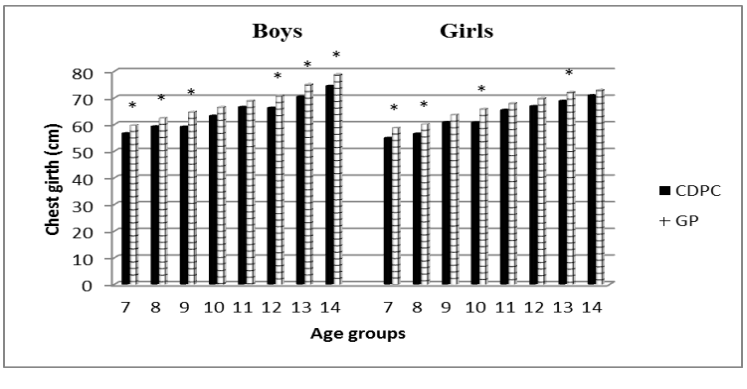
The literature data on changes in chest girth in comparative gender aspect in children from the general population showed no differences up to 12 years of age and occurrence of dimorphism in favor of boys manifested by age of 13 [1].



* Differences were statistically significant (p <0.05)
Fig.1. Height of children deprived of parental care (CDPC) as compared to general population (GP)

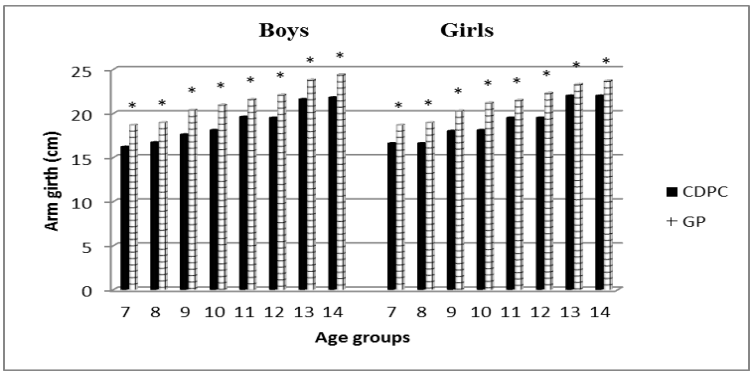


* Differences were statistically significant (p <0.05)
Fig. 2. Weight of children deprived of parental care (CDPC) as compared to general population (GP)

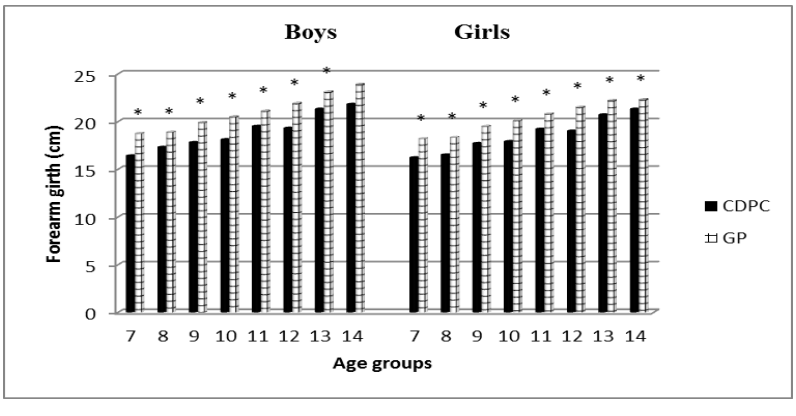


* Differences were statistically significant (p <0.05)
Fig. 3.Chest girth of children deprived of parental care (CDPC) as compared to general population (GP)

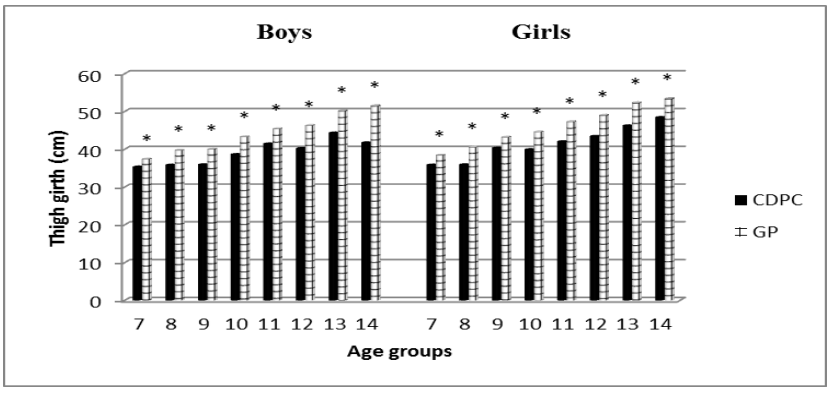
Despite of a relatively small sample of investigated children, the present study showed no statistically significant gender differences in all age groups up to age 13. Sexual dimorphism with higher values of the chest girth in boys was observed in 14 years old children.



* Differences were statistically significant (p <0.05)
Fig. 4. Arm girth of children deprived of parental care (CDPC) as compared to general population (GP)

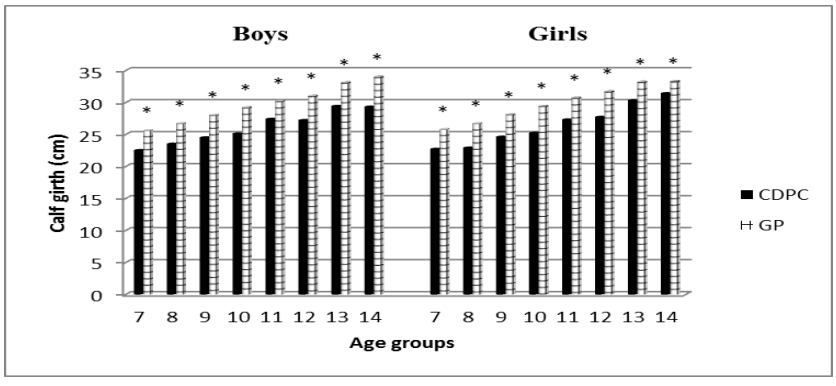


* Differences were statistically significant (p <0.05)
Fig. 5. Forearm girth of children deprived of parental care (CDPC) as compared to general population (GP)



* Differences were statistically significant (p <0.05)

Fig. 6.Thigh girth of children deprived of parental care (CDPC) as compared to general population (GP)



* Differences were statistically significant ($p < 0.05$)

Fig. 7.Calf girth of children deprived of parental care (CDPC) as compared to general population (GP)

Arm and forearm girths also increased with age in both sexes without the intersexual differences in the studied sample (Table 1).

Similar results were published by D. Dimitrova (2001) for children, living in a family background, who reported the occurrence of sexual dimorphism in 15 years old children.

As compared to reference data [2], the mean values of arm and forearm girths of children from HCDPC were significantly lower in both sexes and in all age groups (Fig. 4, Fig. 5). The exceptions were the arm girths of 13 year old girls and forearm girths of 14 year old boys.

The results for the thigh and calf girths are presented on Table. 1. The children from HCDPC had statistically significant delay in all age groups and in both sexes (Fig. 6, Fig. 7). This accounts for the smaller body sizes and overall retardation in children from HCDPC.

The higher calf girths of the girls were statistically significant only in 9 and 14 year old children. The comparison of the calf girths in both sexes showed no gender differences in the investigated age range.

Similar results are established by D. Dimitrova (2001) studying children in families of Sofia, which sets the same average girths of the calf for the representatives of both sexes to 17 years of age.

CONCLUSION

The analysis of the results showed a significant retardation in somatic development of children receiving institutionalized care in all age groups and in both sexes as compared to their peers from the general population. Developmental delay in basic anthropometric indicators causes later onset of sexual dimorphism in these children. The delay in basic anthropometric indicators of somatic development of the children deprived of parental care is probably related to food deprivation in the early stages of their institutional background.

This study provided evidence of some delay in growth of children deprived of parental care, living in orphanages, as compared to their peers in general population. The observed differences may be attributed to both socioeconomic and genetic factors. Early care and nurturing have a decisive and lasting impact on how children grow to adulthood. These findings indicate the need for appropriate public intervention programs.

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CARDIORESPIRATORY ENDURANCE OF BULGARIAN FENCERS

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Keywords: fencing, cardiorespiratory endurance, physical working capacity.

Cardiorespiratory endurance is a component of physical fitness related to health, which refers to the ability of the circulatory and respiratory systems to supply oxygen to peripheral tissues during prolonged exercise. The high level of cardiorespiratory endurance indicates high physical working capacity, which includes the ability to release a relatively high amount of energy for a prolonged period of time.

Fencing performance at a highly competitive level may be dependent on a wide range of physiological properties. The quick movements and short bursts of activity suggest that the sport taxes anaerobic energy liberating sources to a large extent. Moreover, the fact that a fencing bout normally exceeds five minutes implies a dependency even on the aerobic energy yield. Finally, a competition usually lasts for two days or more and the competitors are usually active for 6 to12 hours on each competition day.

The aim of this study is to establish the level of cardiorespiratory endurance of Bulgarian National team fencers.

METHODS

The subjects were 34 high level fencers (both genders, representing the three weapons). The mean age for men was 20.9, for women – 22.7 and their sports experience – 7.6 years. Participants completed a cycle ergometric test to determine maximal working capacity (Wmax, Wmax/kg), a way to estimate the maximal ergometric power and maximal oxygen consumption (VO_2max, VO_2max/kg) – for estimate aerobic power. Another way for assessing the adaptability and effectiveness of the cardiovascular system at maximum exercise is to determine the maximum pulse rate (HRmax) and the oxygen pulse (OP - indicator of the economy of cardiovascular system's work).

RESULTS AND DISCUSSION

The results of the cycle ergometric test are presented in Table.1

At the end of the ergometric test HRmax reached 194, 7 bpm for male fencers and 190, 7 bpm – for female. The values of HRmax for male and female athletes are very similar; the difference of 4 bpm is statistically insignificant.

Table 1. Parameters of cardiorespiratory endurance of Bulgarian fencers

Parameter	Male	Female
HRmax	194,7 ± 9.7	190,7 ± 6.8
Wmax	245,6 ± 37.3	171,3 ± 22.5
Wmax/kg	3,3 ± 0.57	3,02 ± 0.3
VO2max	3450,6 ± 553.9	2258,1 ± 307.7
VO2max/kg	45,9 ± 7.6	39,8 ± 4.9
OP	17,8 ± 2.9	11,9 ± 6.8
OP/kg	0,234 ± 0.03	0,209 ± 0.02

Ergometric power: The average of Wmax is 245, 6 W for male and 171, 3 W – for female fencers. Women show lower working capacity than men, the difference of 74, 3 W is significant (p<0, 01). The value of Wmax/kg is 3, 3 W / kg for males and 3, 02 W / kg - for women. No significance between the results of male and female, this gives us reason to claim that fencers of both genders have identical working capacity.

J. Brisswalter et al. (1994) [2] present us data about working capacity of French fencers. The contingent is divided into National foil fencers and „Maîtres d'armes" (coaches). Maximal ergometric power is 392 W (5,8 W/kg) for the fencers and 270 W (3,8 W/kg) – for the coaches. Both groups of this study show better working capacity in comparison to Bulgarian fencers (p<0,05)(Fig.1).

Sobchak A. & Smoulskiy V. (2007) [8] provide a characteristics of aerobic and anaerobic capacity of elite Polish female foil fencers. The average value of maximal ergometric power after the maximal ergometric test is 227 W (3, 53 W / kg), which indicates that Polish female fencers have a significantly higher working capacity than Bulgarian female fencers (Fig. 2).

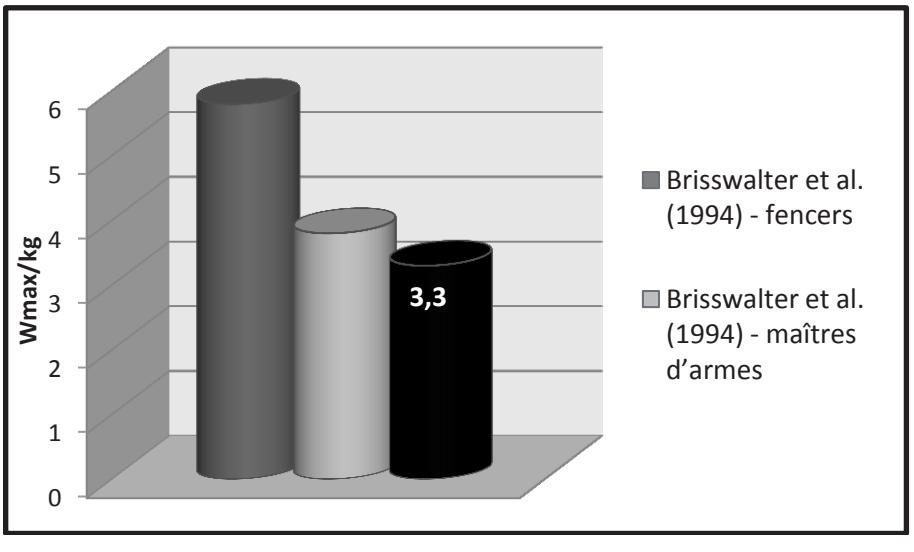

Fig. 1. Maximal ergometric power – male fencers

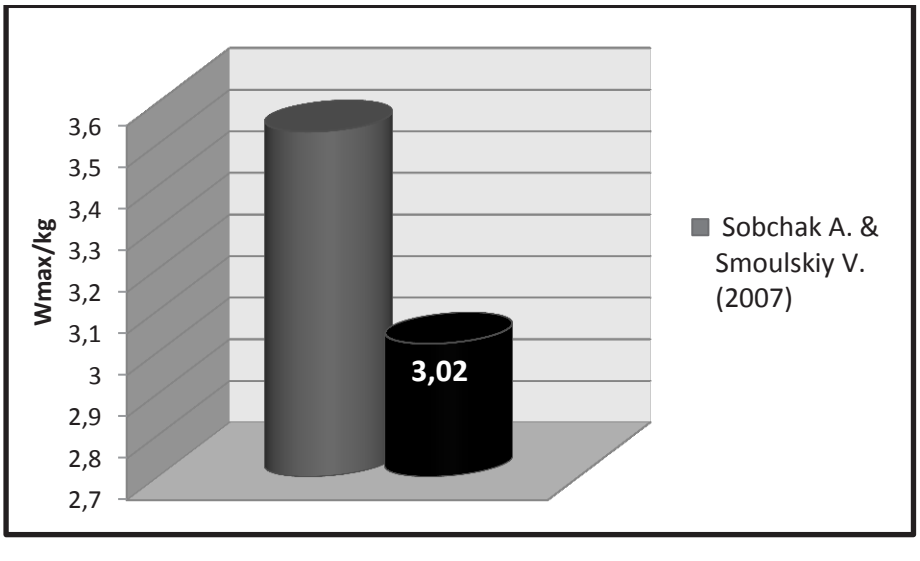

Fig. 2. Maximal ergometric power – female fencers

Maximum oxygen consumption (VO2max) was defined as the largest amount of oxygen that can be taken, spread and used by the body during physical activity. Different sports require different levels of

aerobic capacity; therefore the values of VO2max / kg vary widely. In sports like cross country skiing, road biking, medium and long distances in track and field, where speed-strength endurance is important, the values of VO2max / kg exceed 80 ml / min / kg and above.

In "The Olympic book of sports medicine" (1988) the values of VO_2max/kg for fencing are 45-50 ml/mi /kg for male and 40-45 ml/min / kg - for female fencer.

The average of VO_2max for males are 3450,6 ml/min (45,9 ml/min/kg), and 2258,1 ml/min (39,8 ml/min/kg) – for females. Male fencers have higher oxygen consumption than female, the differences of 1192,4 ml / min (6,1 ml/min/kg) are significant (p <0.01).

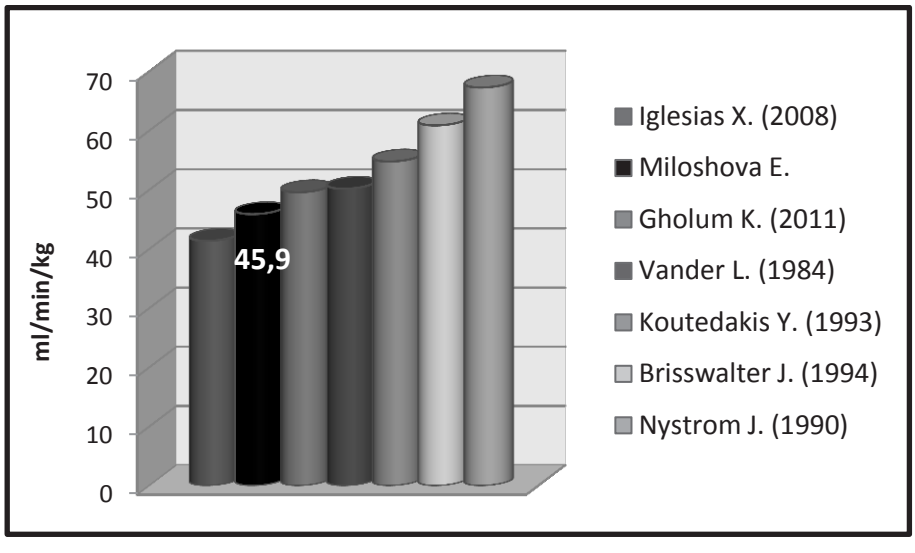

Fig.3. Maximal oxygen consumption – male fencers

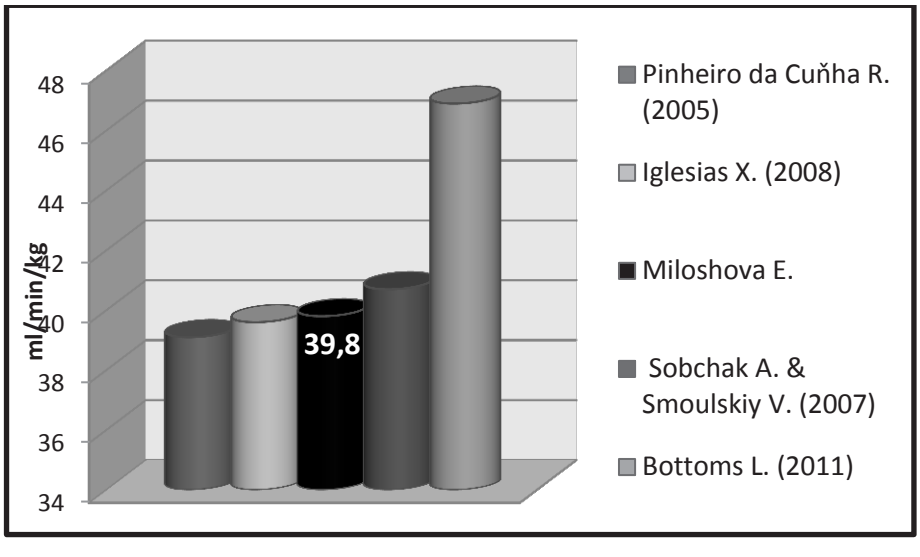

Fig.4. Maximal oxygen consumption – female fencers

The obtained values are the same as those cited in the "Olympic book of sports medicine" [9], which enables us to claim that oxygen consumption of Bulgarian fencers is in the normal range for the sport.

Many studies give us data for oxygen consuption. The values of VO2max/kg in these sourses ranged from 41.4 to 67,3 ml/min/kg (Fig. 3). The highest values of the indicator belong to Swedish fencers [6]. French foil fencers demonstrate high oxygen consumption - 60,9 ml/min/kg [2], the difference of 15 ml/min/kg compared to that of Bulgarian fencers is statistically significant (p <0.01). Lowest aerobic

capacity belongs to Spanish fencers - 41,4 ml/min/kg (p <0.05), while the Greek, American and Kuwaiti fencers demonstrate higher oxygent consumption [3, 4, 5, 10] (p <0,01).

The mean differences for VO2max/kg between Polish (40, 7 ml/min/kg), Spanish (39, 6 ml/min/kg), Brasilian (39, 1 ml/min/kg) and Bulgarian female fencers (39,8 ml/min/kg) are minimal and not significant [4, 7, 8]. In another study [1] the autors reported quite bigger oxygen consumption - 46, 9 ml / min / kg for elite Polish epee female fencers (Fig. 4).

The maximum oxygen pulse (OP) is an indicator of economy of the cardiovascular system's performance. OP is defined as the ratio of maximum oxygen consumption to maximum pulse rate (VO2max / HRmax). From base line 4-5 ml/bpm, at the end of the maximum ergometric test OP can reach 20 ml / bpm and more.

The average of OP is 17.8 ml /bpm (0,234 ml /bpm/kg) for male fencers and 11.9 ml /b pm (0.209 ml / bpm/kg) – for females. Male fencers have higher values of OP compared to those of the female fencers, the differences are 5,9 ml /bpm and 0,025 ml /bpm/kg (p<0,05).

No data was found for OP of male fencers, only in one study [8] that examines the factors which have influence on aerobic-anaerobic capacity of Polish foil female fencers. The reported value of 14.4 ml / bpm is significantly higher than those of Bulgarian female fencers.

CONCLUSION

The ergometric power of Bulgarian fencers is close to that of fencers from other countries.

The aerobic power of tested fencers is greater than that of the general population, but much lower in comparison with data of the literature sources.

We recommend more activities to improve total endurance and aerobic power during the training process.

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GLOBAL SELF-ESTEEM, PHYSICAL SELF-ESTEEM AND BODY MASS INDEX IN EARLY ADOLESCENTS

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***Key words**: Global Self-esteem, Physical Self-esteem, BMI, early adolescents*

INTRODUCTION

A number of factors including biological, cognitive, social, and environmental contribute to the influence of the adolescent's personal development and Self-esteem [17].

The relationship between obesity and Self Perception, particularly in children and adolescents has important implications for their physical and psychosocial health and well-being. A better understanding of this relationship could help target psychology services and public health strategies to work more effectively.

Two distinct concepts related to Self-esteem with reference to gender differences are important. "Global self-esteem" which is overall positivity of the person's self-evaluation [6] and multidimensional aspect i.e. "Domain-specific self-esteem", which describes self-satisfaction in specific areas (e.g., appearance, academics, social, etc).

The multidimensional and hierarchically organized model proposed by Shavelson, R. J, et al. (1976) is recommended by some leading researchers in that area [14, 20].

The influence of gender on Self-esteem was observed by Rosenberg in 1965 which was followed by many other research findings [10, 12, 16, 21, 32, 33].

Larger gender differences can be expected in domain-specific Self-esteem than in Global Self-esteem [29, 30].

In previous investigations some contradictions are observed concerning the gender differences of the Self-esteem in adolescents. Some authors maintain that females have lower Self-esteem in adolescence [7, 10, 32], while others say that males have lower Global Self-esteem than females [1]. Some other researchers speak about no difference between the genders [13, 21].

In the available literature no studies that examined the relationship between BMI, Global Self-esteem and Physical Self-esteem in any of the age groups in Bulgaria were found.

The purpose of the present study was to investigate the gender differences and the relationship between the Global Self-esteem, Physical Self-esteem and Body Mass Index in early adolescens.

METHODS

The study involved 106 students, 38 boys and 68 girls, 14 and 15 years old from Vladislav Gramatik Public School in Sofia

The Perceived Physical Fitness and Perceived Physical Appearance were assessed using the methodology described in our previous study [3]. According the level of Self-esteem in both subscales the respondents were divided into three groups - low, medium and high.

The Global Self-esteem was measured with the scale of Rosenberg. It estimates the global attitude towards oneself [5]. The Rosenberg Self-Esteem Scale has demonstrated good reliability and validity in a large number of different sample groups [24, 31, 34].

The scale is of Likret type with four levels. It consists of 10 statements. The final score is a result of the sum of the individual scores of each statement. The minimum possible score is 10 and the maximum – 40. According to the level of Self-esteem, the respondents were divided into three groups - low, medium and high.

Body mass index (BMI) – was measured using the following equation: BMI = weight (kg) / height^2 (m). Depending on the values obtained of this indicator, respondents were divided into four groups - underweight, normal, overweight and obese according to Slanchev (1998).

For statistical analysis of the experimental data analysis of variance was used. The comparison between the groups was performed by t-test for independent samples at p ≤0.05. A correlation analysis was used as well.

RESULTS AND DISCUSSION

Global Self-esteem

The positive Self-esteem is the basis of successful personal, social and professional development.

In our study we found that the boys have statistically significant (p≤0,05) better Self-esteem than girls (table. 1). Our study confirms the results of several other authors [10, 25, 27], while a study of children (7-9 grade) by Jordan [1] defines a significantly higher Self-esteem in the girls.

In age-gender aspect we found the highest values of this index in the 14-year-old boys, and the lowest ones - in the 14 year old girls. Statistically significant difference (p≤0,05) was found only between the these two groups.

Largest percentage of boys (68.4%) and girls (58.8%) have medium level of Self-esteem, which is an indication of positive Self-esteem (fig. 1).

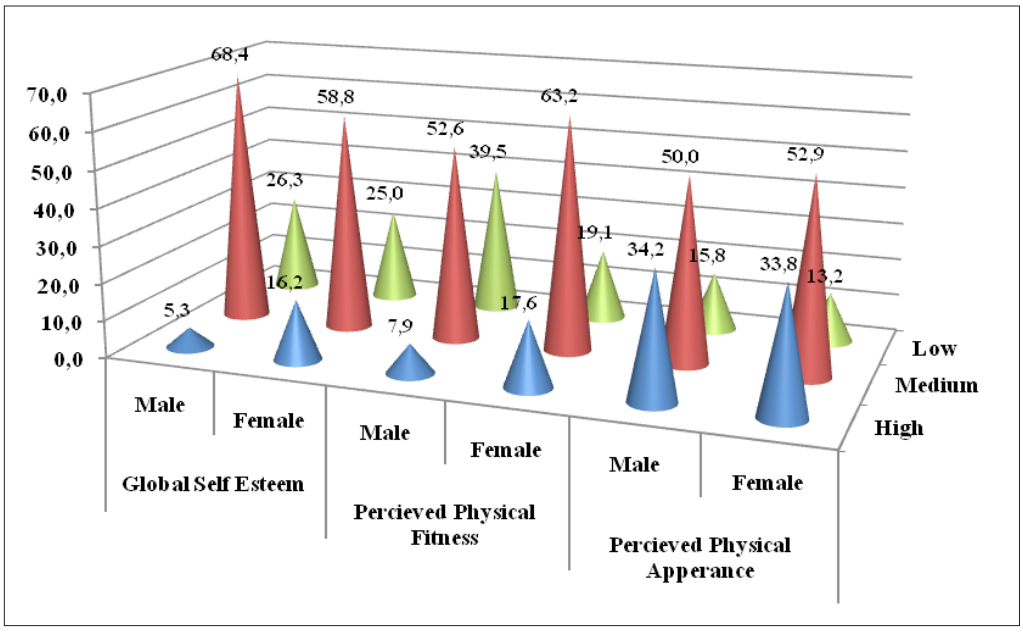

Figure 1. Percentage distribution of students of both sexes as per their Global Self-Esteem, Percieved Physical Fitness and Percieved Physical Apperance

Physical Self-esteem includes the Perceived Physical Fitness and Perceived Physical Appearance [15] and is considered as a particularly important factor for the young people both for their Global Self-esteem and psychological well-being [23].

Perceived Physical Fitness

Boys have significantly higher Perceived Physical Fitness than girls (p≤0,01) and it has the highest values in 14 year-old boys. Statistically significant difference is found between them and the 14 year old girls (p≤0,01). In some scientific studies authors confirm reliably lower Perceived Physical Fitness of girls [2, 18], but there are some authors who reveal no significant difference between the genders [21].

To all assessed physical abilities, including «courage», the boys give a higher rating than the girls. The largest percentage of the boys (52.6%) and the girls (63.2%) show medium level of perceived physical ability, which indicates a positive self-assessment of their physical fitness (fig. 1).

Perceived Physical Appearance

In our study, we did not find any statistically significant differences between boys and girls in this indicator, however the highest Perceived Physical Appearance was measured in the 15 year-old boys and the lowest - in the 14 year-old girls. Other studies have found significant differences in the Perception of Physical Appearance between the sexes in favor of the boys [2, 10]. Largest percentage of boys (50.0%) and girls (52.9%) have medium level of Perception of Physical Appearance, indicating a positive self-assessment of their own Physical Appearance (fig. 1).

Body mass index (BMI)

The widespread use of the Body Mass Index in practice is determined both by its ability to quickly assess the „normal" weight and to establish the relationship between its values and the risk of socially significant diseases (cardiovascular, diabetes, etc.). The World Health Organization states that BMI is an acceptable criterion for evaluation of the nutritional status in both adults and adolescents.

Any differences in this indicator between boys and girls in both ages were not found (table. 1). In some studies of children from the general population [11] and children deprived of parental care [4] no statistical differences in body mass index between the sexes were found too. A comparison of the values of this index in the age aspect showed significant differences (p≤0,05) in girls, as 15-year-olds have higher values.

Obese children were not found in our groups of study. The largest percentage of the boys (65.8%) and the girls (79.4%) have normal values of BMI (fig. 2). The boys are with a higher percentage of overweight (boys 18.4%, girls 7.4%) while the children of both sexes reveal approximately the same percentage of underweight (boys-15 8%, girls 13.2%).

Table 1. Descriptive data and gender differences of the measured parameters

Indices	Boys (n=38)		Girs (n=68)		Gender diff (P)
	X	sd	X	sd	
Global Self-esteem	3,20	0,42	2,98	0,59	0,03
Percieved Physical Fitness	4,07	0,60	3,69	0,68	0,01
Percieved Physical Apperance	3,56	0,89	3,41	0,99	0,45
BMI	20,20	2,38	20,02	2,32	0,71

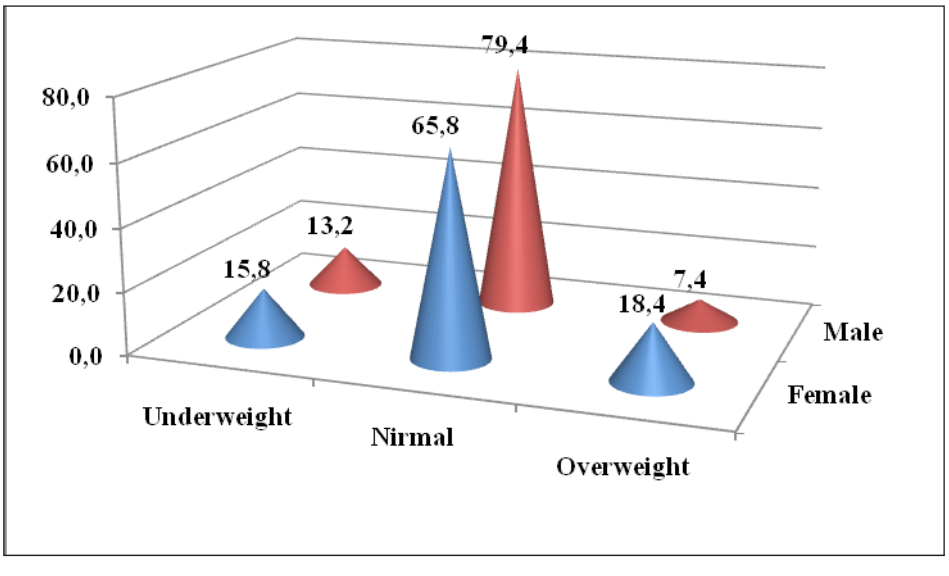

Figure 2. Percentage distribution of students of both sexes as per their Body Mass Index.

The data from the present study was compared with two other studies of children from the general population [11, 22] (fig. 3). Compared with the data of Natcheva et al. (2012) reliable differences were found only in 15-year-olds girls. In our study this group of girls shows higher values of BMI (p≤0,05).

Compared with the data of Dimitrova (2001) reliable differences were found only in the girls. In our study the 14 year old girls demonstrate lower values of BMI (p≤0,05), while the 15-year-olds demonstrate higher ones (p≤0,05).

Correlation

In our study statistically significant positive and moderate correlation of Self-esteem on one hand and Perceived Physical Fitness (r = 0,37) and Perceived Physical Appearance (r = 0,40) on the other was found (table. 2). Such dependence is detected also by Lau et al. (2004). These authors reveal reliable positive correlation between Self-esteem on one hand and the indicators of "motor skills", "endurance", "strength" and "satisfaction with the appearance" on the other, which was confirmed in our study.

Table 2. Correlation between Global Self-esteem, Percieved Physical Fitness, Percieved Physical Apperance and BMI

Characteristics	GSE	PPF	PPA
Percieved Physical Fitness	0,368**		
Percieved Physical Apperance	0,401**	0,512**	
BMI	0,100	-0,055	-0,027

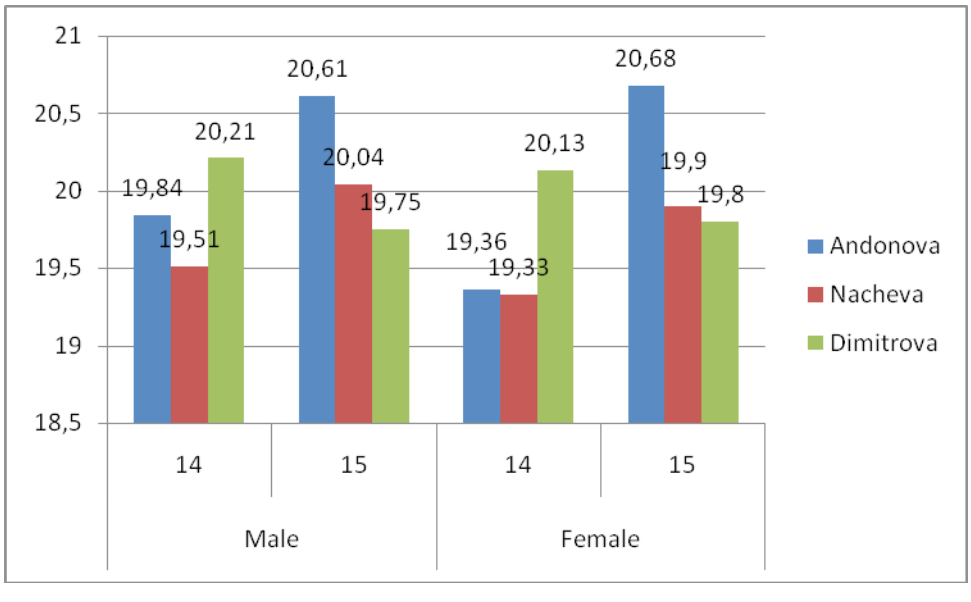

Figure 3. Students of both sexes average as per their Body Mass Index in three studies

Looking at the individual items of the Physical Self-esteem Scale in our study we found a statistically significant negative correlation with BMI in the self-assessment of "athletic" as appearance quality only. Weak negative but non-significant correlation was defined with the "satisfaction with appearance" item. The strongest negative correlation between BMI and Perceived Physical Appearance is determined also in studies of Craciun (2010) and Cuddihy (2006). In those studies reliable negative correlation between BMI and all sub-scales, except that of „strength" where it is slightly positive, was determined. In our study we found a slight negative correlation of the same motor skill and BMI (r = -0,07).

The discrepancy of the results of our study with the above-mentioned could be due to the fact that we had no children with obesity while in the other studies there were some. The fact that in the study of Romanian children [8] the percentage of overweight was significantly higher (boys - 19.7%, girls - 20.4%) than in our study (boys - 18 4% girls - 7.4%) is also of a certain importance.

CONCLUSION

The results of our study show that the boys have higher Global Self-esteem and Perceived Physical Fitness than the girls. There are no gender differences in BMI. Moderate correlation was found between Global Self-esteem and Perceived Physical Fitness (r=0,37) and between Global Self-esteem and Perceived Physical Appearance (r=0,40). The highest percentage of both boys and girls have normal values of BMI. In our study there are no students with obesity. In both sexes prevail those with a medium level of Global Self-esteem, Perceived Physical Fitness and Perceived Physical Appearance.

The positive Self-esteem is the basis for successful personal, social and academic development. The Physical Sself-esteem plays a significant role in Global Self-esteem during adolescence and youth.

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KINESITHERAPY FOR WOMEN WITH DYSMENORRHEA

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Key words: dysmenorrhea symptoms, kinesitherapy, pelvic floor therapy

INTRODUCTION

Nowadays primary dysmenorrhea is women's most often gynecological problem met. According to Jamieson DJ, Steege JF (1996), 90% of the women have this problem. In a study of Harlow SD, Park M (1997) inbetween women high students, based on one year diaries, 72% of the menstrual cycles under study have been painful, most often during the first day of the menstruation, 60% of the women under study report for one episode of strong pain at least.

The problem of been absent from school or work is underestimated. Harlow SD, Park M (1997) study notes that 42% of the women under study report for absences or decreased activities at least once. In some long period studies of young women, the absences are from 34% to 50% of the cases (Andersch B, Milsom I., 1982). In an older study Dawood MY., 1984), the dysmenorrhea is noted as the reason for 600 mil working hours lost and losses of 2 billions dollars in the production each year (Andrew S. Coco, M.D, 1999).

The frequency of the menstrual disorders under the impact of physical load is studied in the Bulgarian methodological literature (Toteva M., 2006). The particularities of the menstrual cycle are studied too, including the availability of dysmenorrhea symptoms in women actively and not actively practicing sport (Popova-Dobreva D., 2011, Popova-Dobreva, D., S.Popova, D.Obreshkov, 2010).

The aim of the study is to establish the impact of the kinesitherapy programme made by us on the manifestation of dysmenorrhea symptoms inbetween young women.

METHODOLOGY

The study is made during the period January – April 2014. Contingent of the study is 20 women high students from Bulgarian Higher establishments who are not actively practicing sport at an age between 19 and 23 years.

The contingent of the persons under study is divided into 2 groups – control one and experimental one according to the women's wish to perform the complex of exercises proposed by us. Each of the groups is composed of 10 persons. The average age of the contingent under study is 12, 9 years. The average age of the menarche is 12, 9 years. The average BMI of the contingent is 21, 6.

The experimental group performs a complex of exercises from 3 to 5 times per week for the period of one menstrual cycle. The start of performing the complex of the exercises is during the first day after the end of the menstrual cycle. The complex of the exercises is performed during the menstrual cycle too. The control group performs its normal everday physical activity only. All persons entered into the study fill in at the begining an informational agreement and a Questionnaire, filled in during the last day of the menstrual cycle. After the end of the next monthly cycle, everybody entered into the study fill in the Questionnaire again. It reports on the subjective complains of the patiants during the monthly cycle as well as the subjective feeling of pain while using:

- Visual Analogue Scale;
- Mc Gill questionnaire on pain;
- The SF-8™ Health Survey;
- Short questionnaire about the evaluation of the subjective needs of physical activity during menstruation (filled in by the experimental group only).

The kinesitherapy metholodoly we have prepared has the following aim, tasks and means:

The aim of the kinesitherapy is increasing the quality of life by decreasing the pain and overcoming the subjective sensations.

The basic **tasks** of the kinesitherapy are: To improve the blood and lymph circulation in the waist and pelvis zones; Stimulating the trophic and the exchange of the tissues in the abdominal cavity; Leveling of the excitation and suppresion processes in the cortex of the brain and improvement of the nerve-humoral regulation.

The means through which the tasks set up are attained are: isotonic and isometric exercises from various starting positions for the abdominal, back and gluteal muscles; stretching exercises, pelvic floor exercises, respiratory exercises – diafragm breathing, relaxing exercises.

RESULTS

The present development presents the results of some more substantial indicators we have studied.

Change *in the menstruation due to the execution of physical exercises*

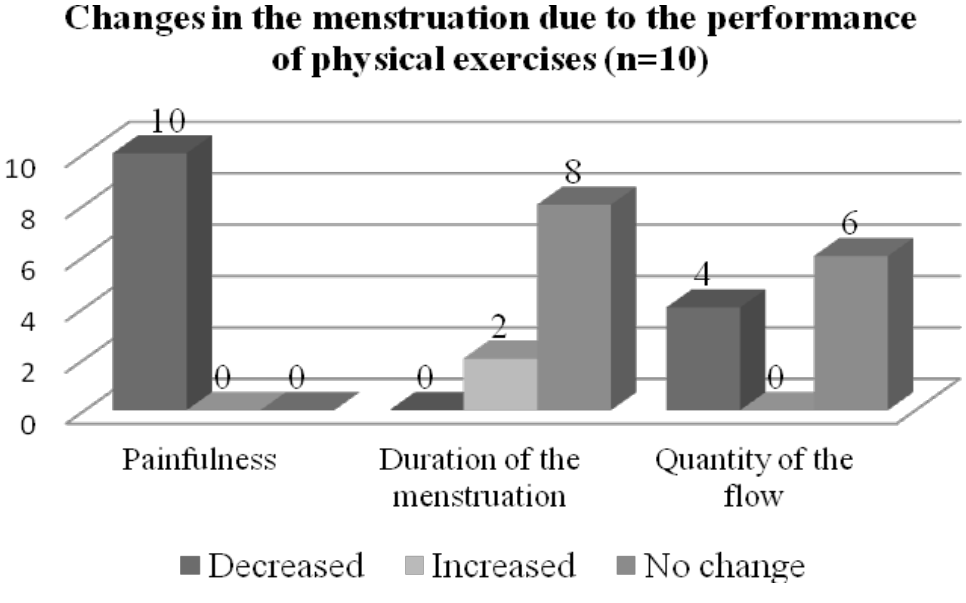

Fig 1. Changes in the menstruation due to the performance of physical exercises (n=10)

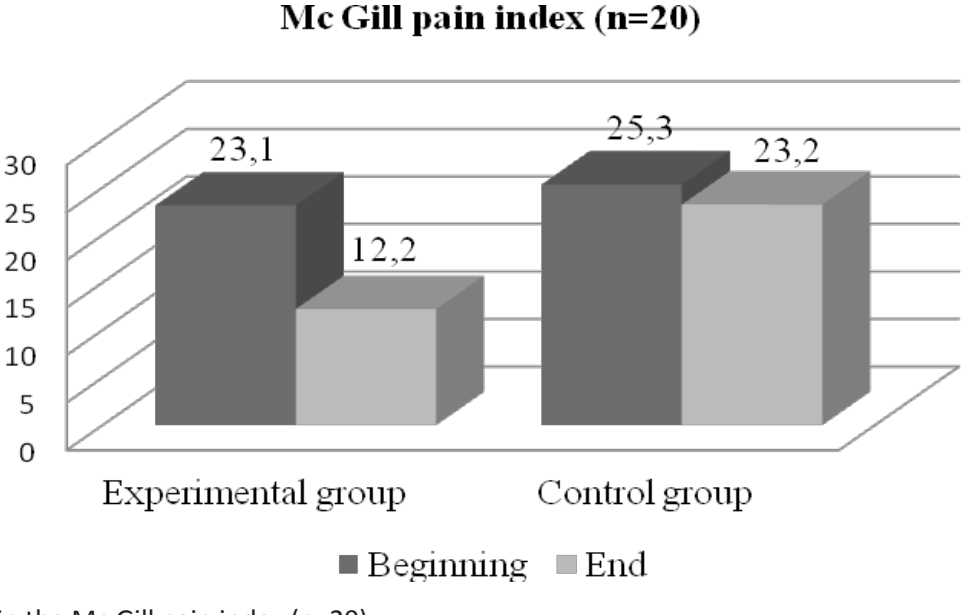

Fig.2 Changes in the Mc Gill pain index (n=20)

Fig.1 presents the changes in the menstruation of the experimental group due to the performance of exercises during the cycle (n=10).

At the end of the study all persons from the experimental group report about decreased painfulness during the menstrual cycle. Two women (20%) report about an increase of the menstrual cycle while four women (40%) report about an increase of the quantity of the menstrual flow.

Subjective evaluation of the impact from the performance of the physical exercises during the menstrual cycle on the menstruation.

All women of the experimental group define as positive the impact from the perfomance of the physical exercises during the menstrual cycle.

Change in the Mc Gill pain index

Fig.2 presents the changes in Mc Gill pain index

Upon comparing the results of the pain evaluating index from Mc Gill questionnaire, substantial decrease of the average value is established – from 23,1 at the beginning to 12, 2 at the end. Slight fall down is established for the control group too – from 25, 3 at the beginning to 23, 2 at the end.

Upon a check of the statistic importance through the t-criteria of Student about important extracts with a level of importance α=0,05, it was established that the difference at the initial and final result of the experimental group on the pain evaluating index is not occasional and statistically important difference between the initial and the final state is achieved. For the control group there is not substantial difference between the start and the final of the study in relation to the pain evaluating index.

Change in the Mc Gill moment pain index (MPI)

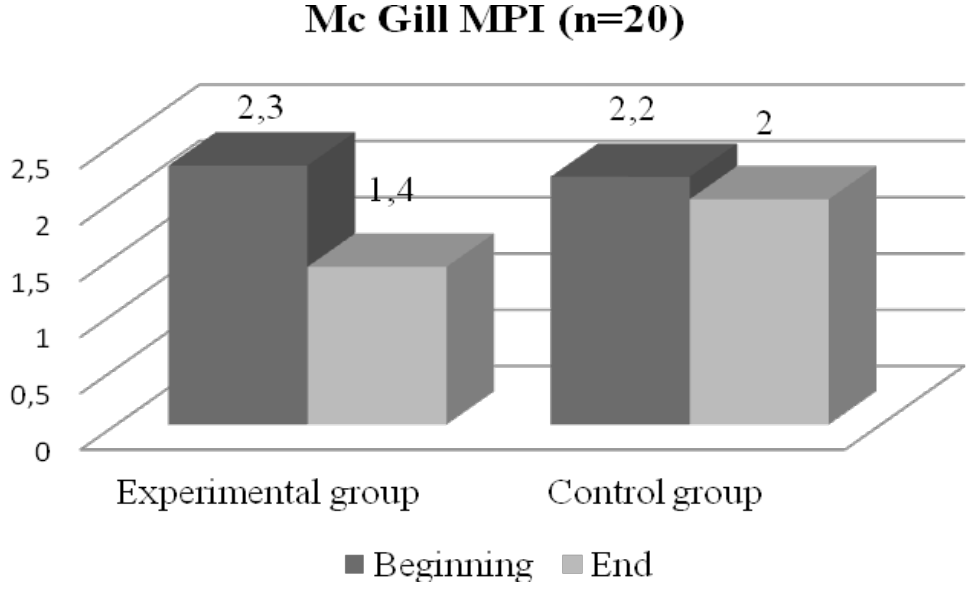

Fig.3. Changes in Mc Gill MPI (n=20)

Fig. 3 presents the changes in Mc Gill MPI (n=20)

The changes in Mc Gill MPI values are much more expressed for the experimental group too; at the beginning the average value for the group is 2, 3 and at the end – it is 1, 4. The difference is of statistic importance (t-criteria of Student, α=0, 05). The difference for the control group is minimal. The average MPI value at the beginning is 2, 2 and at the end – it is 2.

Fig.4 presents the changes in the VAS at the beginning and at the end of the study.

The average value of the experimental group as per the VAS is 5, 7 at the beginning and after the applied kinesitherapy programme, it is considerably decreased to 3, 2. The difference is of statistic importance (t-criteria of Student, α=0, 05). The difference of the average value for the control group is minimal and again decrease from 5, 6 to 5, 4 is noted.

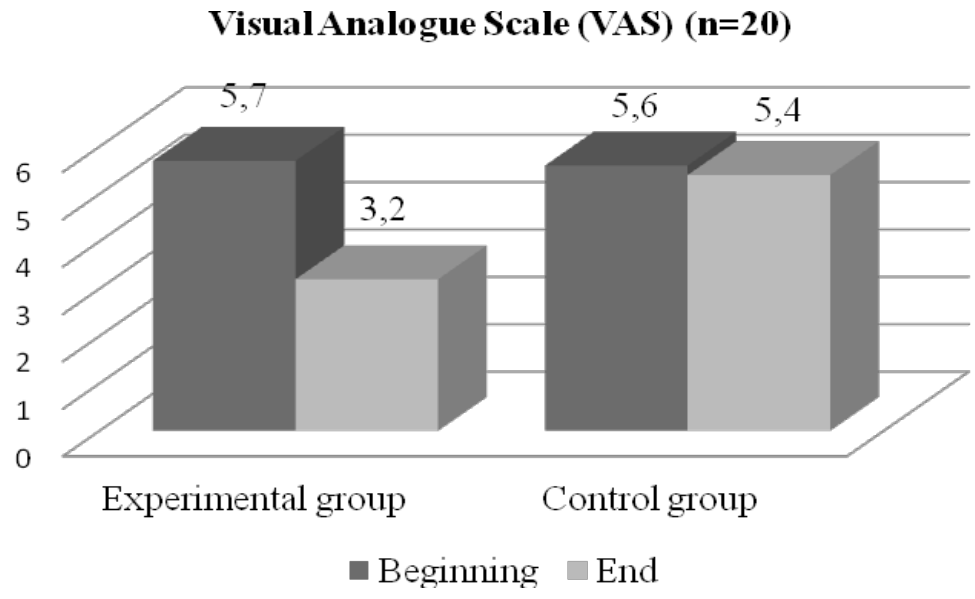

Fig.4. Changes in the Visual Analogue Scale (VAS) (n=20)

Change in the women's physical state as per SF8.

Fig.5 presents the changes in the women's physical state as per SF8 (n=20)

Upon comparing the average values for the SF8 physical health, an increase is established for the experimental group. At the beginning the average value is 49,7, which is above the average for the general population and at the end it reaches the value of 54,1. The difference is of statistic importance (t-criteria of Student, α=0, 05). A decrease of the average value for the control group is noted while at the beginning it is 54, 3 and at the end it is 53,6. There is no statistic importance for the difference of the results.

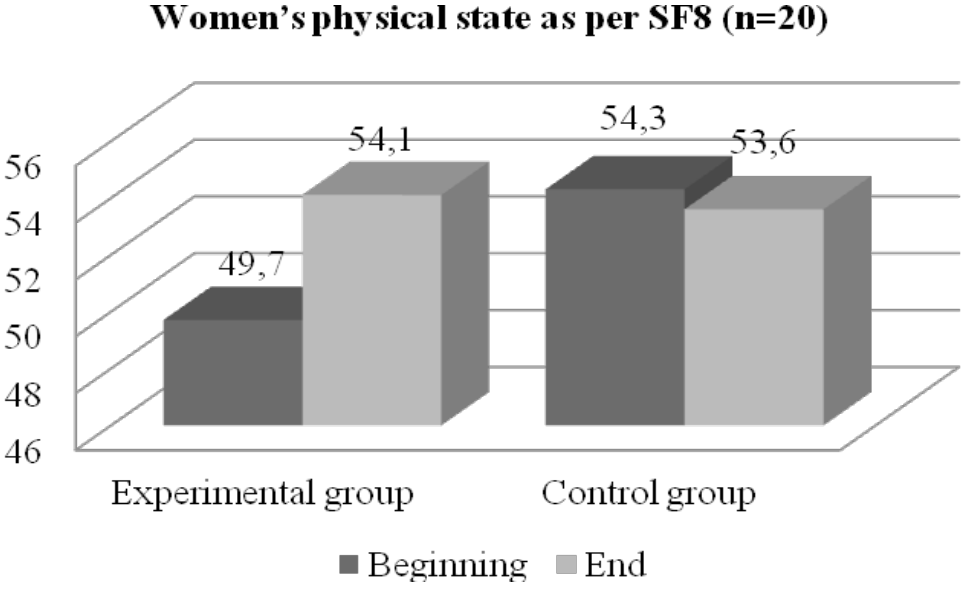

Fig.5 Changes in the women's physical state as per SF8 (n=20)

Change in the emtional state as per SF8.

Fig.6 presents the changes in the women's emotional state as per SF8 (n=20)

The emotional state is improved for both groups under study. There is more expressed increase of the average value of the emotional health for the experimental group where at the beginning the value is under the average for the total population – 47, 6 while at the end of the experiment it is increased

and becomes above the average level – 49,7. The average value of the emotional health for the control group is 48, 6 at the beginning, which is under the average for the total population and at the end of the study it is increased to 49, 9, which is above the average result for the total population.

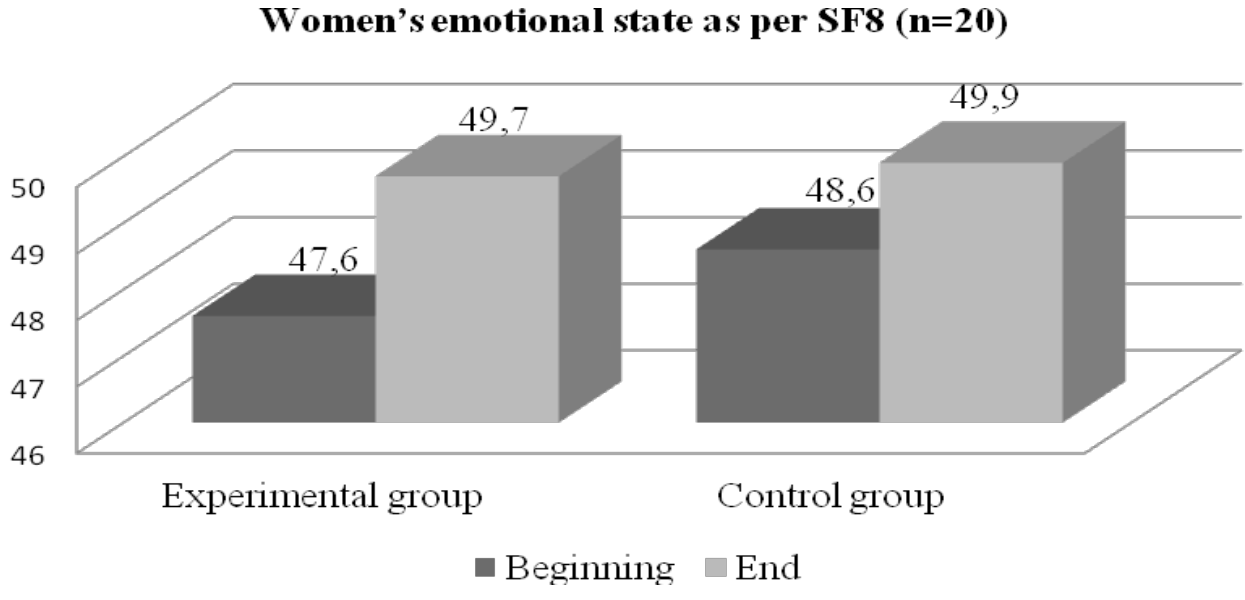

Fig. 6. Changes in the women's emotional state as per SF8 (n=20)

DISCUSSION

Many and various methods for the therapy of the dysmenorrhea have been established both from the conventional and the alternative medicine because of its great social importance. It is considered that the systematic physical activity is still another method through which the dysmenorrhea symptoms can be positively impacted. Shavandi *et al*. (2009) have carried out a study for establishing the effect of 8 weeks isometric exercises on the primary dysmenorrhea and have reported that the intensity and the duration of the pain is decreased but the quantity of the flow has not been changed. Shahrjerdi and Sheikh Hoseini (2010) have also established that. There is considerable decrease of the strength and duration of the dysmenorrhea symptoms and decrease of the quantity of medicaments taken by the young girls entered into a 8 week course of stretching exercises. A range of studies show that that there is a connection between the stress and the gynecological symptoms. Women, who actively practice sport experience lighter symptoms than those who train incidentally or do not at all practice such exersices.

Actually, dysmenorrhea is successfully treated by techniques for decreasing the stress and the physical activity and the exercises are accepted as positive stress (Noorbakhsh Mahvash et all, 2012). From Watanabe et all (1990) study, making use of rats, it is established that the increase of the prostaglandinas in the plasma, inducted by incidental intensive performance of physical activity, is considerably decreased after such systematic activity. The evidences presume that following a physical activity, animals adept to stress through reduction of the prostaglandin synthesis and/or through increaseing the decomposition of the prostaglandinas.

Physical exercises are famous with the fact that they provoke the liberation of endorphines in the brain which increase the threshold of pain and improve the spirit of those practicing sport. That is one reason more for entering systematic training as a method for mastering the dysmenorrhea symptoms.

CONCLUSION

Pain has negative impact on the physical activity of 55% of the women entered in our study;

The kinesitherapy methodology applied has positive effect on the dismenorrhea symptoms which is expressed in decreasing the pain in the abdominal zone and the waist and of undesirable changes in the mood.

The systematic performance of the kinesitherapy complex of physical exercises we have proposed has brought to an increase of the quality of life of the women entered into the experimental group by improving their physical and emotional state.

All women from the experimental group evaluate subjectively as positive the applied kinesitherapy methodology and the application of the physical exercises during the menstrual cycle.

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NUTRITIONAL INTAKE, BIOCHEMICAL AND ANTHROPOMETRIC CHANGES IN BULGARIAN WRESTLING ATHLETES

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***Key words**: nutrition assessment, wrestling*

INTRODUCTION

The athletes' diet is in relation with the number, volume and intensity of training sessions [11]. For them is also important to intake the macronutrients in right ratio.

Many participants in endurance and aesthetic sports and sports with weight classes, are chronically energy deficient, especially carbohydrate intake [9].

Competitions in wrestling are contested in weight classes, and most athletes compete in a class 5% to 10 % below their usual weight [1, 3, 6].

During preparation period before competition athletes from many sports (especially wrestling) train two or three times per day. That leads to increase of energy expenditure and the part of physical activity (PA) can by like that of basal metabolic rate (BMR) even two times higher (while normally PA is 50% of BMR) [11]. In these cases apatite is not good indicator for the real energy and macronutrients needs. For these athletes is better to make assessment and manage in their diet [9].

As the general fuel source for high-intensity exercise it is important for athletes to intake an adequate amount of carbohydrates in their diet [5, 8**].** Without enough carbohydrates to replenish both glycogen and maintain sufficient blood glucose levels, cortisol will be secreted in an effort to maintain blood glucose through muscle proteolysis, and amino oxidation [2].

METHODOLOGY

Subjects

18 Male wrestlers (n=18, 21 yr ±1,4SD) (free and classic style) at national level served as subjects in this investigation. The mean period of sports practice was 11 (±1,7 SD) years. All subjects participated in 15 hours of training per week. Nobody of them was taking any drugs or medication.

All subjects were informed about the possible risks of the investigation before giving there written informed agreement to participate.

Experimental design

The aim of our study was to examine the effect of diet management on the anthropometric and biochemical changes in the wrestling athletes during precompetition period.

Subjects were randomly separated into two groups (A, B: n= 9/group). Group A (called control) and group B (called diet).One week before the first measurement was sent WEB-based test for assessment of the nutrition to all members.

The measurements were made at the 1-st day and 15-th day of the last 3 weeks of pre-competition period at the morning in fasting state. During investigation period group A was on their own nutritional regimen, group B was with managed diet.

Anthropometric measurements

The weight and height of each subject was measured and the percentage of body fat was estimated from nine measurements of skinfold thickness [14]. Body mass was recorded to the nearest 0,05kg

using a portable digital scale with each subject wearing light clothing and no footwear. Height was measured to the nearest 0,5cm. All skinfold measurements were collected by one of the authors, an experienced anthropometrist. Each skinfold was measured nearest 0,5mm.

Nutritional intake

Assessment of nutrition was made with Web-based test, which was sent to all members one week before the first measurement [13]. They made 7-d food record and completed the test like is explanted in the written instructions which were attached to the test. To the subjects from the group B was sent managed diet and were asked as accurate as possible to follow this diet. The control group was also asked to follow their own regimen.

Blood collection and biochemical analysis

Blood samples were taken from the antecubital vein into plain vacutainer tubes in the morning at rest under fasting conditions at. 9.00 a.m. at the first and the fifteenth day of the investigation.

Cortisol was determined in blood plasma by a protocol in i-CHROMA Reader.

Statistical analysis

Anthropometric, nutritional and cortisol data are presented as a mean and standard deviation. Criterion for significance was set at $p < 0,05$.

RESULTS

The protein, fat and carbohydrate daily intakes (Table2.) of Group A are much lower than recommended values for Moderate-Carbohydrate diet (for 80 kg male and total energy 3500 kcal they are respectively: 1,7g/d, 1,5g/d and 6 g/d [10] while Group B is much close to the recommended values.

Table 1. Mean daily nutritional intake for group A and group B (±SD)

	Group A		Group B	
	(g/kg)	(%)	(g/kg)	(%)
Proteins	1,02±0,35	19	1,57±0,48	15
Fats	1,06±0,45	38	1,49±0,59	35
Carbohydrates	2,43±0,53	43	4,79±1,49	50

Table 2. Anthropometric data for group A and group B (Mean ± SD)

	Group A		Group B	
	1-st day	15-thday	1-st day	15-thday
Height (cm)	172,9±7,2		173,1±7,4	
Body weight (kg)	79,6±4,5	78,9±4,65**	76,5±19,4	76,2±19,1
BMI (kg/m^2)	26,4±2,8	26,2±2,9	25,3±4,4	25,0±4,6
FFM (kg)	67,4±10,2	66,8±10,2*	65,5±14,3	64,74±14,2
Muscle mass (%)	56,89±4,75	55,22±2,47*	58,41±1,83	58,43±3,72
% body fat	14,8±2,2	15,1±2,1	13,9±3	14,0±3,1
* $p < 0,05$; ** $p < 0,01$				

Values for the anthropometric parameters are shown in Table2. At the end of the study Group A reduces significantly the weight from 79,6±4,5kg to 78,9±4,65kg ($p< 0,01$) and Group B reduces insignificantly the weight from 76,5±19,4kg to 76,2±19,1kg ($p>0,05$). There is significant reduction of Fat-free mass (FFM) and muscle mass at group A.

Both groups have no change in body fat percentage during the investigation.

Blood plasma cortisol level (Fig.1) of both groups is increased: for Group A 234,45±86,14 nmol/l vs. 456,51±79,84 nmol/l, p<0,001 and for Group B 248,93±98,71 nmol/l vs. 393,11±112,82 nmol/l, p<0,05. The increase of group A is higher than Group B.

Table 3. show the dynamic of muscle hip circumference (MHC) and muscle arm circumference (MAC). Group A reduce significantly MHC.

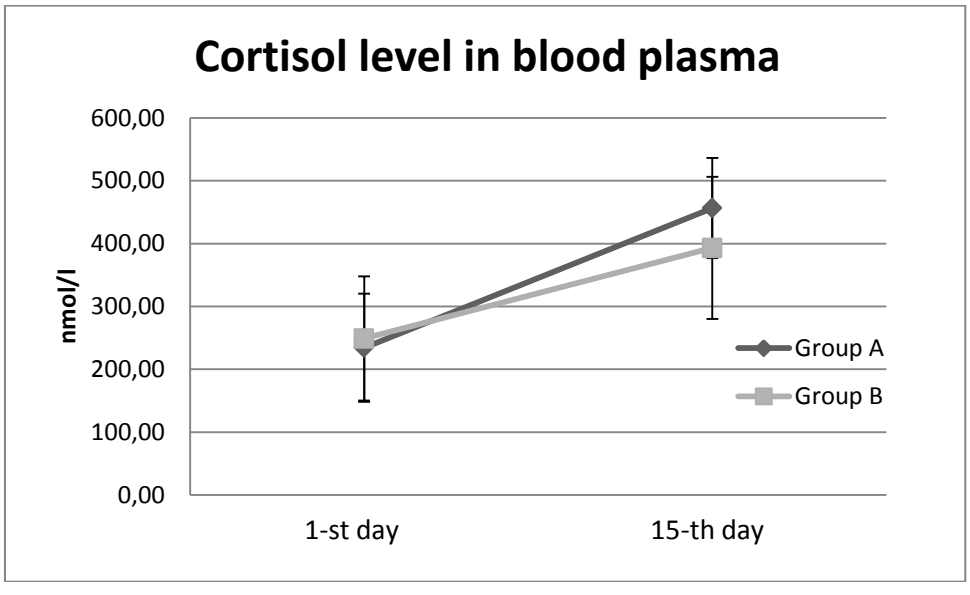

Fig.1. Level of blood plasma cortisol for group A and group B (Mean ±SD).

Table 3. Dynamic of muscle hip circumference (MHC) and muscle arm circumference (MAC) (Mean ± SD)

	Group A		Group B	
	1-st day	15-thday	1-st day	15-thday
MHC	53,22±5,6	52,00±4,67*	52,11±5,80	51,55±6,68
MAC	28,16±2,22	27,7±2,24	27,74±3,67	27,73±3,45
* p < 0,05				

DISCUSSION

Total energy intake of group A is relatively low (mean 1820 kcal ±468 kcal), while Group B intake is higher (mean 2880 kcal ±752 kcal) and close to the recommended values [10].

Carbohydrate intake of group A is too low. Lambert et al. (2010) suggest that prior to competition, wrestlers should decrease their training volume, increase their training intensity, maintain adequate hydration, and ingest large amounts of carbohydrates to optimize their training, optimize performance [7].

The low intake of proteins and carbohydrates of group A is in accordance with higher level of blood plasma cortisol (Group A vs. group B on 15-th day). Degoutte F. et al. (2006) also show increased blood plasma cortisol in group of judo athletes with reduced diet (1670 kcal) and 2,45 g/kg/d carbohydrate intake [4]. Deficits greater than 500 to 1,000 kcal usually results in very limited additional loss of fat and promote loss of water and some fat-free tissue (muscle) [12]. The results in our study support this claim. The deficit of group A is greater than 1000 kcal and their FFM and muscle mass are significant decreased. The same picture is in the group of judo athletes with reduced diet in a study of Degoutte F. et al. (2006).

The mean percentage of body fat in our groups is 15% which is relatively high. Different studies in the US reported varies from 6% to 12,8% [6]. Study of Kordi R.et. Al. (2011) show 15,9% mean percentage

of body fat in members of wrestling clubs in Tehran. As the main reason for it Kordi R. et. Al. (2011) indicates that the subjects employed fewer fat reduction methods such as special dietary regime and exercise for weight loss.

CONCLUSION

The management of nutritional intake is important for maintaining optimal physical conditioning and achieving high performance in sports. It can help of wrestlers to reduce the body weight on account of body fat not of fat free mass (especially muscle mass).

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INFLUENCE OF CHESS ON MENTAL STATE OF PSYCHIATRIC PATIENTS

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1. INTRODUCTION

Mental disorders cause permanent disability. Currently there is no created system for effective rehabilitation and integration of psychiatric patients. There are many studies on the beneficial effects of chess on the psyche of healthy children (1, p. 61-79). In Kiev, Ukraine, Dmitry Komarov explores the influence of chess on children with Down syndrome.

The purpose of this study is to determine the impact of chess on psychiatric patients who are clients of the Center for Mental Health "Chovekolubie" in the town of Pazardzhik.

2. THEORETICAL BASIS OF THE PROBLEM

Chess arose in the 7-th century in India, from where it transferred to Europe. In the 15th century the current rules were adopted. In today's world chess is taught as a sport in schools, incl. universities. Chess is a serious subject of study in computer sciences as a model for creation of artificial intelligence. People organize tournaments and championships at local, national and global level. Chess players are organized in local clubs, national federations, which are united in the World Chess Federation. The chess game is played with 32 pieces on a square board with 64 squares of two colors (9, p. 7).

At the center "Chovekolubie" chess is practiced in a wide range of varieties: training in the chess club – composed problems and instructional games, educational and competitive games. Special events and family tournaments for people with mental disorders have been organized at local, national and international level. Some clients of the Center participate in chess tournaments and championships also outside the Center. During the family tournament, using conversational process of finding a chess move, some of the players can discover that they like to be leaders responsible for others, some will prefer to be followers of their playmates.

At the Center sometimes chess is played on a large board in the garden with live pieces. Participation in various forms of chess provides complex stimuli for brain functions as well as their integration to achieve conscious purposeful group work. We use the method of family constellation - constructing family relationships through chess pieces and positions in order to provoke comments by using the third person form of communication (10, p. 99).

In this study, we explore the influence of chess on depression, intelligence and logical thinking. Under **the influence** in the current scientific work we accept the opportunity to produce objectively measurable changes. Accordingly, we monitor respondents in the systematic process of training and competitive activities in the chess club "Chovekolubie." The term "depression" means : "sad and depressed mood tinged with a feeling of painful displeasure, internal stress, fear and anxiety" (6, p. 287). The concept "logical thinking" (or reasoning) is used in the sense of ability to detect features and patterns of objective reality, which are not directly accessible to the senses (6, p. 77-78). In another source "thinking" is defined as a cognitive process aimed at solving problems i.e. information processing (5, p. 277-278). From all the varieties of thought process we have focused our attention on the ability of generalization (3, p. 7).

In most cases in modern literature under the term "intelligence" we view the hierarchically structured set of abilities that characterizes the level and quality of the thought processes of individuals (5, p. 190). In our study we are interested in the ability of the respondents to see relations, analogies, progressive changes, shifts and decay of elements. The concept of intelligence is used in the sense of mental retardation, occurring as a consequence of inherited or acquired by the end of early childhood and

pathology associated with difficulties in social adaptation (6, p. 181).

Working hypothesis

This scientific work plays the role of a pilot study about the complex positive impact of the practice of chess game on the social integration and rehabilitation of psychiatric patients. The study is limited to examining the influence of chess on intelligence, logical thinking and depression.

3. PURPOSE, OBJECTIVES, METHODOLOGY AND ORGANIZATION OF THE STUDY

3.1. Purpose and Goals

The purpose of this research is to establish the credibility of our working hypothesis, namely: systematic chess activities have a positive impact on intelligence, logical thinking on depressed people with psychiatric diagnoses.

In order to achieve the goal of our study we performed the following tasks:

- Theoretical task – we explored theoretical sources that are relevant to the subject;
- Experimental tasks - teamwork environment was created and functions were allocated to each of the participants; research methods have been chosen; the study itself was organized and conducted.
- Analysis – The data analysis has been carried out followed by interpretation of results.

3.2. Subject and object of research

The subject of this research is the influence of chess on the mental state of psychiatric patients.

Target population: psychiatric patients, clients of the Center for Mental Health "Chovekolubie" – Pazardzhik, participating in the activities of the chess club "Chovekolubie."

3.3. Methods of study

While conducting this study we use:

General methods - theoretical method: exploring scientific literature on chess, psychology, psychiatry and statistics;

Measurement methods - psychological tests;

Modeling methods - mathematical statistics: mean, standard deviation, dispersion, coefficient of variation, Student`s criteria for dependent samples and guaranteed probability.

3.4. Organization of the study

Data from two measurements has been used for the research - the first measurement was conducted in November 2012 and the second - in November 2013. Altogether 11 patients from the Center of Mental Health "Chovekolubie" in Pazardzhik have been surveyed. These are people with psychiatric diagnoses.

All the participants are tested individually by filling 3 tests: Raven Progressive matrices, "The fourth is redundant," Questionnaire for the Study of Depression. Sessions measurement data has been held in the psychological study of "Chovekolubie" center. Between the two measurements respondents participate in weekly sessions of the chess club "Chovekolubie." The duration of each systematic and organized chess practicing is 2 astronomical hours. The classes are carried out once a week - on Thursday

4. ANALYSIS OF SURVEY RESULTS

4.1. Intelligence

The average intelligence of the group has grown significantly in only one year - from 73.1 to 84.1. The difference is 11 units.

Standard deviations for the two measurements are respectively 18.5 and 17.1. They are slightly increased compared to the recommended rate of 10 - 15% . Expectations of the authors were for higher deviations, because the individual data of the participants in the group are quite different. In the initial measurement four of the people are within pathology - below 70, and the rest are within normal and average intelligence. In the second measurement only two people remain within the range of pathology. Both individuals grew up in orphanages. It is noteworthy that one of those - № 2 even reduces his

IQ. Taking into account that the last chess tournament - championship of the workers in the city, the same person was involved in the team, which became champion and he was a contestant on the first board. We believe that this result was probably influenced by other factors – the tested person is a high school part-time student. This is not the first psychological study in which participating and showing a

Table 1. Results of the study of intelligence, logical thinking and depression

№	RESEARCHED PERSON	FIRST MEASUREMENT			SECOND MEASUREMENT		
	NAME	IQ	Logical thinking	Depression (rating)	IQ	Logical thinking	Depression (rating)
1.	Maria	55	5	4	57	10	1
2.	Fanka	90	11	0	84	11	1
3.	Ilia	40	12	2	88	12	1
4.	Krasimira	55	10	5	55	10	1
5.	Bogomil	82	11	5	83	11	1
6.	Ani	90	12	5	106	12	4
7.	Daniela	92	12	5	106	12	4
8.	Lyubomir	86	10	3	108	11	2
9.	Katya	86	11	6	87	12	2
10.	Mitko	82	11	4	82	11	5
11.	Asen	55	2	5	70	5	1
Mean		73.1	9.7	4	84.1	10.6	2.1
Standard deviation - S		S = 18,5	S=3.22	S = 1,7	S = 17.01	S=2.02	S = 1.51
Coefficient of variation - V		V = 25.3	V = 33.19	V = 42.5	V = 20.3	V = 19.05	V = 71.9

Table 2 Differences in the results of the first and second measurement

№	RESEARCHED PERSON	DIFFERENCE BETWEEN FIRST AND SECOND MEASUREMENT		
		IQ	Log. thinking	Depression
1.	Maria	2	5	3
2.	Fanka	- 6	0	-1
3.	Ilia	44	0	1
4.	Krasimira	0	0	4
5.	Bogomil	1	0	4
6.	Ani	16	0	1
7.	Daniela	14	0	1
8.	Lyubomir	22	1	1
9.	Katya	1	1	4
10.	Mitko	0	0	-1
11.	Asen	15	3	4
Difference between means		11	0.9	1.9
Independent sample - t		t = 1.45	t = 0.68	t = 2.83
Student`s Criterion for dependent samples - t		**t = 29.8**	**t = 1.65**	**t = 1.36**
Guaranteed probability - P		P = 81.81	P = 36.36	P = 100

reduction in IQ of students in traditional educational system.

Coefficients of variation – accordingly 25.3 and 20.3, they are higher than the recommended rate (10-15%), which can be explained with the target group - people with mental health problems. It is noted that after the one-year impact of chess this coefficient falls and approaches the norm.

The number of people experiencing change after the influence of chess practicing shows that the guaranteed probability is 81.81, i.e. is less than 95%. We find that there is no significant difference and consequently we have to say that our hypothesis that chess activities have a significant impact on the intelligence of psychiatric patients has not been confirmed.

4.2. Logical thinking

Average dimension for the group in the first measurement of logical thinking is 9.7, while in the second measurement is 10.6, i.e. a positive difference for the whole group has been discovered. It is noteworthy that 63.6% of the people do not mark change; in 18. 2% of the people the difference is barely noticeable, and in two of the tested people - № 1 and № 11, the difference is drastic - almost two times. Both persons have the same IQ – 55, at the lower limit of rate of 70. This result leads to the conclusion that the systematic training over the chessboard leads to a drastic increase in some components of intelligence - logical thinking, and also to the increase of the overall intellectual performance, see the data from the columns for IQ in the first and second measurement.

Standard deviation - at the rate of 10-15%, is respectively 3.22 and 2.02 for the first and the second measurement.

The coefficient of variation - at the rate of 10-15%, is respectively 33.19 and 19.05 for the first and the second survey.

Guaranteed probability is 36.36 at the rate of 95%.

All these data can be explained by an incorrect choice of the test for the group. The test “Fourth is redundant” is designed for children, but it is applied to people under 18 years.

4.3. Depression

The average values of the group depression during the first and second measurement are respectively 4 and 2.1. The difference of 1.9 indicates that depression decreased after one-year impact of the chess game. Taking into account the scale of measurement - from 0 to 6, and 6 is indicator of a high degree of depression, it can be seen that for a year, the group as a whole has moved from near the top to near the lower limit. Having in mind the specificity of the target group - people with mental health problems, this result is very, very optimistic. The difference in 36.36% of the respondents is drastic – 4 units. Two of the persons (18.18% of the sample) experienced a slight increase in the value of depression. Knowing the respondents personally we believe that this change is due to other life factors.

The standard deviation of the two measurements is accordingly 1.7 and 1.5 at the rate of 10 - 15%. This fact should illustrate a very little deviation from the group standard.

The coefficient of variation - at a rate of 10-15% is 42.5 and 71.9.

The guaranteed probability is quite impressive - equal to 100%. The result is so high, because all the respondents increase the resilience to depression. These results should fully confirm the hypothesis that systematic chess activities certainly reduce depressive attitudes.

5. CONCLUSIONS AND RECOMMENDATIONS

Following the study we can draw the following conclusions:

1. At present time it can not conclusively be demonstrated that systemic chess training positively influences the intellect and logical thinking of people with psychiatric diagnoses - there is an increase in the absolute values, but the guaranteed probability is probably not high enough.
2. The results demonstrate in a very clear way that systematic chess activities decrease the level of depression.
3. The authors of the study have been facilitated doing their job by their preliminary and permanent

contacts with the mentally ill people.

4. By using chess symbols during the group discussion and conversation family dynamic structure becomes more clarified. Some of the patients can even find their “buddy”.

Based on these findings it can be recommended to the Ministry of Labor and Social Policy, to the National Sports Academy and to all Bulgarian providers of social services to assist in the local practical application of the proven therapeutic effect of chess on the mental state of psychiatric patients in several geographical widths of the world - South Africa, Ukraine and Bulgaria.

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PULMONARY FUNCTIONS IN CHILDREN WITH POSTURAL SPINE DEFORMITIES

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Key words: *pulmonary function testing, spine deformities, training*

INTRODUCTION

Spine is an axis of human body and human skeleton; it is composed of 33 bones irregular in its shape, called vertebrae. Vertebrae are connected between each other with intervertebral discs, and they enable the spine to function as one strong and mobile organ. Spine has many roles in human body, through shoulder girdle and pelvis, upper and lower limbs are attached to spine and enable us to walk and move, which gives to spine an essential role in human kinetic chain. During walking, running, jumping and other contact with surface spine acts as a shock absorber, which is enabled by spine shape and large number of interevertebral discs. It also have protective role, it protects the spinal cord that runs through it, and along with the shoulder girdle, rib cage and pelvis it protect internal organs of the human body. Normal spine has four curves, cervical and lumbar lordotic curves and thoracic and sacral kyphotic curves, those curves are often used to describe the spinal posture [1, 2]. According to its location, the vertebrae are, as well as spinal curvature divided into four groups: cervical, thoracic, lumbar and sacral. There are twelve thoracic vertebrae, and each of it has its own pair of corresponding ribs. Thoracic vertebrae and ribs makes thoracic cage, thereby representing the space in which lungs are placed.

Spine deformities have negative influence on human motor abilities, spine and rib cage mobility and esthetic appearance [3, 4, 5]. In abnormal thoracic curvature volume of the thoracic cage is decreased, which leads to decreased space for lungs. Decreased mobility of thoracic spine and ribs lower their normal range of motion during the breathing. Patients with spinal deformities have abnormal values during pulmonary function testing. Strong correlation between severity of deformity and abnormal pulmonary function is already shown in some studies [6, 7]. There are also other factors which can influence pulmonary functions, those factors are: rib distortion, vertebral deformity, muscle weakness, muscle spasm and training status of the patient [8, 9, 10].

Many studies already examined influence of different training regimes on pulmonary functions. Some of those training regimes tend to indirectly influence the pulmonary functions through correcting the spine postural status [11], while others directly influence lung abilities through aerobic regime exercises [12]. Despite many studies in this topic, there is still a lack of literature studying the effects of combined corrective exercise program and aerobic program on pulmonary functions in patients with spine deformity.

The aim of this study was to analyze the influence of combined corrective exercise program and aerobic training program on pulmonary functions in 11 to 15 year old children with spine deformities.

METHODOLOGY

This was a prospective controlled study which included 42 children, age from 11 to 15, divided in two groups: kyphosis deformity group (KDP) and scoliosis deformity group (SDP). Children were included in 12 weeks training program, consisted of corrective exercise program which was depended on the type of deformity and of aerobic exercise program. Pulmonary function abilities and capacities and spine postural status were assessed before and after 12 weeks training regime.

Pulmonary testing

Pulmonary testing was done using VicatestP2a Spirometer. We measured pulmonary function 24h before and after the program. During pulmonary testing VCmax, FEVC, FEV1%, PEF, FIVC and FIV1% values were measured.

Spine posture measurement

Postural status of the spine was assessed using Spinal Mouse, assessing of spine posture was done 24h before and 24h after 12 weeks training program.

Training program

Training program consisted of two combined exercise protocols, posture correcting one and aerobic one. Exercises in posture correcting protocol differed depending on whether the child has kyphosis or scoliosis, while aerobic training protocol was the same for both groups.

Posture correction protocol for both hyperkyphosis and scoliosis patients had 3 sessions per week, during 12 weeks. Every session last 60 minutes, and it composed of 10 minutes stretching exercise, 10 minutes breathing and posture self-correcting exercises, 20 minutes of strengthening exercises and 10 minutes of stretching exercises. Aerobic training program had 2 sessions per week and it was mainly scheduled immediately after 2 of those 3 posture correcting trainings. Aerobic training program consisted of 30 minutes stationary bike driving in between of 60 and 75% of their theoretical maximal heart rate.

Statistical procedures

Statistical procedures were performed using PASW 18.

RESULTS

After 12 weeks of training children with hyperkyphosis had improvement in all measured variables. Cobb's angle of kyphosis curvature was decreased from 37.31° to 32.19° after 12 weeks of training. Significantly better result after 12 weeks of training were also found in VCmax, FEVC, FIVC and FIV1%, while there was also improvement in FEV1% and PEF, it wasn't significantly important (Table 1).

Table 1. Spine postural curvature and pulmonary function results in children with kyphosis deformity

Kyphosis deformity group, 21 children, average age 13.2			
Variable	Initial measurement	Final measurement	*p* value
Cobb's angle	37.31°	32.19°	**< 0.05**
VCmax (*l*)	4.13	4.46	**< 0.05**
FEVC (*l*)	4.01	4.42	**< 0.05**
FEV1%	82.37%	83.24%	> 0.05
PEF (*l/s*)	7.26	7.82	> 0.05
FIVC (*l*)	4.08	4.44	**< 0.05**
FIV1%	87.23%	94.38	< 0.05

Table 2: Spine postural curvature and pulmonary function results in children with scoliosis

Scoliosis deformity group, 21 children, average age 12.9			
Variable	Initial measurement	Final measurement	*p* value
Cobb's angle	15.72°	14.48°	> 0.05
VCmax (*l*)	3.79	4.17	**< 0.05**
FEVC (*l*)	3.62	4.02	**< 0.05**
FEV1%	78.39%	80.72%	> 0.05
PEF (*l/s*)	6.43	6.58	> 0.05
FIVC (*l*)	3.7	4.06	**< 0.05**
FIV1%	78.45	81.21	> 0.05

Table 2 shows us results of initial and final testing of children who were suspected for scoliosis deformity. Results show that there is improvement in postural spine status, but that improvement wasn't statistically significant. Significant improvement was in VCmax, in which at initial measurement it was 3.79 l and at final measurement it was 4.17 l. FEVC and FIVC were also significantly better on final in comparing to initial testing (Table 2).

DISCUSSION

This study examined the influence of 12 weeks training program on pulmonary functions. Training program consisted of two different parts, one composed of exercises for correction of the spine posture and second of stationary cycling sessions. Spine deformities often make multiple problems to the patients, they negatively influence motor abilities [3], decrease range of motion of spine and ribs and they can hamper the work of heart and lungs [13, 14]. Beside that spine deformities often cause esthetic problem [5] and along with it children with spine deformity may be shied to go to sport or physical education classes. Correcting the spine posture will positively affect thoracic cage and it will increase the volume of thoracic cage, which will give potentially larger space for lung development. In this study we examined children with mild degree of hyperkyphosis and children who were suspected for mild degree of scoliosis, but without X-ray confirmation during this study. In previous studies it is already shown that level of spine deformity correlate with aerobic capacities.

Kyphosis curvature of 20-35 degrees calculated by Cobb method is considered as normal physiological curvature. Non structural kyphosis curves under 40 degrees can be effectively correct by exercises, which is also shown in our study. We had improvement of kyphosis curvature from 37.31° to 32.19° after 12 weeks of training program. Correction of spine posture may be one of the reasons for significantly better pulmonary function results shown in Table 1.

Scoliosis deformity below 20 degrees is considered as mild deformity, deformities from 20 to 50 degrees are usually treated with brace application [15], subjects with scoliosis deformity above 90 have serious cardiorespiratory problems, significant decrease in daily activity and increased mortality [16, 17], and they are usually surgically treated. In our study we had patients with suspected scoliosis deformity with Cobb's angle bellow 20°, and after 12 weeks of training we found improvement of scoliosis deformity, but without statistical significance. Pulmonary capacities in this group were better after 12 weeks of training, as it can be seen in Table 2. The results suggest that significantly better results in pulmonary functions came as outcome of aerobic program training. Explanation may lie in the fact that the subjects hyperventilated during the training process [18], or in the fact that the systematic training positively influenced metabolic and structural function of the respiratory muscles [19, 20].

CONCLUSION

In conclusion we can say that corrective exercise and aerobic exercise training program have positive effect on pulmonary functions in children with spinal deformities, in whom normal lung functioning can be under the negative influence of spinal deformity.

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A RELATIONSHIP BETWEEN SOME KINEMATIC CHARACTERISTICS AND POSTUROLOGY PARAMETERS IN SHOTOKAN – KARATE ATHLETES

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Key words: *Posturology, Balance Stability, Kinematic Characteristics*

We assume the relationship between stabilometric indicators and their importance in Shotokan – Karate with sports techniques is different and its disclosure will enable us to improve the training process.

In modern sports science, computer stabilometry is essential for improving complex coordinated movements, for assessing kinetic stability, for evaluation of the rehabilitation of athletes after injuries of the musculoskeletal system, for training of the vestibular analyzer, coordinative abilities [1, 8]. Static stabilometry is a set of balance tests carried out after standing on a platform and by using computation resources for evaluating the stability, such as standing on one leg or tests performed with closed eyes, etc. [2, 4].

The study of kinematic characteristics allows for an indirect assessment of the participation of the musculoskeletal system and its control. Those results give possibilities for improvement of sports techniques.

Therefore we aimed to find the connection and relationship between kinesthetic resistances on one hand, and sports technics-on the other, by determining the balance stability of target groups participating in the study – using instrumentation techniques and implementing benchmarking in the performed balance exercises in order to choose the most informative ones for sports and educational testing.

Methods and methodology of the study: Static stabilometry, video-registration, mathematical statistical methods.

The platform for stabilographic studies measures the pressure at four points thereon, and the transducers are placed at the vertices of the square formed by the platform. An amplifier converter is placed inside and its USB output is connected to a computer. The program for results procession performs several procedures on the measured data:

Calculation and rationing of h1 and h2 as differences on the diagonals (for each measurement): using the described mathematical transformation, the signals from the sensors corresponding to the higher values of the examined subjects with greater weight get normalized in equivalent to the total weight applied on top of the platform. Thus the amplitude of the balance oscillations depends only on the differences, not on the weight specifications of the signals [3].

$$h_1 = \frac{u_a - u_c}{u_a + u_b + u_c + u_d} \qquad h_2 = \frac{u_b - u_d}{u_a + u_b + u_c + u_d}$$

- Calculation of the vector sum of the differences h1 and h2:
  $H = \sqrt{h_1^2 + h_2^2}$
- Defining the biased estimator G:
  $G_i = H_i - H_{\min}$
- Defining its average value Gm and defining the maximum value which is a guide to the area described by the projection movement of the common center of weight in regards to the platform. The shape of the area is determined by the variation coefficient of fluctuations according

to Tishinov O., Albert E. [4]. The higher the value, the more the distribution differs than the normal, and comes closer to the rectangular shape.

$$G_m = \frac{\sum_{i=1}^{N} G_i}{N}$$

- Defining the spectral properties (when signal power is depending on the frequency) is done using the LSSA algorithm (Least-Squares Spectral Analysis [9]). Thus we obtain numerical values of the predominant frequencies individually defined in relation to the participants in the study [5, 6].

All results are entered in text files in the selected directory of the computer.

The motor structure of sport techniques are registered through a high-speed CASIO-EX-ZR200 video camera with recording frequency ranging from 30 to 1000 fps. The frequency of recording we used was 120 fps [7].

By means of consecutive framing processing, the coordinates of the trajectories points were recorded in the computer using SkilSpector software. In the initial menu we choose graphics of speed, trajectories or travel time.

All recordings are entered into a computer, we marked the study points – in this case these were: the toe, hip and shoulder of the lower extremity which did the kick and fingers of the upper extremity. By means of consecutive framing processing, the coordinates of the trajectories points are recorded in the computer using our personally developed software. In the initial menu we choose graphics of speed, trajectories or travel time. One can use the digital equivalent of the graphs obtained from the initial menu of the analysis software in order to obtain additional accuracy in the statistical analysis.

The experiment was conducted with 22 athletes in Shotokan – Karate, ranging from 20- 29 years old, 16 male and 6 - female, 9 persons I – II dan and 13 persons from 1 to 7 qu. They perform a series of kicks – a Mae Geri straight front kick, and a Yoko Geri side kick and Gyako-Zuki strike with upper limb. After their performance, for the completion of a standartized stabilometric test, athletes stand in Romberg posture.

RESULTS AND ANALYSIS:

The results of the kinematic parameters speed toe of lower limb and hip joint angle are presented in Table № 1 and Fig. № 1.

Table 1. Kinematic parameters – velocity and hip joint angle (V – velocity, degree – angle)

Parameters	V GyakoZuki [m/s]	V Mae Geri [m/s]	V Yoko Geri [m/s]	Mae Geri [degree]	Yoko Geri [degree]
X	13,18	12,33	10,89	70,82	64,05
S	3,61	3,57	4,10	13,16	13,91
V	27%	29%	38%	19%	22%
As	-0,09	-0,04	1,87	0,16	-0,24
Ex	0,57	-0,65	5,25	-1,38	-0,58
Max	21,21	19,80	24,76	94,00	89,00
Min	5,10	6,80	6,71	53,00	38,00
R	16,11	13,00	18,05	41,00	51,00

The impact velocity of the upper limb is naturally higher due to the shorter kinematic chain, but with less force. The average impact velocity with lower limb showed no significant differences, while Yoko Geri difference between the maximum and minimum values is higher, which is explained by various sports specialization. The average values of the angle of the hip in the Mae Geri is higher than that in Yoko Geri, because of the moderating effect of trochanter major, but with a larger scope.

The mean deviation value is the amplitude obtained after the calculation of all values attained from the projection of the common center of gravity on the platform. The maximum value of the deviation gives a guiding reference of the maximum amplitude of the deviation of the athlete's body. In performing the kick, the mean deviation reaches maximum, whereas the static standing in Romberg position is smaller.

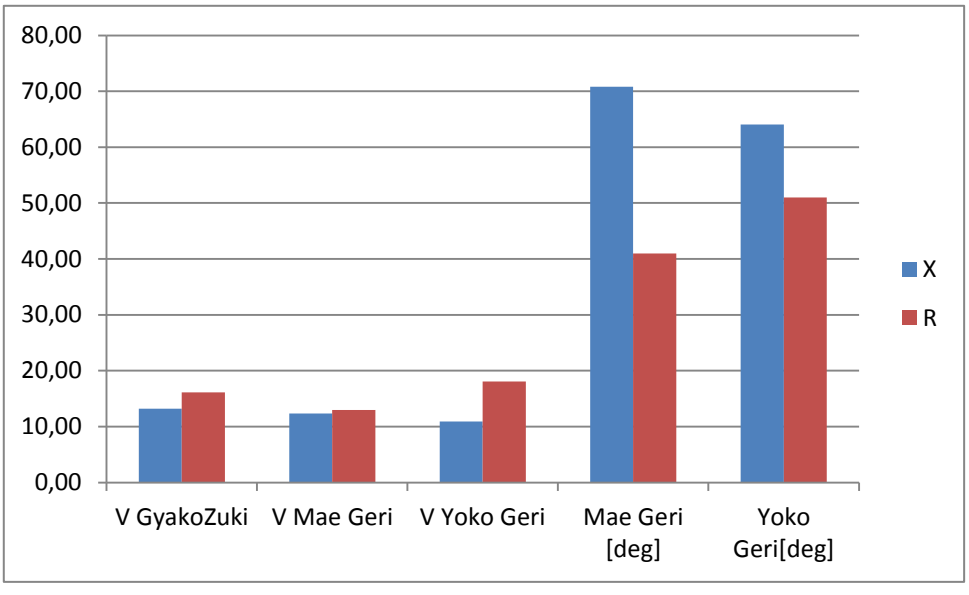

Fig. №1 Average and Range values of the kinematic parameters

Speaking of the dynamics for maintaining the body balance, it is necessary to analyze the frequency response of the balance function – using its spectral characteristics. If the graph indicates higher frequencies, this corresponds to more frequent fluctuations in amplitude and the common center of gravity in order to handle the balance. We can see a spectral distribution with the presence of lower frequencies compared to competitors with higher qualification (Fig.№2).

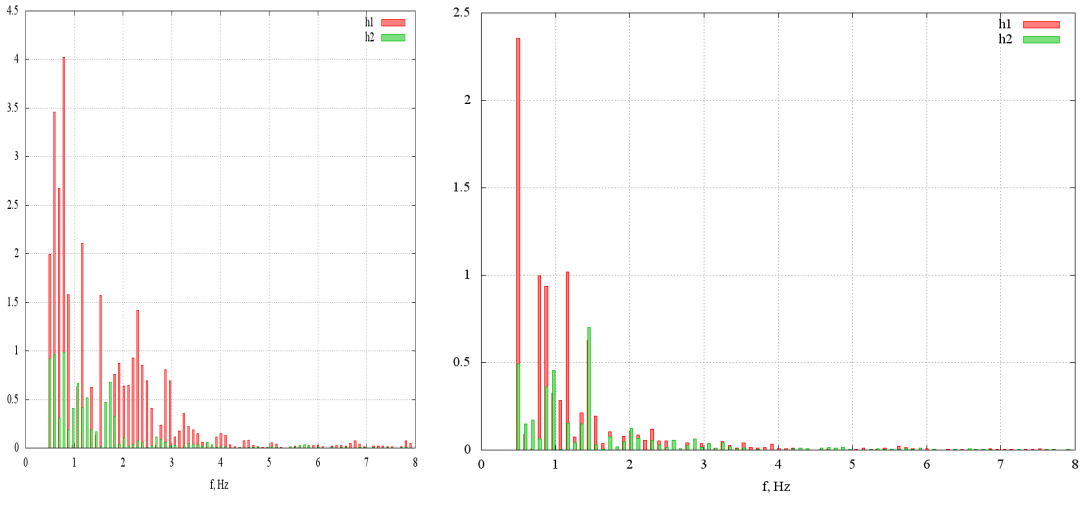

Figure № 2. Frequency Response in Athletes of Higher and Lower Dan

With the increase of the amplitude of the balance oscillations, the values of the kinematic parameters of the speed and acceleration of the shoulder decrease – this can be considered as a compensatory movement directed towards maintaining the balance. In the frequency analysis of the balance oscillations, one can observe a spectral distribution with the presence of lower frequencies in athletes of lower qualification in comparison to those of higher qualification.

CONCLUSIONS:

- The impact velocity of the upper limb is naturally higher due to the shorter kinematic chain, but with less force.
- The average values of the angle of the hip in Mae Geri is higher than that of Yoko Geri
- Due to the low values of the variation coefficient, the excerpt of the investigated parameters can be considered relatively homogeneous.
- With the increase of the amplitude of the balance oscillations, the values of the kinematic parameters of the speed and acceleration of the shoulder decrease – this can be considered as a compensatory movement directed towards maintaining the balance.
- In the frequency analysis of the balance oscillations, one can observe a spectral distribution with the presence of lower frequencies in athletes of lower qualification (less skills) in comparison to those of higher qualification (more skills).

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INFLUENCE OF SELF-EFFICACY ON THE BURNOUT IN PHYSICAL EDUCATION AND SPORTS TEACHERS

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***Key words**: Burnout, Self-efficacy, Physical education and sport teachers*

One of the major aspects in Bandura's social-cognitive theory (1977) is related to the construct of ***Self-Efficacy***, which refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments. The individual level of self-efficacy determines people's different ways of thinking, feeling or acting. Low levels of self-efficacy often result in more manifest symptoms of anxiety, depression and helplessness. "Persons with low self-efficacy also have low self-esteem, and they harbor pessimistic thoughts about their accomplishments and personal development. In terms of thinking, a strong sense of competence facilitates cognitive processes and performance in a variety of settings, including quality of decision-making and academic achievement" [24; p.153]. In contrast, persons with high levels of self-efficacy choose more challenging tasks, set higher goals and stick to them with obstinacy whereas their acts are well structured in their mind in advance. They invest more efforts in what they do. Where obstacles appear, they explore the surrounding environment in the search for new ways to act. They quickly recover after a setback [4, 21, 24].

Self-efficacy impacts human functioning through four psychological processes: cognitive, affective, motivation and selection [5].

There are four basic sources of information that affect the level of self-efficacy. *1) Mastery experience*: This is the most important source because its influence is based on personal and direct experience. In addition, personal success is attributed to one's own mental activities, skills and efforts [25]. *2) Vicarious experience*: This source is also known as modeling. Through processes of social comparison, people judge their own abilities in various fields or situations evaluating them by correlation with other people's abilities. The higher the identification with an observed behavior model, the more effective it is as a source. Vicarious experience is considered the second most effective source for development of self-efficacy [4, 29]. *3) Verbal persuasion:* Where people receive realistic encouragement from their social environment they will overcome more successfully self-doubts [29]. The validity of verbal persuasion as a source has also been proved empirically. *4) Physiological arousal:* Various psychosomatic symptoms such as sweating, palpitations or nervousness indicate that the person is facing a big challenge and needs competencies to cope with it. These symptoms reflect the individual's perception of self-efficacy and affect successful coping.

Usually, self-efficacy applies to specific fields and functional situations and manifests in each of these fields or situations at different levels of explicitness. "But there is also a general sense of self-efficacy that refers to global confidence in one's coping ability across a wide range of demanding or novel situations. General self-efficacy aims at a broad and stable sense of personal competence to deal effectively with a variety of stressful situations" [24; p. 154].

Among the most actively developed scientific fields is the study of self-efficacy in teachers and its influence on professional stress and burnout.

According the C. Maslach (1982), ***burnout*** is a tridimensional syndrome that develops in working people as a response to the chronic impact of stressors from the work environment. That response has three dimensions: emotional exhaustion, depersonalization and reduced personal accomplishment [16; p.3]. *Emotional exhaustion* is a major component of the burnout syndrome and its most noticeable manifestation. Where people describe themselves as "burned out", they speak mostly of exhaustion [20]. Accounts of tenseness, exhausted emotional resources, and loss of energy describe the facts about this component. *Depersonalization* translates into increasing trend towards alienation and detachment from people on the job, ob cynicism and callousness, loss of idealism and ignoring those in need for specialist's attention and help. Some researchers consider depersonalization as a kind of strategy for coping with stress on the job [12; 27]. The change in *personal accomplishment* is described as loss of faith in one's own competence and perceived lack of professional success, as well as a feeling of reduced ability to work. All these lead to developing negative self-assessment [16, 18, 13].

Burnout components correlate with each other but they reflect different aspects of occupational welfare [17]. However, the different content is not in contradiction with their empirical interconnection [8]. The three components should be measured individually and should not be unified, which means that in all studies they should be considered as empirically independent variables [19].

In studies on the interaction between self-efficacy and burnout in teachers, self-efficacy is considered as a personal trait that plays the role of a moderator of stress impact and thus affects the burnout profile. High levels of professional self-efficacy are associated with lower levels of burnout and with slower development of the latter as a process [10, 11, 9]. Fernando Betoret (2006) considers self-efficacy as an important resource for teachers in coping with stress. The more sustainable is that resource in terms of quantity and quality, the more important its role in the prevention of burnout [6].

In the relationship between self-efficacy and burnout, traditionally the focus is on the mediation function of self-efficacy and too little attention is paid to its preventive function. The optimistic view and the belief in one's own ability to cope with daily challenges increase the motivation to search for constructive performance methods. Teachers with high self-efficacy perceive routing requirements as less threatening than their peers who have doubts about their professional performance [24].

Despite the significant scientific interest in this matter, it is hard to find studies on the relationship between self-efficacy and burnout in ***physical education and sports teachers***. A physical education and sports teacher is a unique subject of pedagogic activity. That teacher's specificity is determined by the particularities of the educational process carried out and by his or her personal qualities formed as a result from own sports activities and background [2].

Classes in this subject are characterized by intense motor activity in the form of physical exercises and games. The physical load of students requires constant regulation, and the execution techniques and the respect of safety rules need to be monitored continuously. The organization of activities is dynamic due to the uninterrupted combination between individual, group and frontal involvement of students with certain tasks [2]. Work conditions differ a lot from those of teachers in other subjects. They include sports grounds within school yards and gyms equipped with various apparatuses and facilities. Physical education teachers have to give classes under different weather conditions, "deprived from the shelter of the class room" [28]. They work with students who are excited, noisy and "out of control" [7]. These teachers are under the influence of specific sources of stress but also of protective factors such as rhythmical psychological and physical loads, immediate communication and natural expression of the actual emotions at a given moment [2].

As a general rule, physical education teachers have their own athletic background which is a premise to their joining of the profession. In the course of their athletic and competitive career they have achieved many victories and suffered losses accompanied by both satisfaction and disappointment. They have a personal experience of competition stress and the ways to control it. Competition stress stimulates the development of a general strategy for coping with difficulties [14, 15].

The objective of this experimental study is to reveal the specificities of teacher self-efficacy (TSE) and general self-efficacy (GSE) in Bulgarian physical education and sports teachers, and their impact on burnout.

The goals of the study are the following:

To find out whether there are differences between physical education and sports teachers and other teachers in respect of studied variables;

To measure the impact of TSE and GSE on each component of burnout in teachers

The study ***covered*** 77 teachers of which 55 women and 22 men. Among them 36 (46.75%) were teachers of social studies and sciences. The average age of teachers was 42.99 years (Min 26; Max 59; SD 8.07) with highest proportion of teachers aged between 41 and 50 years. With consideration to their teaching experience, the teachers were distributed into the following groups: 0-5 years (7.8%); 6-15 years (41.6%); 16-25 years (35.1%) and more than 25 years (15.6%); (M = 16.92; Min 2; Max 35; SD 8.38).

METHODS

Maslach Burnout Inventory – Educators Survey (MBI-ES) [19].

The questionnaire contains 22 items grouped in three subscales: emotional exhaustion, depersonalization and personal accomplishment. Respondents rated on a Likert-type scale with 7 levels the frequency of their experiences described in the items from 'never' to 'every day'.

The General Perceived Self-Efficacy Scale, Bulgarian version by IlijanaStamova, Ralf Schwarzer and Matiihias Jerusalem, 1993 [26]

The scale consists of 10 items with four possible answers each: absolutely not true, rather not true, rather true and absolutely true. This scale is unidimensional.

Teacher's Self-Efficacy Scale [22]

This study used the Bulgarian adaptation or the Self-efficacy measuring test for teachers by Zh. Zhelyazkova-Koynova [1]. The scale contains 10 items that reflect one factor. Respondents evaluate the degree to which each statement describes them and give their answers on a 4-level Likert-type scale.

The statistical processing of data includes variation analysis, comparative analysis (Mann Whitney U) and correlation analysis.

ANALYSIS OF RESULTS

The results from variation analysis show that the levels of burnout in physical education and sports teachers are lower for all three components compared to the values obtained for social studies and sciences teachers (see Table 1). Similar results have been obtained in another study of ours [3].

Table 1. Means and Standard Deviation of the Variables

Variable	Physical education and sports teachers				Other subjects teachers			
	Min	Max	M	SD	Min	Max	M	SD
Emotional exhaustion	1.78	5.56	3.27	1.06	1.78	6.56	4.01	1.40
Depersonalization	1.00	2.60	1.57	0.49	1.00	5.00	1.88	1.00
Personal accomplishment (reduction)	1.00	4.13	1.83	0.72	1.00	3.63	2.20	0.76
TSE	28	40	34.44	3.52	24	40	32.61	3.96
GSE	27	40	34.11	3.43	21	38	30.20	4.37

We found out that there were statistically significant differences between the two groups of teachers in respect of two components of burnout: emotional exhaustion (u=2.49; $\alpha = 0.05$) and reduced personal

accomplishment (u=2.27; α = 0.05). Although the objective of the study did not include disclosure of differences in studied variables between men and women, we carried out an analysis of results based on respondents' genders. This was done because the number of women in the pool was twice the number of men. The only significant difference discovered was related to emotional exhaustion, which was more elevated in women (u = 3.68; α = 0.01). This is a typical result obtained in many other studies of burnout in teachers.

The results for self-efficiency show that the level of professional self-efficiency is higher than the level of general self-efficiency in both groups of teachers. It should be noted that in physical education teachers the values for the two varieties are very similar, almost identical, while in their co-workers teaching other subjects these values differ significantly. This result leads to the conclusion that physical education teachers state with equal determination their belief in their ability to be successful in different fields and situations. Perhaps they have general strategic approaches and/or principles of behavior the application of which guarantees success in various situations.

Another result that deserves attention is the much higher level of TSE (u = 2.02; α = 0.05) and of GSE (u = 3.71; α = 0.01) in physical education and sports teachers. These differences may be used as a basis in determining the specificities of sports teachers' ways of thinking, feeling and performing. They are more optimistic, show higher belief in their abilities to handle the challenges that they face and recover quickly after a possible failure. The most probable reason for that specificity of self-efficiency in physical education teachers lies in their athletic background. For them, of predominant importance as source of self-efficiency is the mastery experience. During a career in sports one usually achieves series of successes. The way to success involves sustainable important efforts, setting challenging and clear coals, discovering successful ways to act when short of time or in a competitive situation, acceptance of defeat, and exhaustive and impartial analysis of errors. Athletes master optimal ways to efficiently regulate their emotional status and prefer proactive stress-coping strategies. Thus, sports appear as a kind of school where precious life experience is accumulated and where the athlete gathers belief in his or her own efficiency.

The correlation analysis that we carried out revealed a negative correlation between burnout components on one side and on the other side TSE and GSE (see Table 2). Other authors have discovered similar correlations as well [7, 24, etc].

Table 2. Correlation analysis of studied variables

Variable	TSE	GSE
Emotional exhaustion	0,40**	0,39**
Depersonalization	0,28*	0,28*
Personal accomplishment (reduction)	0,68**	0,66**

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

Taking into consideration the nature of burnout, which develops as a process over time, that correlation may be explained as follows: the higher the individual level of TSE and GSE in teachers, the slower and less easily the different components of burnout appear in them. The strongest is the protection function of TSE and GSE in respect of reduction in personal accomplishment. TSE and GSE impact with similar intensity the individual components of burnout in teachers. Teachers' belief in their ability to cope successfully with various situations and fields in life is as important as protector against burnout in them as is their belief in the ability to handle professional issues.

As a result from the whole study, the following conclusions may be formulated:

Physical education and sports teachers are characterized by higher levels of professional and general self-efficiency compared to their peers teaching social studies or sciences;

That specificity provides them with better resistance to stress and to the development of burnout;

The most probable reason for these higher levels of self-efficiency in sports teachers lies in their athletic career in the course of which they have been exposed for a long time to the influence of the most important source of self-efficiency, namely mastery experience.

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COMMUNICATION STYLES BETWEEN PARTNERS IN COMPETITIVE DANCESPORT COUPLES

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Keywords: *sport competition, dance couples, interaction, communication styles*

Everything is beauty in the world of dance. The pronounced aesthetic impact of ballroom dancing involves emotions and motivation that are typical for each competitive couple. The particular style of communication is the result of the specific features of interaction, interactivity and mutual perception between partners (Костов, 2011). The synchrony between them has been, and remains to this day, a permanently open, current, topical problem of the day. Its solution requires a thorough, integrated study of the mechanisms that hinder or stimulate for many years, successful competitive career. Considering the traditions of ballroom dancing and their status in the country, it is essential that the knowledge of the individual characteristics in the personal realization of the competitors with its strengths and weaknesses (Костов, 2011; Стоянова, 2008, 2009).

Today, every professional specialist knows that the high technical level is not sufficient for successful realization. As proved particularly focused research (Balogh, 2002) during exercise is a necessary effective communication, connected with the expression of personal responsibility. For this contributes the cooperation between the partners (Peters, 2003). Other studies (Hájas, 2004; Majoross, K., P. Hamar, I. Dózsa, H. Dancs, 2008) indicate the role of relationships and characteristics of communication between the two partners as important to overcome the difficulties in pursuit of professional excellence. Experience tension and conflict in educational training and competition process is overcome through harmonious joint co-investment of effort by both partners in the pursuit for elaboration of dancing skills in the name of success (M. Kinga, 2008).

Considering the theoretical foundations of ballroom dancing, Златин Костов (2005) emphasizes the dialog communication on both sides, with the constant exchanging of roles. Communication between partners is the exchange of thoughts, opinions, experiences, etc., relating to their joint activity. Moreover, each person orients in the situation, analyzes it, proceeding not only from his own motivation and goal, but also from the other partner. Achieving the necessary physical, mental and emotional synchrony in the competitive appearance of the couple needs mental stability as a result of the work focused on harmonization of the relationship between the partners (Стоянова, 2008). Individual differences between the partners (sometimes drastic) often leads to tension, misunderstanding, and hence - to conflicts between them. Solving the technical problems in the preparation and the analysis and evaluation of the racing performance is hampered considerably.

Differences between the two partners in the couple appear in several specific ways: often one partner begins to communicate the position of the leader; striving to preserve some autonomy occurs in other; third prefer to be mentored; fourth are self-critical and super-self-demanding and so on. (Стоянова, 2009).

Although it is not common, sustainable and viable interpersonal relationships occur in some tandems: the dance couple is united, it has the necessary mental compatibility in solving complex and responsible sports competitive tasks. High mutually agreeable harmony is observed in them.

However, the most common problems are observed in the process of communication and relationships. They are the reason why some dance couples fail to realize their possibilities and do not achieve their goals, they hard keep their results, fall into a short-term or long-term crises, and in many cases discourages their partnership and divide as a couple, abandoning their favorite sport.

D. Buss (as quoted by Keranov, 2009) has established that the inborn characteristics of the individuals

quite often generate a number of conflicts, which, on the other hand, can serve as an offspring of energy for the couple and can boost the personal motivation for problem solving.

More often than not, however, the result is manifested in worsened relationships between the partners, which, in its turn, may bring about one of the following consequences:

1. Breaking-off, refusing (switching-off) contacts: formally "walking out" of the relationship (isolation).
2. Voicing the problem in public: discussions on key issues, seeking help from other people, showing initiative and trying to accomplish a change.
3. Loyalty to the other party/partner; expectations to solve the problems by joint efforts.
4. Disregard: ignoring the partner and their criticism on the hot topic, demotivation emerging, disintegration of the couple, denying participation in any further activities.

The manifestation of any of these behavioral reactions depends to a large extent on the degree of satisfaction that the activity arouses, as well as on the participation of each partner in the communication process and on the quality of the alternative chosen to find and select another partner (a new one).

Achieving synchrony in communication with the partner is time-consuming, efforts-consuming and requires patience, but once this goal has been achieved, the dancers can rely on a strong, beneficial, and creative relationship and successful performance on the stage.

The preliminary stage of the study reveals some individual characteristics in the interrelations and communication in the course of education-training and competitive settings, as well as basic, leading characteristic features of both partners in the tandem (Бахчеванова, Мутафова-Заберска, 2013). Data shows various peculiarities and varying degree of expression in the activity of the specific types of personality. These results direct the authors' attention to the specific peculiarities within the communication process, the interaction and the relationships between the dancers in any single situation that generates tension – which is true of each competition.

The working hypothesis of the study is based on the assumption that there exists a real opportunity, by deciphering the communication styles used by the dancers, to achieve optimization of both the psychological compatibility between the partners and the overall education-training and competitive process.

The goal of the study is to reveal the style of communication used by couples of dancers in the two basic competitive categories – High Professional Sport Latin Dancing (HPS-LAT) and High Professional Sport Standard dancing (HPS-STT) – through solving the following basic tasks:

1. Theoretical analysis of the literature concerning the issue investigated.
2. Establishing the specifics of expression for the various personality types in each of the dancing couples.
3. Comparative analysis of data referring to couples of dancers from both the categories.
4. Differential and comparative gender analysis of the dancers.

The subject of the study is the communication styles of competitors in the sports dancing category.

The methods of the study rely on the concepts implied in the symbols of Johnson's test (1981) used to measure five major strategies employed in resolving conflicts which arise in the communication process.

The study is conducted with 47 couples of dancers, varying in age between 16 and 32 years, subdivided in classes D, C, B, A, and M, and having experience in the field of sports from 2 to 21 years. The total number of people included in the study is 94.

The system-structural and content psychological analysis of the obtained data points to a number of interesting tendencies in the communication process between the competitors (table 1, diagram 1): the whole sample of dancing couples under investigation shows considerable differences in their communication styles – Owl (Confronting), Teddy bear (Smoothing) Shark (Forcing), Fox (Compromising). Competitors from all four categories ("D & C classes - Basic dance training", "Latin", "Standard", "Ten dance") most often communicate in the "Owl" style which comes forward as a domineering one, typical of all subjects (55.343).

Table 1. Dynamics of communication styles in competitive dancesport couples

Styles of Communication	D & C classes	Latin	Standard	Ten Dance	Total ∑	Average χ
Shark (Forcing)	43,85	50,73	40,69	44,80	180,07	45,0175
Teddy Bear (Smoothing)	52,23	53,18	44,46	50,20	200,07	50,0175
Fox (Compromising)	45,92	46,64	40,38	44,00	176,94	44,235
Owl (Confronting)	58,62	56,18	53,77	52,80	221,37	55,3425
Turtle (Withdrawing)	40,15	38,45	39,69	40,00	158,29	39,5725
Total ∑	240,77	245,18	218,99	231,8		
Average χ	48,154	49,036	43,798	46,36		

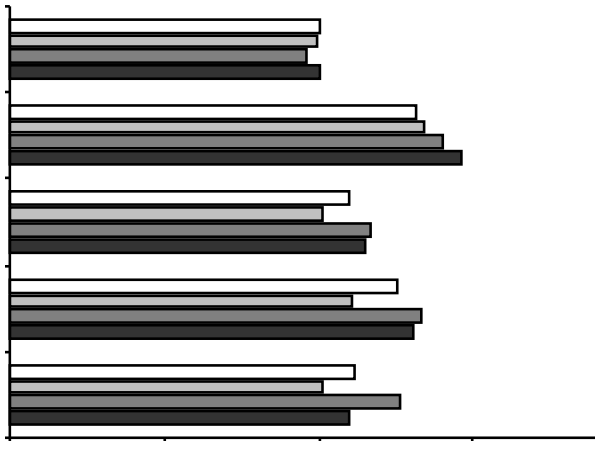

Diagram 1. Markedness of communication styles

The highest values for the „Owl" style have been established for "D & C classes" category (58.62), followed by those of the "Latin" category (56.18), the HPS-STT dancers (53.77), and the lowest values of the style are with HPS-Ten Dance (52.80). In this style the dancers show great respect for their goals and interrelations and look upon conflicts as problems which should be solved by mutual efforts while striving to find a decision satisfying both parties.

The style showing the lowest values, the one least frequently occurring with all dancing categories is the "Fox" (44.23): seeking some practical benefit while solving problems is not typical of competitive couples; the smallest number of them all realize how important it actually is to reach a decision where it is necessary for each of the parties to "give" something in order to "win"; quite often a sacrifice of some personal interests is associated with the expectation that the partner should do the same.

The representatives of "Latin" group show the highest values for the "Teddy Bear" style (53.18). The relationship with the partner is of paramount importance for these dancers while their personal goals come in the second place and retreat in the background; the dancers believe that all conflicts and arguments should be avoided since any discussion may have a harmful effect on the relationship.

With respect to "Shark" parameter, the "Latin" group shows the highest values again (50.73): most of the competitors in this group clearly manifest leaders' ambitions on the verge of aggressiveness; their opinion dominates their partner's; they are the ones who dictate contacts and relationships; the ones who impose their decisions at any cost without considering the other person's views; their own interests are much more important for them than the relationship between partners.

An interesting fact is that the highest values (49.04) for styles of communication have the competitors of "Latin" category. This is equally true of the four styles ("Owl-Confronting", "Teddy Bear-Smoothing", "Shark-Forcing", "Fox-Compromising"), and in a much higher extent than with the "Standard" group. The "Latin" dancers express their emotions and expansiveness in a much more outstanding way than

the ones from the standard dances group. The situation with the dancers of the "Standard" is a completely different one – these dancers show the lowest values in all communication styles, which deserves further attention and study.

The comparative analysis of the factor "manner of communication" reveals the extent of statistical importance of the styles which are being studied (table 2):

Table 2. Comparative analysis

	Turtle (Withdrawing)	Shark (Forcing)	Teddy Bear (Smoothing)	Fox (Compromising)	Owl (Confronting)
Chi-Square	.243	9.857	8.856	8.860	8.712
df	3	3	3	3	3
Asymp. Sig.	.970	.020	.031	.031	.033

Shark (Forcing) is the personality type which is domineering and sometimes forcefully commanding in their relationships, this type normally takes the upper hand making the opponents to accept their decision of the conflict ($\chi 2$=9.857; α=.020).

Teddy Bear (Smoothing) is the personality type who tends to avoid conflicts for the sake of harmony, this is the type who would rather forsake their own goals in order to keep their relationships ($\chi 2$=8.856; α=.030).

Fox (Compromising) is the personality type who is prepared to seek a compromise with the people around them if this is necessary for friendly relationships, this type would renounce their own interests to find a decision which equally benefits both sides ($\chi 2$=8.860; α=.030).

Owl (Confronting) – a personality type which looks at conflicts the way they would look at issues which need to be resolved and tends to seek a decision which would satisfy both the parties, by optimizing the relationships, the "owls" clarify the situation, reduce the tension, impose cooperation in an up-front manner, exchange of information and studying the differences ($\chi 2$=8.712; α=.033).

The analysis of the average values for the parameters obtained from Johnson's test (table 2) referring to the specific communication styles of the four dancing categories proves that these values are very close.

The comparative gender analysis (table 3, table 4, diagram 2) shows again that the "Owl" parameter gives the most markedly expressed statistical variance (u=3.197; α=.001): confrontation in the name of successfully resolving the issue is more typical of the men (28.83), rather than the women (26.64), the difference being a negligible one (2.19). It is only the "Teddy bear" (Smoothing) parameter where women dominate in the style trying to avoid confrontation and attain harmony.

Table 3. a Grouping Variable: Gender

Test Statistics(a)

	Turtle (Withdrawing)	Shark (Forcing)	Teddy Bear (Smoothing)	Fox (Compromising)	Owl (Confronting)
Mann-Whitney U	880.500	1007.000	1041.500	1071.000	683.500
Wilcoxon W	2008.500	2135.000	2169.500	2199.000	1811.500
Z	-1.699	-.739	-.478	-.254	-3.197
Asymp. Sig. (2-tailed)	.089	.460	.633	.799	.001

Table 4. Mean values of the variables in men and women

Styles of communication	Men	Women
Turtle (Withdrawing)	20.53	19.06
Shark (Forcing)	22.70	22.09
Teddy Bear (Smoothing)	24.64	25.23
Fox (Compromising)	22.23	21.91
Owl (Confronting)	28.83	26.64

The nature of dancing is inherently dynamic and tense, quite often it entails conflicting communication between partners through accomplishing a number of behavioral acts having high moral and esthetic value. It is those acts that underlie the humanization and the creative performance of the partners in the tandem.

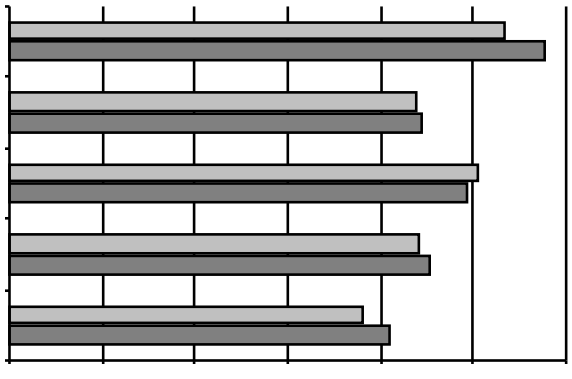

Diagram 2. Markedness of communication styles in gender

The analysis we have carried out allows us to make the following generalized conclusions and recommendations:

1. Literature sources emphasize on the issue of communication as a major factor for the establishing of creative and cooperative relationships between competitors in sports dances competitions – such relationships should form their style of behavior.
2. The "Owl" style comes forward as the optimal communication style for the dancing couples from both competitive categories (Latin and Standard) and all groups covered by the study.
3. Being the most typical, domineering for all dancing couples, the "Owl" style obviously satisfies both the parties when conflicts have to be resolved, optimizes the relationships, reduces the tension through cooperation, exchange of information and clarifying the differences.
4. All four styles of communication („Owl", „Teddy Bear", „Shark", „Fox") are well demonstrated in all dancing groups included in the study, moreover, they all have high statistical significance.
5. The lowest values for all dancing groups have been registered for the "Turtle" style – it is indicative that with this style no statistical reliability of data has been established.
6. For all the styles of communication included in the study, the leading role (with slight differences between the partners) is attributed to the male partner who is also the natural leader in the process of sport-competitive activity.

The recommendations that should naturally follow the conclusions made include, first and foremost, continuation of the study in order to achieve a further and more profound understanding of the essence, the contents, and the specific features of the five styles of communication between the partners that have been investigated; the communication process should encompass relationships during train-

ing sessions, as well as before, after, and during a competition.

It is necessary to direct the partners' attention to use opportunities for better understanding each other's characters by accommodating to each other on the basis of newly-discovered qualities, which obviously both partners possess.

The communication between the two partners should contain more information about the other person, exchange of opinions, sharing views, beliefs, and judgments, without imposing one's one opinions. To avoid cases of "manipulating" (the leading person dancing "above" their partner, and the partner – "for the leader") it is essential to seek methods of achieving a state of an optimal social-psychological compatibility founded on the emotional intelligence, characteristic of the "Owl" style. This will enable more successful solutions to the problems arising during the technical preparatory stage and in the course of further improvement of partners in the sports dance.

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INTERDEPENDENCE OF THE LEVEL OF PERCEIVED STRESS AND PRE-COMPETITIVE ANXIETY WITH SAMBO ATHLETES

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Key words: *state anxiety, perceived stress, sambo.*

The problems of stress and how to deal with it are of great interest for sports psychologists, trainers, sports pedagogy specialists, and all who explore the influence of psychological factors on the achievements of athletes and on the process of recovery. The interactive approach defines stress as lack of balance between the demands of the environment and the individual abilities to cope, i.e. the level of stress is a function of the ability of a person to answer the requirements of a given situation [8, 9]. Stress is characterized by changes in mental, behavioural and physiological reactions directed to adaptation. Stress arises from stressors, events or thoughts which are threat, harm or challenge for the body or exceed the resources available to manage [8].

Fress indicates two main causes of stress in the sports activity: the adaptation options are not enough (novelty, inexperience, unexpected moment) and the over motivation of athletes. The common element in stress situations is the discrepancy between the capabilities of the human and the requirements to it [1].

The high level of perceived stress could lead to increased pre-competition anxiety. Anxiety is one of the major psychological problems worldwide. The causes of this condition can be searched in different directions, but the researchers emphasize that stress leads to an anxiety situation.

The relationship between anxiety and performance during the competition are explained by the position of the different theoretical approaches. One of the most common modern theories, on whose basis are carried out numerous studies is the Multidimensional theory of [9]. According to it the pre-competition anxiety includes three key elements: cognitive, somatic and behavioral.

The cognitive component covers negative expectations for presentation and the possible consequences of failure, inability to concentrate, disorders of attention before and during the presentation. The signs are: indecision, confusion, poor concentration, irritability, fear, inability to understand the directions, dissatisfaction, etc.

The somatic component of anxiety refers to the physiological effects of disturbing experiences: the increase of excitement, accompanied with the expediting of breathing, increased muscle tension, sweating, trembling, nausea, insomnia, blush and other vegetative reactions. Behavioral component is the subject of some research in the field of sport. It is characterized by the following signs: numb body posture, a cautious game, avoiding eye contact, cover face with hands, biting nails and other reactions.

We assume that the level of perceived stress in the past month affects the level of pre-competition anxiety with sambo athletes.

The aim of this research is:

to determine the level of perceived stress and and the pre-competitive anxiety in sambo athletes depending of gender and sports results;

to examine the relationship between the level of perceived stress and the pre-competitive state of anxiety in sambo athletes.

The object of the research are 77 sambo competitors from different sport clubs in Bulgaria, 16 to 20 - years old, 42 boys and 35 girls, medalists – 47; 30, ranked after the third place.

METHOD

1. **Questionnaire for perceived stress** (PS-1) developed by Cohen, Kamarck, Mermelstein, 1983 [6] and adapted for Bulgarian conditions [4]. It consists of 7 positively and 7 negatively formulated items. The researched people have to evaluate from 1 to 5 the frequency of their feelings and thoughts described by the items.
2. Bulgarian version [2] **of Competitive State Anxiety Inventory** - (CSAI-2), [9]. The scale measures three factors – cognitive anxiety, somatic anxiety and self-confidence, evaluated by a four level scale of Lickert type. Self-confidence is considered as the level of reliance on one's own abilities for achieving success in sport. The reliability coefficient is: α of Kronbach 0,85 for the first one, α of Kronbach 0,86 for the second one and α of Kronbach 0,88 for the third subscale.

Organization

Studied athletes participated in the Sambo championship for boys and girls up to 18 years and up to 20 years. All subjects completed the Questionnaire for perceived stress (PS-1) the day before the competition, and the Competitive State Anxiety Inventory-2 on the competition day, one hour before the start, according to the requirements of the author [9].

Results

The results from the variational analysis of experimental data concerning the level of perceived stress were found: M=36,56; SD=8,33 for examined people generally. The level of perceived stress during the last month is higher with girls (M=37,88; SD=8,29) than with boys (M=35,45; SD=8,29), but the differences were not statistically significant (Mann-Whitney criterion). This may be expected since sport activity makes equivalent demands on athletes independently from the gender (table 1).

The level of perceived stress during the last month is lower with medalists from first to third place (M=36,13; SD=8,74) than athletes ranked after third place (M=37,23; SD=7,73), but the differences were not statistically significant, either (fig. 1).

According to the accepted norms of the perceived stress test (PS-1) for Bulgarian athletes the amount of perceived stress for the subjects of the research is calculated in percentage as a whole (fig. 2), for girls (fig. 3) and for young men (fig. 4) separately.

Half of the subjects have average values of perceived stress. This is a prerequisite for positive expectations about their performance. One third of all competitors have high values of perceived stress, which might be due to worries about their performance and lack of self-confidence. Only 20% of all subjects tested have low values of perceived stress for the last month and remain calm in a stressful situation (fig. 2).

The calculations showed that there are 42% of girls with low level of perceived stress, 21% of all girls have test results within the norm and the rest 37% have higher stress levels (fig. 3).

A quarter of boys are showing high levels of perceived stress. In the norm there are 61% of all tested boys, and 14% of them are with low values (fig. 4). Probably part of the youts athletes have a sense of personal control over the stress situation, which is connected with activation, excitement, arousal, readiness for competition.

The variational analysis shows that self-confidence is the most clearly expressed of the components of pre-competition anxiety, followed by cognitive and somatic anxiety, which has been confirmed by other research [2, 3].

In this study wasn't revealed a statistically significant difference between the average values of cognitive, somatic anxiety and confidence when surveyed persons defined by gender and rank. But the girls there are higher levels of cognitive and somatic anxiety compared with young men in which the level of confidence is higher (fig. 5). According to Jones the women show a progressive increase in cognitive anxiety and an earlier increase in somatic anxiety in comparison with men, as well as reducing the confidence before the race [7].

Table 1. Mean values of perceived stress, differentiated by gender and classification

Perceived stress	M	SD
Athletes in the research	36,56	8,33
Girls	37,88	8,29
Boys	35,45	8,29
Medalists from 1st to 3rd place	36,13	8,74
Athletes ranked after 3rd place	37,23	7,73

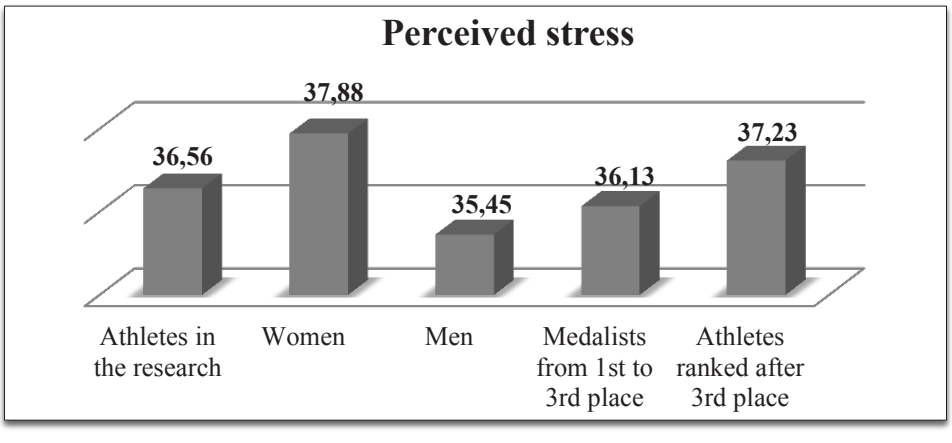

Fig. 1. Mean values of perceived stress, differentiated by gender and classification

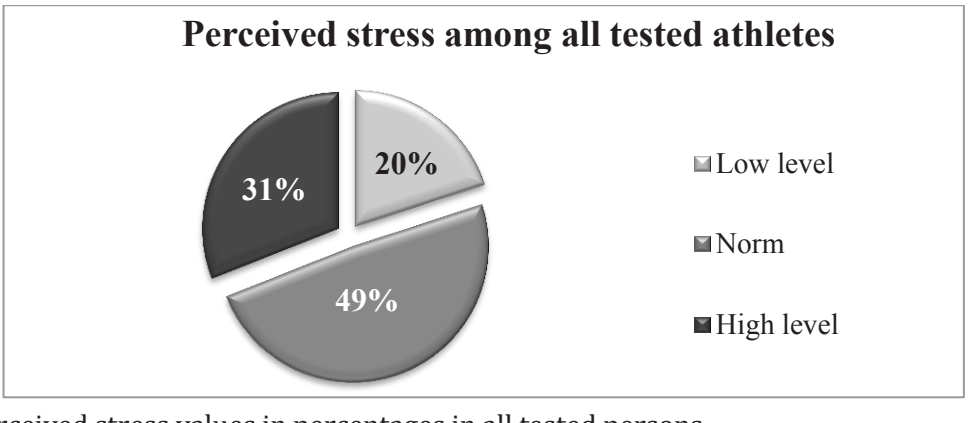

Fig. 2. Perceived stress values in percentages in all tested persons

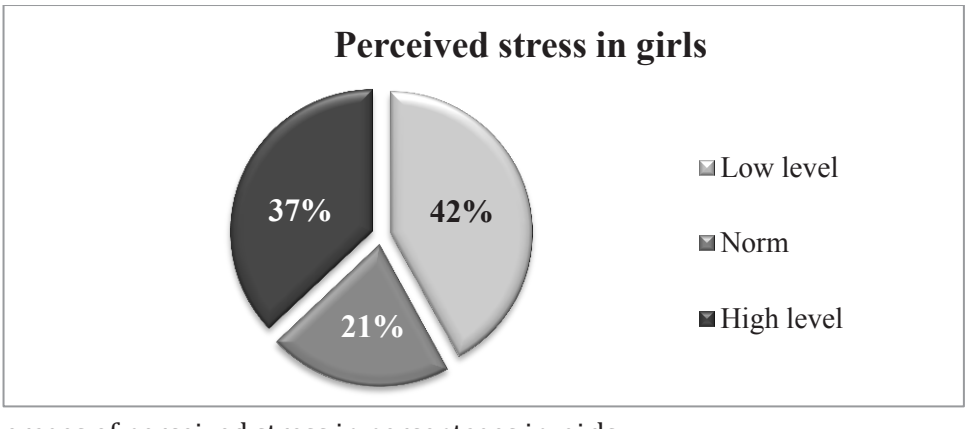

Fig. 3. Averages of perceived stress in percentages in girls

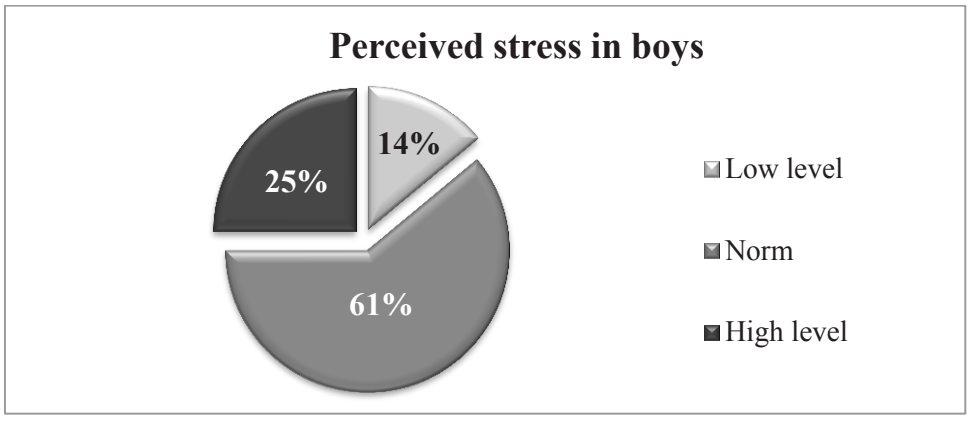

Fig. 4. Averages perceived stress in rates in boys

Table 2. Mean values of pre-competitive anxiety, differentiated by gender and classification

Pre-competitive anxiety	Cognitive anxiety		Somatic anxiety		Self-confidence	
	M	SD	M	SD	M	SD
Athletes in the research	1,71	0,44	1,34	0,36	2,99	0,72
Girls	1,78	0,52	1,41	0,39	2,93	0,69
Boys	1,67	0,41	1,31	0,35	3,01	0,74
Medalists from 1st to 3rd place	1,71	0,47	1,34	0,39	2,95	0,76
Athletes ranked after 3rd place	1,73	0,39	1,34	0,32	3,05	0,64

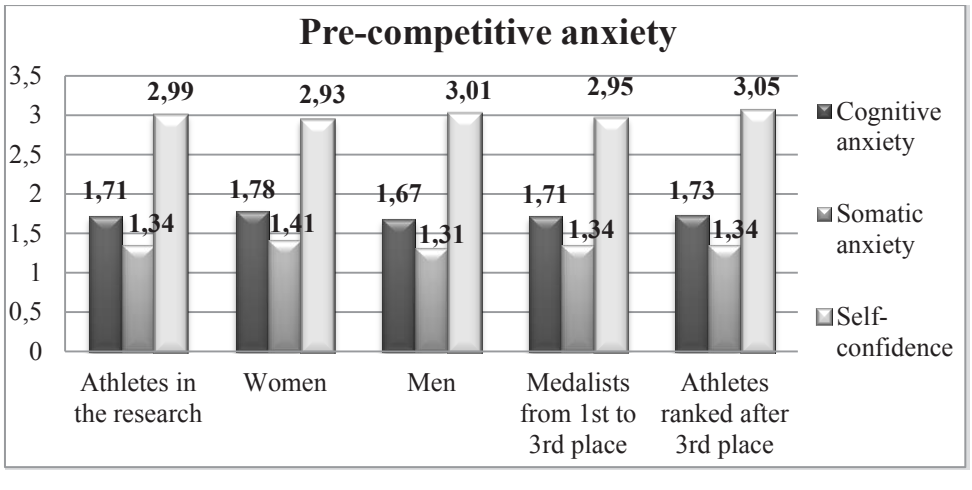

Fig. 5. Mean values of pre-competitive anxiety, differentiated by gender and classification

From the survey it is revealed that the competitors, ranked from 1 to 3 place have lower average values of cognitive anxiety (M = 1,71; SD = 0,47) compared to those ranked after the 3rd place (M = 1,73; SD = 0,39). These results support the assertions of researchers that high levels of cognitive anxiety affect sports performance [5, 10]. Between the compared groups statistically significant differences are not found regarding the components of the pre-competition anxiety (table 2).

According to the accepted norms of the test for pre-competition anxiety (CSAI-2) for Bulgarian athletes [3] in single combats, it has been calculated in percentage what amount of athletes show high, average and low level of cognitive anxiety (fig. 6), somatic anxiety (fig. 7) and self-confidence (fig. 8).

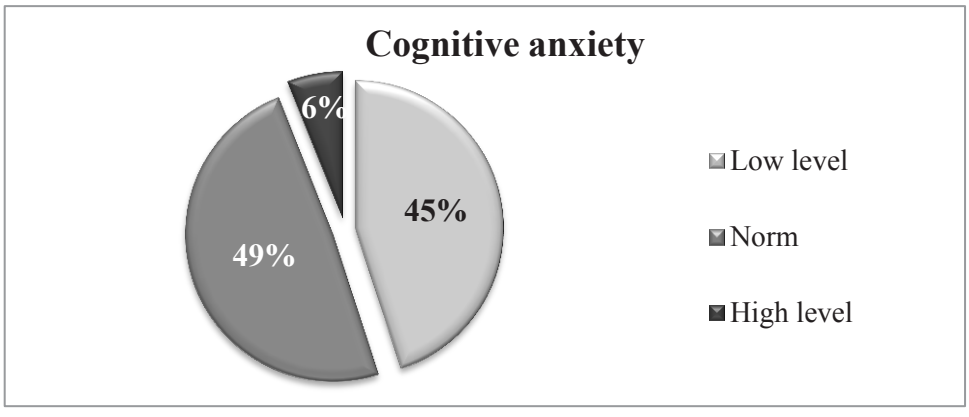

Fig. 6. Values of cognitive anxiety in percentages in all tested people

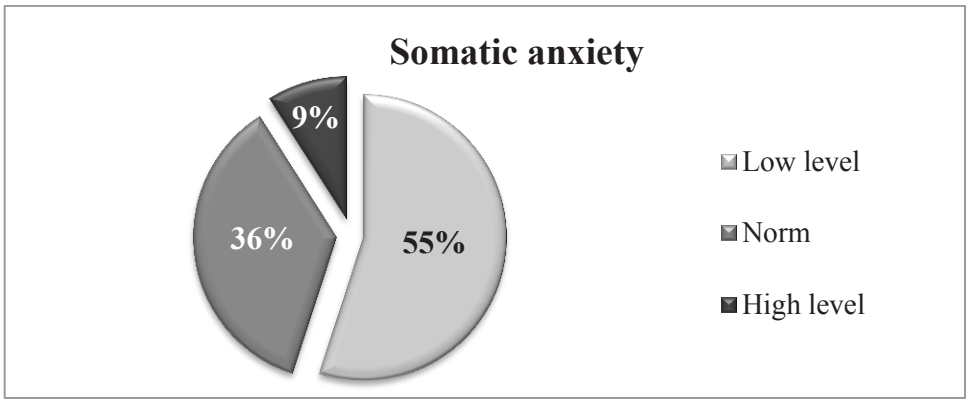

Fig. 7. Values of somatic anxiety in percentages in all the tested people on the day of the competition

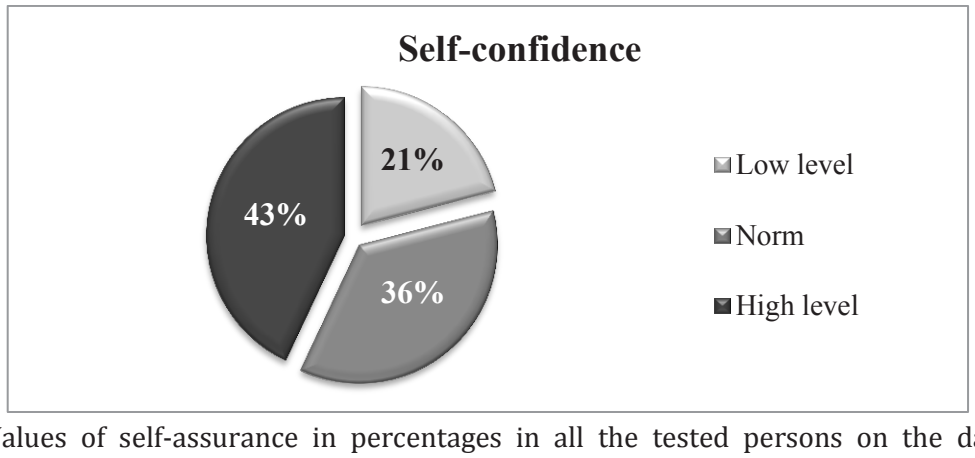

Fig. 8. Values of self-assurance in percentages in all the tested persons on the day of the competition

Table 3. Correlation analysis

Variables	Cognitive anxiety	Somatic anxiety	Self-confidence
Perceived stress	0,426**	0,401**	
Cognitive anxiety		0,352**	- 0,431**
Somatic anxiety			- 0,454**

** p=0,05; ** p=0,01.*

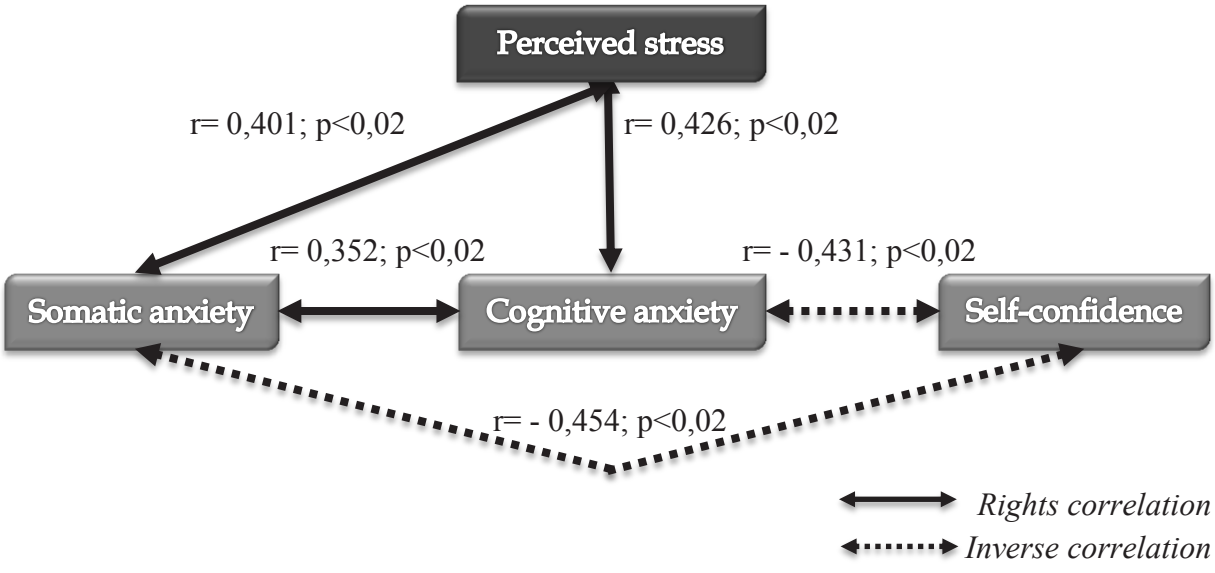

Fig. 9. Correlation analysis

Table 4. Influence of perceived stress on the components of pre-competition anxiety

Variables	Perceived stress			ΔR^2
	β	t	sig.	
Cognitive anxiety	0,387	2,938	0,005	0,132
Somatic anxiety	0,309	2,276	0,027	0,077

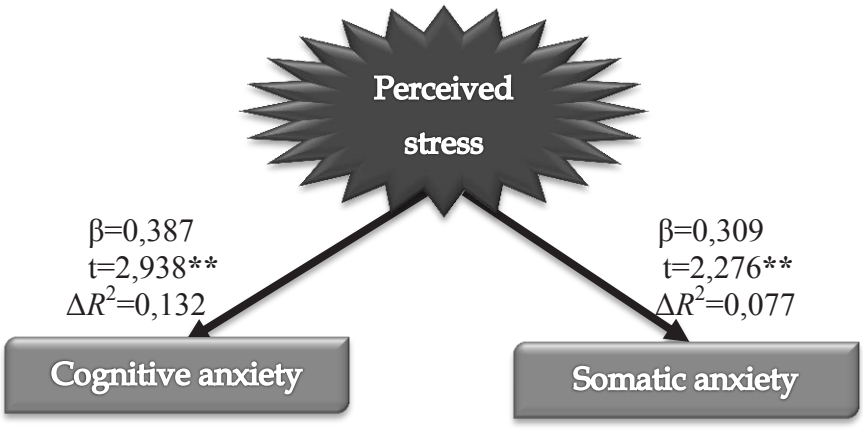

Fig. 10. Regression analysis

In terms of cognitive anxiety it was found that almost half of the tested people's results are facing within the norm. Only 6% of the competitors in the Sambo have high level of cognitive anxiety. The other 45% values within the norm (fig. 6).

Results for somatic anxiety indicates that the values in the 36% of athletes are within the norm. The most of the tested persons (55%) who have a low level of somatic anxiety in conditions of stress in physiological manifestations of alarming experience are least pronounced (fig. 7). Only 9% of the competitors feel the strongest mental tension, which can manifest as: rapid heartbeat, accelerated respiration, perspiration, frequent urination, muscle spasms, etc.

About self-confidence (fig. 8), it was established that the values of one fifth (21%) of the sambo competitors tested are below the norm. This might be due to insufficient sport experience and worry about their performance. The values of confidence in 36% of of the competitors are within the norm. The remaining 43% demonstrate high level of self-confidence. They feel prepared for the competition and do not worry about their performance.

To reveal the relations and interdependence of the studied variables, we used **correlation analysis** (Spearman criterion). It was established that a high level of perceived stress is related to high level of cognitive (r=0,426; p<0,02) and somatic anxiety (r=0,401; p<0,02). It was observed correlations between the levels of cognitive and somatic anxiety (r=0,352; p<0,02). The increased self-confidence is associated with lower levels of cognitive (r =-0,431; p <0,02) and somatic (r =-0,454; p <0,02) anxiety (table 3, fig. 9).

To reveal the influence of perceived stress, we have applied step **regression analysis**. It was established that the high level of perceived stress influences mostly cognitive (β=0,387**) and somatic anxiety (β=0,309**) of the tested sambo competitors (table 4, fig. 10).

CONCLUSIONS

The obtained results support the hypothesis for the influence of perceived stress on the pre-competitive anxiety. Establishing the level of perceived stress in the last month before a competition, and its influence for the demonstration of pre-competition anxiety will help coaches and athletes to choose more efficient training methods for a successful performance on the competition. The obtained results are an important direction for sport psychologists and coaches in their efforts to increase the sambo athletes self-confidence for coping with the challenges of stress and anxiety and to achieve maximum realization.

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FACTOR STRUCTURE OF MAIN MENTAL ABILITIES OF 10-15 AGED GIRLS PRACTICING SCHOOL TENNIS

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Key words: *tennis, motivation, self-efficacy, anxiety, sport confidence, self-regulation*

INTRODUCTION

Successful sport performance depends from number of factors - motor abilities, technical skills and last but not least - of the mental skills of the athletes. This is particularly relevant for tennis, which is considered as a mental game. According to M. Crespo (2005) main mental abilities of tennis players are self-confidence, self-efficacy, anxiety, self-regulation and motivation. **Self-confidence** as one of the most important variables related to sport performance is defined as "the belief or degree of certainty, individuals possess about their ability to be successful in sport" (Vealey, 1986). High degree of confidence before and during the match determines lower level of competitive anxiety and often correlates with better performance (M.Besharat, S. Pourbohlool, 2011). According to the Vealey's model the sport confidence is composed of three main components: (1) a trait component, which represent a consistent personality trait - how confident is the athlete his abilities in general, (2) a state component, which is a temporary situational state and (3) so called Competitive Orientation; which includes how the individual defines "success".

Self-efficacy refers to individual's belief in his/her ability to perform particular activity for achieving desired outcomes (Bandura, 1997). Based on the social-cognitive theory, individuals with higher levels of self-efficacy are less vulnerable to severe emotional arousal and are more capable to adaptive coping with emotional arousal compared to individuals with lower levels of self-efficacy (Bandura, 1997, 2001).

A definition of motivation is that represents the internal and external forces that lead to the initiation, direction, intensity and persistence of behavior. (R. Vallerand,2004). According to the theory, sports motivation construct contains three main dimensions – *intrinsic* and *extrinsic* motivation and *amotivation*. Intrinsic motivation (IM) refers to participation in sport activity for the pleasure and satisfaction, and extrinsic (EM) - for reward/punishment, which are associated with the achievement or lack of success.

IM is a global construct that can be differentiated into three more specific motives - *to know*, to *accomplish,* and to *experience stimulation*. *IM to know* refers to the engagement in an activity for the pleasure and satisfaction that the athlete experiences while learning, exploring, or trying to know/ learn something new. *IM to accomplish is* defined as participation in activity for the pleasure and satisfaction derived when trying to reach something new. *IM to experience stimulation* represents involvement in sport activity for the experience of fun, pleasure and positive sensations (Vallerand et al. 1992). Extrinsic motivation (EM) describes participation in sports activities to achieve the award (to avoid punishment). EM is a multidimensional construct which consist three main types external motives: *external regulation*, *introjection,* and *identification* (Deci and Ryan 2000).

External regulation is the most clear expressed type of extrinsic motivation. It refers to the involvement in an activity to gain rewards or to avoid punishment. I*ntrojection* refers to a more 'internalised' involvement with an activity. At this stage, behaviour is not self-determined, but the individual internalise the reasons for her/his actions*. Identification* is a more self-determined type of extrinsic motivation than external regulation because behaviours are valued, and considered important and, thus, engagement is perceived as chosen by the individual itself (V. Barkoukis, at al,2008).

The third component of motivation is amotivation, which is the state of lack an intention to act. Amotivation results from not valuing an activity, not feeling competent to do it, or not believing it will (lead to a)yield a desired outcome.(R. Ryan, E. Deci, 2000).

Self-regulation is the ability to activate, monitor, inhibit, persevere and/or adapt one's behavior, attention, emotions and cognitive strategies to attain personally relevant goals (Hrbácková, K., S.Vávrová, 2013). The children with these strengths are in control of their emotions, thoughts. They monitor their behavior, evaluate their abilities, and are able to adjust their behavior, if it's necessary.

Mentioned psychological constructs are related between and are in two way relationships with sport performance.

The purpose

The aim of the study was to explore relationships between different personality traits of 10-15 aged girls, practicing school tennis.

The tasks

- To achieve thee purpose of the study, the following tasks are realized:
- To describe the state of sport motivation, self-efficacy, sport-confidence, anxiety and self-regulation;
- To explore of the relationship between mentioned personality traits;
- To reveal the factor structure of the psychological characteristics of girls involved in school tennis.

Participants and methods

Object of the study are mental qualities of children involved in school tennis. The investigated girls (n = 24) were participants in the European AAS Tennis Team Championship. The methodology of the study involves five psychological test instruments - a trait self-confidence inventory (Vealey, 1988), self-efficacy (Bandura, 1997, T. Jancheva, T. Misheva, 2006), Sport Competition Anxiety Test (SCAT), sport motivation scale (SMS, L. Pelletier, 1995) and self regulation scale (SRS).

RESULTS AND DISCUSSION

The studied girls are at average age M = 12.46 ± 1.02 years old, with tennis experience M = 2,65 ± 1,58 years, but these two variables do not affect the studied psychological characteristics.

Table 1. Descriptive statistics and Cronbach's alfa

Item		n	Mean	St. dev.	V	As	Ex	Cronbach's alfa
Age		24	12,46	1,02	8,19	-0,011	1,467	-
Experience		24	2,65	1,58	59,62	0,921	1,065	-
Height		24	160,46	7,04	4,39	0,545	0,145	-
Weight		24	48,25	6,25	12,95	0,030	-1,271	-
Intrinsic motivation	IM to know	24	4,84	1,50	30,89	-0,393	-0,907	0.900
	IM to accomplish	24	5,15	1,30	25,18	-0,398	-0,926	0.849
	IM - stimulation	24	5,30	1,21	22,80	-0,690	0,764	0.785
	Sum	24	15,29	3,42	22,35	-0,550	-0,516	0,910
Extrinsic motivation	EM -identified	24	4,46	1,12	25,06	0,075	0,085	0,625
	EM - introjected	24	4,21	1,34	31,76	0,514	-0,326	0,607
	EM – Ext. regulation	24	5,08	1,64	32,26	-0,085	-0,768	0,664
	Sum	24	13,75	3,31	24,04	0,513	0,048	0,791
Amotivation		24	1,84	1,14	61,66	1,411	0,813	0,696
Anxiety		24	22,13	3,92	17,70	0,173	-1,222	0,610
Sport-confidence		24	77,39	12,57	16,24	-1,055	1,105	0,935
Self efficacy	Self_Efficacy	24	40,83	5,04	12,35	-0,337	0,375	0,899
	Self obstruction	24	24,17	4,94	20,44	0,342	-0,955	0,733
Self regulation	Emotional	24	16,00	2,36	14,74	-0,412	-0,380	0,693
	Behavior	24	10,08	1,72	17,03	-0,196	-0,552	0,620
	Cognitive	24	7,83	1,05	13,40	-0,625	1,573	0,827

$As_{0.05}$=0.944, $Ex_{0.05}$=1.636

The exploratory analysis showed that the questionnaires and their subscales have acceptable internal consistency Cronbach's alfa ranges from 0,607 to 0,935. Descriptive statistics and concrete value of Cronbach's alfa for each of the items are presented in table 1.

The results of the study show a statistically significant higher value of intrinsic ($M_{(sum\ of\ values)}$ = 13.75±3,31) to extinsic ($M_{sum\ of\ values}$=13.75±3.31) motivation (t = 2.28, p = 0.036). The most clear expressed motive is to experience stimulation (5,30±1,21), followed by the desire to achieve the goals of the group (5,15±1,30) and the victory (5,08±1, 64). This ranking is logical, given the objectives of the held European Championship, which are primarily to pleasure of the game and the competition, above all to show respect for teammates and opponents during the tournament. In accordance with that is observed low level of amotivation (1,84±1,14). Values obtained for self-efficacy (40.83±5.04) and self-obstruction (24.17±4.94) are lower than cited from Т. Янчева (2006). The mean value of sport-confidence (77.39±12.57) is higher than published from Ж. Желязкова (2008) about the same age group. All tested variables are normally distributed.

The correlation analysis (table 2 and fig. 1) shows that the intrinsic motivation positively correlates with extrinsic motivation (0.506), especially with EM identification sub scale – 0.576), sport-confidence (0.639) and self-efficacy (0,749). In contrast, extrinsic motivation correlates with amotivation (0.418). This means that to build a lasting desire to participate in sports and successful performance is essential to build children's intrinsic motivation – the joy from the game, stimulation from learning or doing something new. Self-efficacy marks high correlations with subscales of intrinsic motivation (to accomplish 0.741, to experience stimulation 0.762), sport confidence (0,750) and considerably weaker with extrinsic motivation (0.419), which confirms the above. Naturally, the self-obstruction, as negative human trait, is related negatively with sport-confidence (-0.473) and self-efficacy (-0.520). This confirms the findings in several scientific publications (Urdan, Midgley & Anderman, 1998, cit. by T. Iancheva Ts. Misheva, 2006). The anxiety marks moderate positive correlation with the external regulation (0.497).

Table 2. Pearson's Product Moment Correlations

Item	IM-to know	IM to accomplish	IM - stimulation	IM	EM - identified	EM - introjected	EM – ext. regulation	EM	Amotivation	Anxiety	Confidence	Self efficacy	Self obstruction	Emotional regulation	Behavior regulation
IM-to know	1,000														
IM to accomplish	**,438**	**1,000**													
IM - stimulation	**,562**	**,821**	**1,000**												
IM	**,803**	**,861**	**,911**	1,000											
EM - identified	**,554**	**,423**	**,491**	**,576**	1,000										
EM - introjected	0,252	0,278	0,341	0,336	0,361	1,000									
EM – ext. regulation	0,335	0,195	0,294	0,325	0,313	**,680**	1,000								
EM	**,463**	**0,367**	**,462**	**,506**	**,672**	**,872**	**,842**	1,000							
Amotivation	-0,018	0,079	0,162	0,079	0,057	,493	,415	**,418**	1,000						
Anxiety	0,313	0,320	0,352	0,383	0,178	0,250	**,497**	0,388	0,193	1,000					
Confidence	0,392	**,621**	**,654**	**,639**	0,305	0,155	**,430**	0,364	0,087	0,281	1,000				
Self efficacy	**,454**	**,741**	**,762**	**,749**	**,496**	0,191	0,349	**,419**	-0,012	0,296	**,750**	**1,000**			
Self obstruction	-0,105	-0,388	-0,307	-0,302	0,025	0,360	0,140	0,231	0,274	0,096	**-,473**	**-,520**	1,000		
Emotional regulation	0,025	0,164	0,198	0,143	0,181	-0,328	-0,341	-0,222	-0,300	-0,146	0,329	0,307	**-0,395**	1,000	
Behavior regulation	-0,265	0,151	0,066	-0,036	-0,321	0,177	-0,075	-0,073	**,463**	0,134	-0,030	-0,084	0,193	-0,140	1,000
Cognitive regulation	-0,066	0,179	0,256	0,129	0,059	0,305	0,286	0,279	0,114	-0,132	**,449**	0,183	-0,204	0,018	0,298

$r_{0.05}$=0.41, $r_{0.01}$=0.53

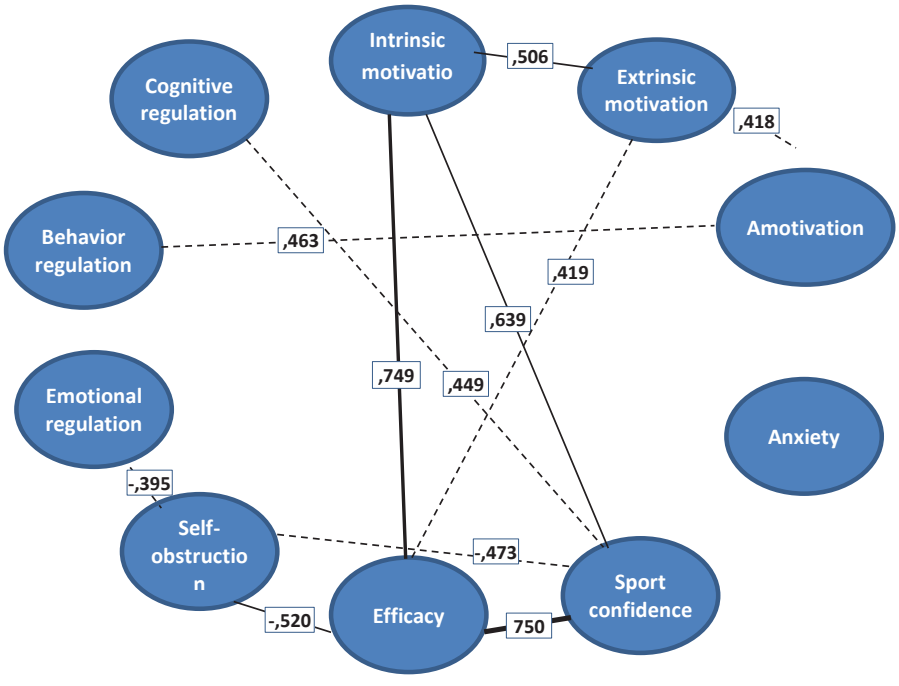

Fig. 1. Main correlations between items investigated

Table 3. Factor structure of mental abilities of children involved in school tennis

Items	Components				Communalities
	I component	II component	III component	IV component	
Intrinsic motivation - to experience stimulation	**0,893**	0,143	0,045	-0,016	**0,820**
Self efficacy	**0,893**	-0,031	0,176	0,071	**0,834**
Intrinsic motivation - to accomplish	**0,884**	0,039	-0,069	-0,062	**0,791**
Sport confidence	**0,821**	0,026	0,068	0,320	**0,781**
Intrinsic motivation - to know	**0,541**	0,209	0,506	-0,267	**0,664**
Extrinsic motivation - introjected	0,209	**0,848**	0,068	0,153	**0,792**
Extrinsic motivation - external regulation	0,310	**0,776**	0,223	0,128	**0,765**
Amotivation	0,096	**0,654**	-0,420	-0,005	**0,613**
Emotional regulation	0,341	**-0,616**	0,111	0,142	**0,528**
Self obstruction	**-0,516**	**0,582**	-0,030	-0,292	**0,692**
Behavior regularion	0,089	0,223	**-0,891**	0,031	**0,853**
Extrinsic motivation - identified	0,460	0,267	**0,605**	-0,040	**0,650**
Cognitive regulation	0,253	0,221	-0,178	**0,845**	**0,858**
Anxiety	0,440	0,381	-0,102	**-0,546**	**0,646**
Total	**4,35**	**2,85**	**1,744**	**1,342**	
% of variance explaned	**31,072**	**20,355**	**12,457**	**9,587**	
Cumulative %	**31,072**	**51,427**	**63,884**	**73,471**	

It's interesting to comment the correlations of the tree dimensions of self-regulation. The emotional regulation relates moderately with the self-obstruction (-0.395), which means that the higher the level of children's self-obstruction is, the more difficult is for them to control their emotions. Behavior regulation correlates with amotivation (0.463) and cognitive regulation relates positively with sport-confidence (0.449). Factor analysis (table 3) shows the presence of four main components which explain 73,47% from overall value dispersion. The first component (31.07%) include the items of the intrinsic motivation (IM to experience stimulation L=0.893, IM - to accomplish L=0.884, IM - to know L=0.541) and self-efficacy (L = 0.821). This shows that for children involved in school tennis, the core groups of

motives for competing are the desire for stimulation by the activity, the joy from movement and competition. In this component fall also self-efficacy and sport confidence. Therefore, this component can be defined as positive attitude towards playing and mastering tennis.

The second factor (20.355%) includes the subscales of extrinsic motivation (EM-introjection L=0.848, EM – external regulation L=0.776), amotivation (L = 0.617), self-obstruction (L = 0.582), and emotional regulation (L = -0.616). Compiling of these items in one common component shows that the second most important aspect is the awareness of sport competition. The desire of winning could lead to burnout, increased levels of self-obstruction, decreased levels of motivation and emotional regulation.

As a third factor (12.46%) is specified the behavior regulation (L=-0.891) and EM-identification (L=0.605) which probably means, that children who feel the need to identify themselves as good players and winners, mark lower values of behavioral regulation.

To the fourth factor derived fall cognitive regulation (L=0.548) and anxiety (L=-0.546), suggesting that the ability of children to control their thoughts and analyze the competitive situation leads to lower levels of perceived anxiety.

CONCLUSIONS

Based on the results of the study can be drawn the following conclusions:

The children involved in school tennis and participating in the European Championship of American schools are characterized by elevated levels of intrinsic motivation and sports confidence, medium levels of anxiety and amotivation.

The factor structure shows the presence of four main components of the mental skills:

(1) positive intrinsic motivation to practice tennis with high confidence and efficacy;

(2) awareness of competition - externally imposed motivation for winning with possible occurrence of amotivation and self-obstruction, leading to decreased levels of emotional regulation;

(3) necessity for self-assertion, which according to success achieved could lead to lower behavior regulation;

(4) cognitive regulation and its ability to reduce the level of perceived sports anxiety manifested through the competition.

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MINIMALIZATION OF THE EMOTIONAL STRESS BY MANUAL WELLNESS ACTIVITIES AND RITUALIZATION

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Keywords: emotional stress, Wellness ritual, education

INTRODUCTION

"The mind is its own place, and in itself can make a heaven of hell, a hell of heaven"

("Paradise lost", John Milton)

Modern life is related to dynamic tempo of society's development, urbanization, information overload and environment of sharp conflict situations of various nature, so the frequency of emotional stress condition increases and covers all age groups. **[6]** The World Health Organization warns that stress has turned into "global epidemics".**[11]**

Meanwhile it was proven that emotional stress is among the significant factors for the occurrence of numerous circulatory system diseases, as well as digestive system diseases and some neuropsychiatric disorders. **[6]** Stress and its emotional manifestations – anxiety and depression – are the biggest health problem of modern societies: 50 to 75% of all visits to the doctor are related to complaints and diseases caused by stress. **[8]**

Stress is defined as organism's condition that results from the unusually prolonged irritation and requires tension in view to adapting to the irritator. Distress is a condition that is stress' continuation and is related to the occurrence of morbid changes in organism. **[6]** Anxiety is psycho-physiological event that is an element of the normal self-regulation in extreme circumstances and is part of the general adaptation syndrome. Anxiety is negative diffusive feeling of emotional tension, of expectation for possible unpleasant things and uneasiness, indefinite fear of something that can happen. **[1]**

In recent years the notion "stress" is more and more being replaced by the notion "emotional stress". Main factor that contributes for the occurrence of emotional stress are the negative emotions and the related conflict situations. The latter are continuous impossibility to satisfy organism's main essential needs of biological and social-psychological nature. This conflict situation could result from the violated moral-ethical and social-legal norms, from the too dynamic speed of life and information overload or as a consequence of the negative impact of numerous environmental and professional factors – air pollution, increased radiation level, increase of noise, physical factors, monotonous rhythm of the conveyer work, social factors such as isolation and alienation.

There are various methods for tension regulation – relaxation, physical exercises, dietary regime, behaviour changes**[6]**

"In the last decade the SPA and Wellness industry (SPA – health through water; Wellness – pleasant experience established itself in the individual schedule of the modern person..." **[5]** while searching for effective impacts, methods and rituals for combating stress. The general appellation "SPA and Wellness tourism" is used in our country in order to identify several tourism forms: Medical SPA (it is characterized by the effective treatment and rehabilitation that take place under medical control), SPA and Wellness (related to procedures for relaxation and comfort of body and soul).

The quality of the services rendered in the SPA and Wellness centres directly impacts the health condition, functional activity, workability and self-esteem of clients. **[3]** At general European level the SPA and Wellness methods contribute for the "...improvement of quality of life of the European citizen..." . **[9]**

In this light "...the greatest challenge is the adequate development of human resources that are the

basis for developing and improving the offered tourist product." **[5]** It is essential to create "…educational Wellness modules .. " **[2]**, related to anti-stress rituals with proven effectiveness in the educational-qualification degree "Master" – "SPA culture, East and aqua practices" and "SPA culture, hydro-, litho- and thalasso-practices".

The aim of this article is to establish and compare the effect of applying various Wellness rituals on the psychic and emotional condition of clients in view of the scientific reasons for introducing them in educational modules for certifying the personnel in the educational-qualification degree "Master" – "SPA culture, East and aqua practices" and "SPA culture, hydro-, litho- and thalasso-practices" in "National Sports Academy" "V. Levski" - Sofia.

Survey tasks:

- ✓ Research, comparison and analysis of the effect resulting from the one-time application of three Wellness rituals - "Kriya", "Aromatherapy" and "Ayurveda" on the following indicators: situational anxiety, heart rate and arterial blood pressure.
- ✓ Definition of the knowledge, skills and competences that are necessary for certifying the personnel in Wellness rituals of proven effectiveness.

METHODOLOGY

In order to achieve the defined R&D aims and tasks we used the following methodical instruments:

For assessing the situational (instant) psychic-emotional condition:

State-Trait Anxiety Inventory by Charles Spielberger – STAI-Y, Bulgarian adaptation by Shtetinski, Paspalanov (1989). In the survey we only used the "SA" scale for assessing the situational anxiety. It contains 20 items and measures anxiety in its capacity of condition: "SA" assesses the situational anxiety (temporary, short-term anxiety condition). According to the SA scale half of the items are negatively formulated (in view of the measured properties) and they are being re-coded before summing up all answers. The higher score means higher anxiety level. **[10]**

Heart rate and arterial blood pressure.

The data were input and processed with the statistical package SPSS 13.0. In view of the significance level where the zero hypothesis is being rejected, we accepted $p<0.05$. The following methods were applied: ***descriptive analysis*** – in tabular pattern we have presented the frequency distribution of the reviewed indicators, in surveyed groups; ***variation analysis*** – for assessing the characteristics of the central trend and statistical dispersion; ***graphical analysis*** – for visualizing the results; ***test*** χ^2 for checking hypotheses on the presence of connection between the category variables; ***Shapro-Wilk nonparametric test*** – for checking the normal distribution; ***analysis of variance (ANOVA) –*** parametrical analysis used for searching for differences between median arithmetic values in the case of more than two samples**; *Kruskal-Wallis nonparametric test*** – for checking hypotheses for difference between several independent samples; ***Student's T-distribution*** – for checking hypotheses for difference between two independent samples; ***Student's T-distribution*** – for checking hypotheses for difference between two dependent samples; ***Mann-Whitney nonparametric test*** – for checking hypotheses for difference between two independent samples; ***Wilcoxon nonparametric test*** for two dependent samples.

45 women were surveyed with the average age of 39,84±8,71 in the diapason of 27-57 years. Of them 15 people (33,3%) were subjected to the "Kriya" ritual (this is systematic excerpt of the practice and combination of the best techniques available in the Swedish, Chinese, Ayurvedic massage), 15 people (33,3%) were subjected to the ritual "Aromatherapy" (standardized method of aromatherapy massage recommended by the International Federation of Aromatherapists (IFA)) and 15 people (33,3%) – to the "Ayurveda" ritual (Abhyanga – Shirodhara massage, Marma – Penjara method). (figure 1).

The three surveyed groups were statistically equalized in view of the age factor that is obscuring thus making the follow-up comparisons statistically accurate. (Figure 2).

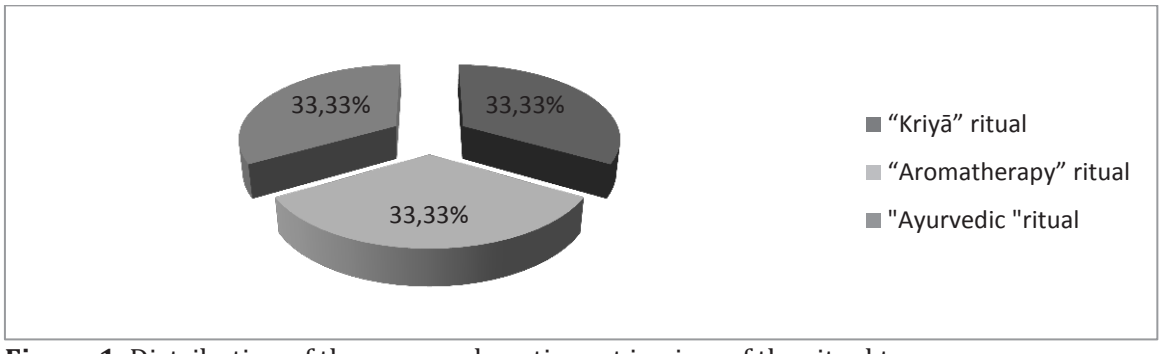

Figure 1. Distribution of the surveyed contingent in view of the ritual type

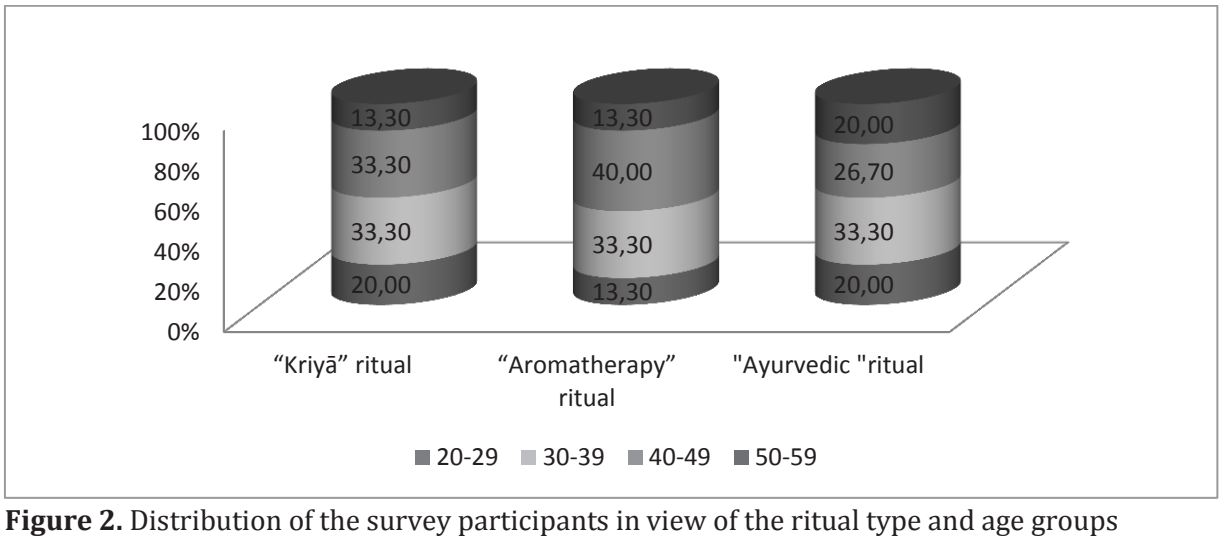

Figure 2. Distribution of the survey participants in view of the ritual type and age groups

RESULTS

Table 1 shows that after the three rituals significant changes were found in the following indicators: arterial pressure, rate and grade describing the anxiety level. Indicators are of significantly lower average values after holding the rituals. The resulting data are about significant reduction of the systolic arterial pressure (SAP), diastolic arterial pressure (DAP), heart rate (HR) and situational anxiety after the three rituals thus supporting the data provided by other authors – “... massage helps for the reflectory dilatation of blood vessels, peripheral strength reduction and arterial blood pressure decline. Massaging some body areas (abdomen, neck, shoulders and massage collar), results in stimulating the sympathetic ganglion and reducing the increased blood pressure...” **[4]** Anxiety level reduction is due to the fact that the “...massage could regulate the excitement and retention processes in the cortex..” thus “... having favourable effect on human psychic. After massage one feels fresh, in high spirits and good self-esteem...” **[4]** On the other hand this effect is probably due to treating various points with the application of the three methods, which are about brining back body’s energy balance hence regulating heart rate, arterial blood pressure and psychical calm down. Thirdly, the effect is due to the pleasant surroundings, where the three rituals are held – dimmed candle light with lavender scent and pleasant relaxing music that are also famous for their calming properties. Since the three rituals take place in the abovementioned circumstances that are one and the same, according to the data contained in table 1 the “Kriya” ritual created by us in its capacity of method an impact that is similar to the one of the Wellness rituals that have established themselves in practice, namely “Aromatherapy” and “Ayurveda” concerning the reduction of the surveyed indicators.

The three rituals have assisted in the significant decline of the situational anxiety level, heart rate, systolic and diastolic blood pressure, and they resulted in mitigating the stress manifestations of the surveyed people correspondingly. Probably this fact is due to the accurately defined assessment of the functional condition of every client and the referral to a ritual that is suitable for him, as well as the

skilfully performed ritual in view of the applied methods. We could state that the reduction of stress manifestations of the surveyed people depends on the presence of effective Wellness rituals in the menu and suitable surroundings, as well as on the knowledge, skills and competence level of the therapist performing the procedure. The therapist is the essential factor for the Wellness centre's success.

Table 1. Comparative analysis of the surveyed indicators in the individual groups before and after the ritual

Ritual	Indicator	Before ritual		After ritual		p
		$\bar{X}$	SD	$\bar{X}$	SD	
"Kriya"	SAP	126,20	10,59	117,93	4,80	0,006
	DAP	78,33	6,31	72,13	7,41	0,002
	HR	69,07	11,04	62,47	7,91	0,006
	RATE	45,00	5,69	32,53	2,56	0,001
"Aromatherapy"	SAP	129,00	9,00	120,27	5,19	0,002
	DAP	78,93	6,75	74,60	6,12	0,001
	HR	71,87	9,51	66,33	8,40	0,001
	RATE	44,53	5,00	33,07	3,56	0,001
"Ayurveda"	SAP	125,67	10,63	120,07	8,71	0,003
	DAP	83,73	8,36	79,53	8,87	0,004
	HR	75,33	15,16	68,93	9,82	0,022
	RATE	44,13	5,80	32,47	1,55	0,001

Table 2. Comparative analysis of the individual groups in view of the surveyed indicators before and after the ritual

Indicator	Ritual	Before ritual		After ritual	
		$\bar{X}$	SD	$\bar{X}$	SD
SAP	"Kriya"	126,20[a]	10,59	117,93[a]	4,80
	"Aromatherapy"	129,00[a]	9,00	120,27[a]	5,19
	"Ayurveda"	125,67[a]	10,63	120,07[a]	8,71
DAP	"Kriya"	78,33[a]	6,31	72,13[a]	7,41
	"Aromatherapy"	78,93[a]	6,75	74,60[ac]	6,12
	"Ayurveda"	83,73[a]	8,36	79,53[bc]	8,87
HR	"Kriya"	69,07[a]	11,04	62,47[a]	7,91
	"Aromatherapy"	71,87[a]	9,51	66,33[ac]	8,40
	"Ayurveda"	75,33[a]	15,16	68,93[bc]	9,82
Rate	"Kriya"	45,00[a]	5,69	32,53[a]	2,56
	"Aromatherapy"	44,53[a]	5,00	33,07[a]	3,56
	"Ayurveda"	44,13[a]	5,80	32,47[a]	1,55

**the same letters along the verticals mean the absence of statistically significant difference, and the different ones – their presence (p<0,05)*

Table 2 shows that before the ritual there was no statistically significant difference between the three groups of surveying in view of the defined indicators which makes the comparison after the ritual statistically accurate. According to the table, before the procedure the systolic arterial pressure values in the case of the three rituals ranged from 120 to 139 mmHg, which according to the WHO is perceived as prehypertension and after the rituals the values were: in the case of the "Kriya" ritual – $\bar{X}$=117,93 mmHg, with p=0.006 (norm), and in the case of the "Aromatherapy" and "Ayurveda" rituals they were

$\bar{X}$ =120,27 mmHg, with p=0.002 and $\bar{X}$=120,07 mmHg, with p=0.003 correspondingly (prehypertension lower limit). **[12]** Even though there is no statistically significant difference in the case of the systolic arterial pressure values after the three rituals, in the case of the "Kriya" ritual the indicator is in the normal range. Table 2 shows that after the ritual the significant difference between the three groups is established for the indicators diastolic arterial pressure and heart rate. Statistically reliable lower values of the diastolic arterial pressure and heart rate are established in the group that participated in the "Kriya" ritual compared to that with the "Ayurveda" ritual, i.e. as more effective in view of reducing the diastolic arterial pressure and heart rate we could define the "Kriya" ritual compared to the "Ayurveda" ritual.

The results contained in table 3 demonstrate that before the ritual in the three groups anxiety was present in 100% of the surveyed women. After the ritual the per cent of women that have defined their condition as non-anxious is as follows: in the case of the "Kriya" ritual – 73,30 %, "Aromatherapy" – 53% and "Ayurveda" – 73,30 %, with significance level of p<0,05. This fact is essential since if the client does not feel any effect after holding the ritual, then she may not use our services once again. According to the data after the ritual the per cent of women suffering from anxiety significantly went down more in the groups with "Kriya" and "Ayurveda" rituals, but significant difference with the per cent in the group with Aromatherapy is not established. I.e. we could define as more effective in view of reducing the situational anxiety level the "Kriya" ritual compared to the "Ayurveda" ritual.

Table 3. Comparative analysis of patients suffering from anxiety in view of the individual groups before and after the ritual

Measurement	**Anxiety level**	**Type of ritual**					
		"Kriya"		"Aromatherapy"		"Ayurveda"	
		n	%	n	%	n	%
Before ritual	absence of anxiety	0	0	0	0	0	0
	anxiety	15	100[a]	15	100[a]	15	100[a]
After ritual	absence of anxiety	11	73,30	7	53,30	11	73,30
	anxiety	4	26,70[a]	8	46,70[a]	4	26,70[a]

*the same letters along the verticals mean the absence of statistically significant difference, and the different ones – their presence (p<0,05)

DISCUSSION AND CONCLUSIONS

1. The one-time Wellness rituals "Kriya", "Aromatherapy" and "Ayurveda" contribute for the significant reduction as well as for normalizing the following indicators: situational anxiety, pulse frequency, systolic and diastolic blood pressure among the surveyed women.

2. Reduction of the emotional stress manifestations among the surveyed people as a result of the application of three Wellness rituals makes it possible to provide the scientific reasons for implementing them in the anti-stress training modules, defining the necessary knowledge, skills and competencies in order to certify the personnel in the educational-qualification degree "Master" – "SPA culture, East and aqua practices" and "SPA culture, hydro-, litho- and thalasso-practices" in "National Sports Academy" "V. Levski" - Sofia.

3. Statistically reliable lower values of the diastolic arterial pressure and heart rate were found in the group that participated in the "Kriya" ritual compared to those that participated in the "Ayurveda" ritual, and after the ritual the per cent of women suffering from anxiety significantly declined in the groups with the "Kriya" and "Ayurveda" rituals. The conclusion is that the "Kriya" ritual created by us has not only similar but even stronger effect compared to the Wellness rituals that have established themselves in practice, namely "Aromatherapy" and "Ayurveda" concerning the reduction of the surveyed indicators.

Table 4: Knowledge and skills that you need to have to apply Wellness rituals such as "Kriyā", "Aromatherapy", and "Ayurveda"

Ritual type	Necessary knowledge	Necessary skills
"K R I Y A"	✓**Swedish massage** – history, essence, impact mechanisms; anatomic characteristics and physiological effect of massage on various organs and systems; technique of massage approaches – essence, types, and manner of influencing the organism; massage of various body parts, general massage; ✓**Chinese massage** – theoretic introduction and effect of the Traditional Chinese Medicine (TCM); topography, function and location of channels and biologically active points; principles and implementation of the TCM, main acupressure techniques and methods; principles of drawing schemes and selecting points; cupping therapy – basic working principles and methods. ✓**Ayurvedic massage – see "Ayurveda ritual"** Indications and counter indications when using the techniques of the Swedish, Chinese and Ayurvedic massage. Hygiene requirements for the massage premise, office furnishing, surroundings, therapist.	▪ creating specific Wellness environment in the massage premise; ▪ skilfully communicating with the guest ▪ specific skills for Swedish, Chinese and Ayurvedic system of health prevention, fluency in broad range of various massage techniques, as well as the capability to assess their effectiveness in individual's health and wellbeing maintenance; ▪ skilfully applying and combining techniques of various massages in view of the individual factors; ▪ understanding of the need to improve one's knowledge and skills in view of the professional development as therapist; ▪ applying the method of the "Kriya" ritual.
"A R O M A T H E R A P Y"	✓**Aromatherapy massage** - history and essence of aromatherapy; olfaction and psycho aromatherapy – anatomic and physiological data; means and methods for essential oils' extraction; international standardization and requirements for the products designated for professional aromatherapy; ways of applying the essential and cold pressed vegetable oils; classification and characteristics of essential oils in view of their chemical spectrum; types, characteristics, properties, application of cold pressed vegetable oils /basic/; preparing aromatherapy massage recipes – essential oils' dosage, properties; pathways of essential and basic oils' penetration in human organism and their impact on various organs and systems; aromatherapy massage – characteristics; indications and counter indications for massage; hygiene requirements for the massage premise, office furnishing, surroundings, therapist.	▪ creating specific Wellness environment in the massage premise ▪ skilfully communicating with the guest ▪ understanding and knowing the properties and ways of correctly storing wide range of essential oils; ▪ skills for mixing, dosing and applying the essential oils in combination with particular techniques in view of guest's individual characteristics in order to improve his or her emotional wellbeing; ▪ applying the method of the "Aromatherapy" ritual recommended by the International Federation of Aromatherapists (IFA)

"AYURVEDA"	✓**Ayurvedic massage** – history and essence of the Ayurvedic science – theory of the tri-Dosha and five elements; Ayurvedic constructions in the human – definition; Ayurvedic anatomy of human – nadi (life energy channels), Marma points (body's life points) and chakras; healing herbs and oils for every constitution; Abhyanga massage – whole body massage, Shirobhyanga massage – head massage, Shirodhara massage – characteristics; indications and counter indications for massage; hygiene requirements for the massage premise, office furnishing, surroundings, therapist.	▪ creating specific Wellness environment in the massage premise ▪ skilfully communicating with the guest ▪defining the individual constitution and applying the particular treatment oils and approaches in view of the individual ▪applying the method of the Abhyanga – Shirodhara massage, (Marma – Penjara method)

This is the reason for us to rely during the personnel training on the artistic activity on our behalf and on behalf of the trainees with the creation of original effective rituals that enrich the Wellness menu in the various centres.

4. Rituals could be repeated once weekly or be combined with each other and with other procedures – apitherapy, algotherapy, thalassotherapy, yoga, meditation, aqua practices, animal-assisted therapy etc. In the case of more intensive impacts more sustainable results are to be expected.

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IMPACT OF THE PSYCHOGENIC AND IDEOMOTOR TRAINING ON THE PHYSICAL FITNESS OF FENCING COMPETOTORS

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Key words: fencing, training, psychogenic, ideomotor, fitness

The data from the literature gives reason to consider the issue of the impact of psychological methods on the physical preparation of the sports people to be insufficiently researched [1, 3, 4, 8, 13, 15, 16]. On the base of the analyzed concepts about the impact of the psychogenic and ideomotor training different approaches with most of the authors and missing ones concerning fencing competitors were found [1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16]. This is the main reason for our decision to research the possibility for increasing the active actions with fencers after undertaking a specialized psychogenic and ideomotor training.

The AIM of the research is to trace the changes in the strength, speed, and balance with fencing competitors after the implementation of a specialized psychological and ideomotor training.

HYPOTHESIS

We assume that after the implementation of psychological means and ideomotor training the fencers' physical readiness will be optimized.

In order to fulfill the aim of the research the following TASKS were set:

1. Research of the literary sources on the subject;
2. Development of methods for psychogenic and ideomotor training for impact on the physical readiness with fencers;
3. Selection of reliable tests for control of the efficiency of the implementation of psychogenic and ideomotor training. The tests should be informative about: the strength, speed, and balance achieved through the experimental methods;
4. Comparison of the experimental with the control group. Analysis of the results from the research;
5. Conclusions.

The object of the research is 47 fencing competitors aged between 18 and 24 from Fencing Club at the National Sports Academy. They were divided into two groups: an experimental group – 23 competitors (14 men and 9 women) and a control group – 24 competitors 915 men and 9 women). The research was held in the period from 18.09.2011 to 15.12.2013.

In the 45-day period, provided before each competition, the individuals from the experimental group were trained to regulate their psychological condition through the developed methods. The psychological relaxation aims at the athletes' achieving an adequate readiness for action in the forthcoming competition.

With the mental reproduction of the competitors' visual-muscle-motor notions, through the ideomotor training the provisional spatial characteristics of certain elements of fencing were perfected (e.g. hitting, stabbing, defense and other actions in the fencing bout). The implementation of ideomotor impact aims at decreasing the time for performing new movements, at perfecting the athlete's accurateness, tempo, and speed of the particular fencing actions.

All fencers prepare for the competition through a specialized 9for the fencing) individual and group training. The athletes from the control group did not have a psychological and ideomotor training.

In order to establish the changes in the physical readiness of the fencers from the experimental and the control groups, the athletes were tested first before the specialized psychological and ideomotor training and secondly – after its completion, i.e. immediately before the beginning of the competition.

The obtained data for the physical readiness during the research period for both groups are given by comparison of their mean quantitative values. It must be pointed out that the major factors determining the adequacy of the psychic readiness of the athletes, such as: attention (concentration, fixedness, intensity, and productivity), the level of self-confidence, activity, mood, and trait and state anxiety are not a subject of discussion here since they are viewed in another publication.

In order to prove the changes in the qualities: speed, strength, and balance of the fencers the following set of tests was used: dynamometry of the working hand, throwing hard ball from place, raising the body from prone position, 50 m running, long jump from place, and sense of balance. The results from the applied tests were processed with an analysis of the variance.

After the implemented psychological relaxation and ideomotor modeling training with the competitors from the experimental group, a significantly higher physical readiness was established compared with the control group. The changes in the explosive power of the lower limbs, the strength and speed of the hand, the strength of the abdominal muscles, and balance are presented in the graphs below.

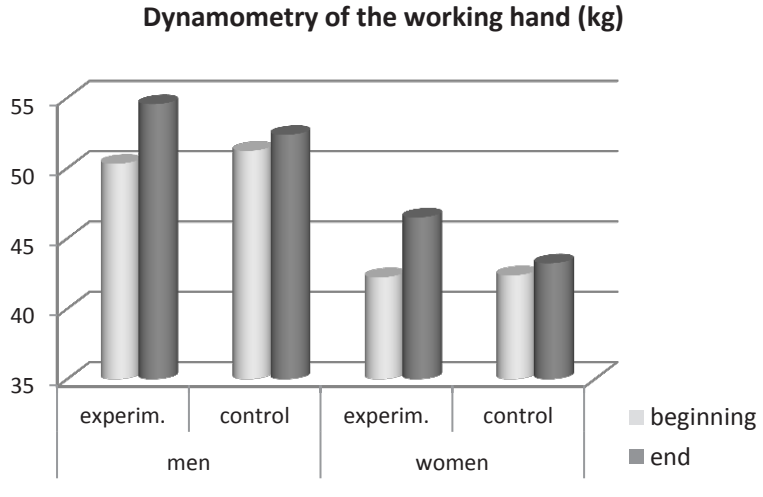

Fig.1

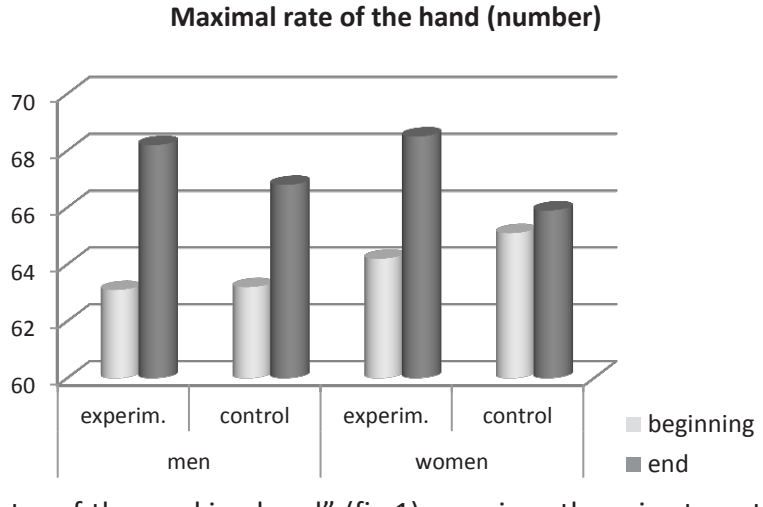

Fig.2

The test „Dynamometry of the working hand" (fig.1) examines the grip strength of the working hand (the hand the fencer handles the weapon with). The control group has 52.38kg mean value at the end of the research. There is a difference of 1.14kg in comparison with its initial value. The experimental group after the implemented methods has a mean value of 54.56kg in the end, or there is a mean in-

crease of 4.24kg in comparison with the initial 50.32kg. The data show that at the end of the research the mean achievements of the experimental group are 3.10kg higher with guaranteed statistical reliability Pt>99% (T-criteria of Student) in comparison with the control group. There are approximately similar initial mean values in the two male groups, but the strength of the working hand was developed to a greater extent with the experimental group due to the implemented methods.

At the end of the research the mean value of the indexes from the test with the women from the experimental group (fig. 1) is 46.50kg, with 42.24kg in the beginning. This group has improved its achievements with 4.26kg. The women from the control group have the average 42.38kg in the beginning and 43.24kg in the end. Their improvement is 0.86kg. When comparing the two female groups at the end of the research a higher statistically reliable increase of 3.40kg and Pt>99% is established in favor of the experimental group.

The research of the reaction speed of the fencers' hand was done with the test „Maximal rate of the hand" (fig. 2). While the men from both groups have similar possibilities at the beginning of the research, in the end the men from the experimental group have approximately 68.2, 5.10 more, and the ones from the control group, with a mean value of 66.8, have an increase of 3.6. When comparing the two groups' average increase, a difference of 4.76 is established in favor of the experimental group, with high reliability Pt>99%.

The data from this test with the women from the control group show initial 64.2, and final - 68.5, and there is an increase of 4.30 (fig. 2). The control female group has an initial mean value of 65.1n, and it finishes the research with 65.9 with an increase of 0.80. The higher increase of 3.50 and Pt>99% for this index with the women from the experimental group, compared to the control one, shows the very good influence of the applied methods.

The explosive power of the hand of the fencers is examined with the test „Throwing a compact 80g. Ball from place" (fig. 3). The average achievement of the male fencers from the experimental group at the beginning of the research is 33.35m, and with the competitors from the control group - 33.56m. At the end of the research the mean values for the men from the experimental group are 38.12m or there is an increase of 4.77m, and those of the control group with mean value of 35.47m have an increase of 1.91m. When comparing the average increase of the two groups a difference of 2.86m is established in favor of the experimental group, with high statistical reliability Pt>99%.

The results from this test with the women from the experimental group are 15.18m in the beginning, and 18.98m at the end of the research, with an increase of 3.80m (fig. 3). The female control group has an initial mean value 15.21m, and it finishes the research with 15.43m, with an increase of 0.22m. The impact of the implemented methods with the women from the experimental group is expressed with the significantly higher increase of 3.58m and Pt>99% for this index, compared with the control group.

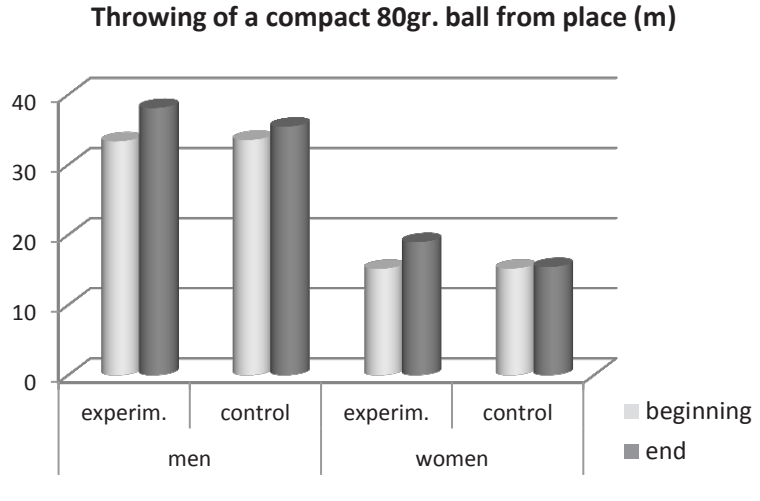

Fig.3

The test „Raising the body from prone position" (fig. 4) measures the strength and endurance of the abdominal muscles. The average achievement of the male fencers from the experimental group for this test in the initial testing is 11.53, in the end 13.6, with an increase of 2.07. The control group's initial average achievement is 11.67 and 12.78 in the end. The increase is 1.11. The average increase of the experimental group in the end compared to the average increase of the control group is 0.96 greater with non-guaranteed statistical reliability – Pt<95%.

With the same test (fig. 4) the average achievement of the female competitors from the experimental group is 10.8 in the beginning, and 12.9 in the end, with an increase of 2.10. The female control group starts the testing with 10.9, and in the end it is 11.1, with an increase of 0.20. The greater average rise in the increase with 1.90 in favor of the experimental group establishes a bigger and statistically reliable Pt>99% improvement in the strength of the abdominal muscles.

From the data obtained from the test „50 m running" (fig. 5), which measures the speed, it is established that at the end of the research there is an improvement in the men's achievements in both groups. The average achievement of the experimental group is c 1.1sec less than the achievement of the fencers from the control group, with a guaranteed statistical reliability Pt>99%.

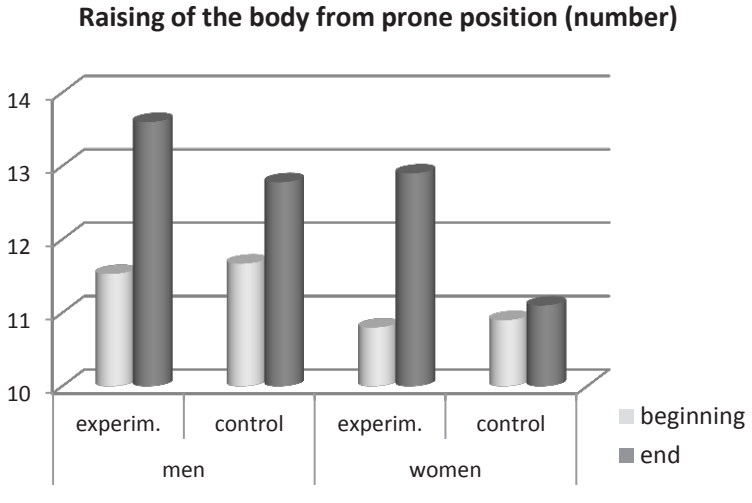

Fig.4

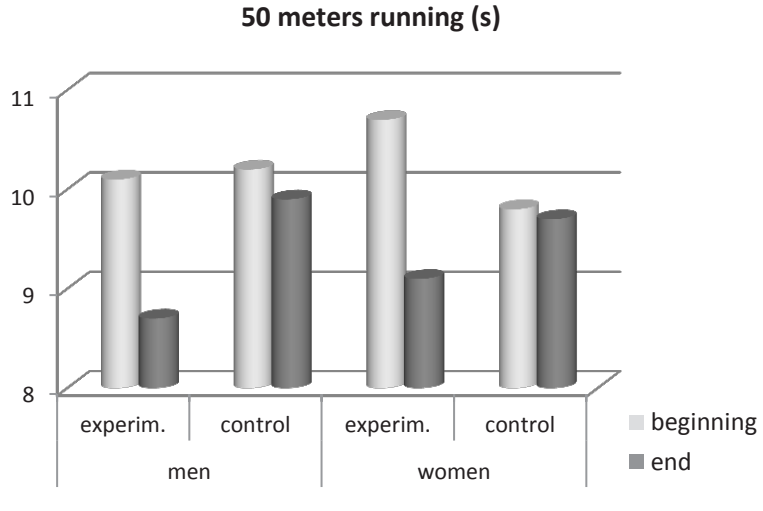

Fig.5

For the same test with the women from the experimental group (fig. 5) the established mean value is 10.7s at the beginning of the research. In the end, their mean value is 9.1s, and the improvement in the results of 1.6s is statistically reliable Pt>99%. The control group has initial 9.8s and final - 9.7s – with an increase of 0.1s. The comparison of the increase in the achievements of the two female groups shows 1.5s improvement in favor of the experimental group.

The mean values of the explosive power of the lower limbs, measured through the test „Long jump from place"(fig.6), for the male competitors from the experimental group in the beginning is 204.5cm, and with the fencers from the control group it is 205.0cm. The data show that at the end of the research the growth in the mean value of the experimental group is 217.5cm or there is an increase of 13.0cm, while with the control group it is 206.5cm, with an increase of 1.5cm. The average increase of the experimental group, compared with the one of the control group is 11.5cm greater, with guaranteed statistical reliability Pt>99%.

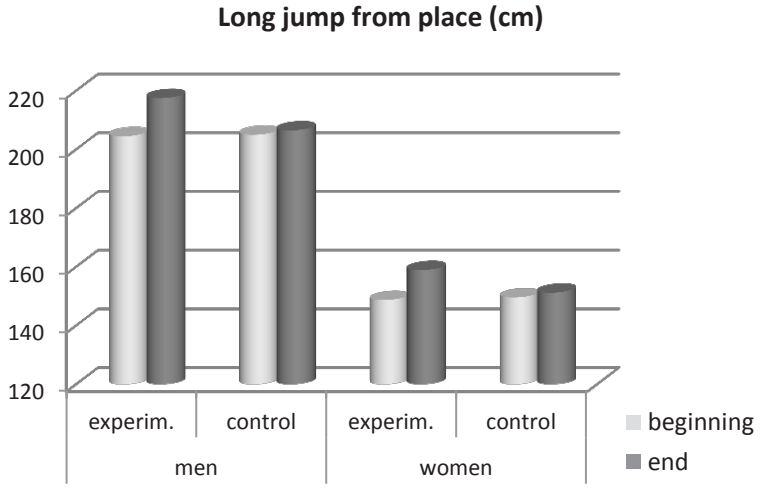

Fig.6

fig. 6

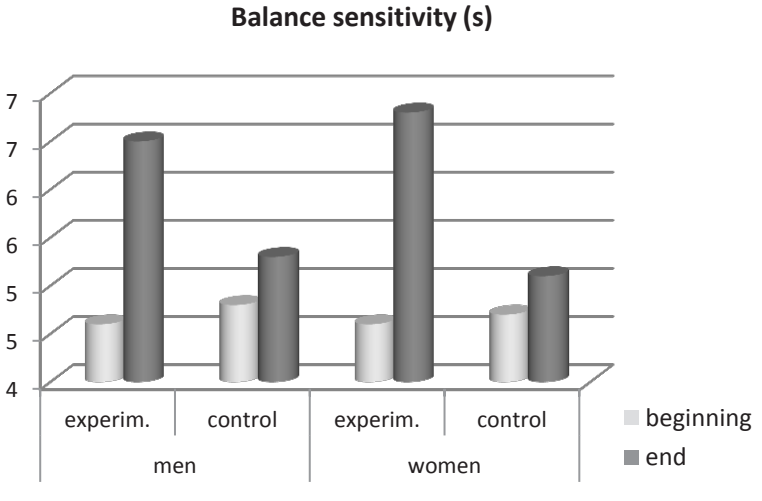

fig. 7

Fig.7

The average achievement with the women from the experimental group (fig. 6) at the beginning of the research is 148.7cm, and 149.6cm with the control group. At the end of the research the increase for the women from the experimental group is significant – 10.2cm. It is supported by aa statistical reliability Pt>99%. The increase of the mean values with the control group is small – 0.16cm. The much higher increase of this index with the experimental group plays an important role due to the necessity of fast and abrupt movements during the fencing bout.

The measured balance of the fencers with the test „Balance sensitivity"(fig.7) shows a significant increase in the mean values of 6.5s with the men from the experimental group. With the control group the average increase in the end is 5.1s. Comparing the average achievements of the two groups a reliability of the differences of 1.40s, with Pt>99% was established.

The average value for the women from the experimental group is 4.6s in the beginning, and 6.8s in the end – with an increase of 2.2s. For the women from the control group the average data for this index are respectively – 4.7s and 5.1s, with an increase of 0.4s. The reason for the higher increase of 1.8s, with high statistical reliability Pt>99%, with the women from the experimental group could be due to the positive influence of the applied methods.

As a result of the implemented experimental methods of psychological and ideomotor training positive changes in the indexes determining the strength, speed, and balance possibilities of the researched male fencers can be observed. The statistically reliable differences, when comparing the experimental and control groups, are indicative of the fact that the new methods help to form a higher degree of physical readiness both with the men and the women from the experimental groups.

The analysis of the results from the research allows us to draw the following conclusions:

As a result of the experimental impact the speed, power possibilities, and balance sense of the researched fencers are increased.

The physical readiness of the researched men and women from the experimental group is perfected in the process of the specialized psychological and ideomotor training. A higher degree os physical readiness of the fencers is achieved.

The implemented methods for specialized psychogenic training are reliable and efficient. They can be used for forming an adequate psycho-physical readiness, and for overcoming the complicated situations during the fencing bout.

Recommendation:

The developed methods for specialized psychic and ideomotor training can be implemented successfully with the fencing competitors.

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INFLUENCE OF EMOTIONAL INTELLIGENCE ON PRE-COMPETITIVE ANXIETY WITH TAEKWONDO ATHLETES

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Key words: *emotional intelligence, pre competitive anxiety, taekwondo*

As a specific kind of sport taekwondo sets certain requirements to personality of the sports person, to his morphological, physiological, and psychic characteristics. The presence of certain qualities of the sports person is a base for achieving sports results. Revealing the psychic qualities, important for taekwondo, the relations and interdependences between them, is the base for increasing the efficiency of the training and competitive process.

The abilities of self-control, psychic conditions, and pre-competitive anxiety accordingly, affect sports results significantly.

The psychic conditions, the different kinds, their peculiarities and manifestation, the mechanism of their appearance, progress and attenuation, are defined by a great number of psychic formations. It can be assumed that emotional intelligence influences them to a great extent as well. The present study aims at revealing the peculiarities of emotional intelligence and its interrelations with the psychic conditions and namely with pre-competitive anxiety.

There are tens of concepts and definitions of the nature and structure of emotional intelligence, but most often it is viewed as the ability to act according to one's own feelings and desires; to understand the relationships of a person, represented in one's emotions and to manage the emotional sphere; effectively to control emotions and to use them to better the thinking process.

Pre-competitive anxiety is viewed as a psychic condition arising immediately before a competition and characterizing the whole psycho-physiological organization of a person. It consists of three components – cognitive and somatic anxiety, and self-confidence (R, Martens, 1990).

On the base of the theoretical analysis of the researched phenomena the following **hypothesis of the empirical study** has been defined:

Taekwondo athletes are characterized with specific structure and expressivity of their emotional intelligence due to the peculiarities and influences of this sport. Emotional intelligence, being a stable psychic characteristic, affects significantly their psychic stability and pre-competitive psychic conditions.

The aim of the research is to reveal the degree of expressivity, the structure and interrelations between emotional intelligence, trait anxiety, and pre-competitive anxiety with taekwondo athletes.

In order to fulfill the aim, the following **tasks** have been set:

1. To establish and reveal the degree of expressivity and the peculiarities in the structure of emotional intelligence with taekwondo athletes.
2. To reveal the degree of expressivity of their trait anxiety.
3. To establish the intensity and peculiarities in the structure of their pre-competitive anxiety.
4. To reveal and analyze the connections and interrelations between emotional intelligence, trait anxiety, and the components of the structure of pre-competitive anxiety.
5. To reveal the influence of emotional intelligence on the components of pre-competitive anxiety.

METHODS

1. Emotional intelligence test. The test was introduced by the French psychologist Christophe Andre. It includes 42 statements and four-degree likert scale for assessment the degree of expressivity. The total number of points (EQ) shows the level of emotional intelligence as a whole. But the method allows a more detailed analysis along the comprising three sub-scales revealing three different sub-types of emotional intelligence: attitude toward oneself; attitude towards the others; attitude towards life (S. Kasyanov, 2001).
2. Spielberger test for trait and state anxiety (D. Shtetinski, I. Paspalanov, 1989). The present study uses only the form for evaluation of trait anxiety.
3. Competitive State Anxiety Inventory - 2; CSAI - 2, made especially for the sports practice by R. Martens (R. Martens, R. Vealey, D. Burton, 1990). The Bulgarian adaptation of the test was made by G. Domuschieva-Rogleva (2006; 2007).

RESULTS FROM THE RESEARCH:

The analysis of the results from the research of emotional intelligence shows that the individuals surveyed are characterized with medium or high level of expressivity of this index. The high emotional intelligence is a base for successful adaptation to every complex situation and supposes the presence of self-control abilities, self-command and dominating psychic conditions and moods, most often positive and stable ones.

The variation analysis of the results from the research of anxiety, being a stable personal characteristic, shows that the researched sample, as a whole, is within the norm.

The researched athletes are characterized with moderately marked values of the pre-competitive anxiety. The obtained results fall within the norm (table 1). The same expressivity is observed along the three components defining anxiety – cognitive, somatic, and self-confidence.

Table 1. Results from the variation analysis of the components of pre-competitive anxiety

	Min	Max	M	SD
Cognitive	10.00	36.00	19.22	6.18
Somatic	9.00	36.00	22.16	6.26
Self-confidence	11.00	32.00	20.26	5.82

Taekwondo, as a kind of sport, requires developed abilities for self-control, for self-regulation and abilities for achieving an adequate psychic condition for the forthcoming bouts. The researched athletes possess great sports and competitive experience; have the necessary qualities and skills, which explains the obtained results. But the outcome of a competition is unpredictable. Regardless the subjective evaluation of one's own preparation and of the rival's abilities, the pre-competitive condition is characterized with increased psychic pressure, anxiety and discomposure. This explains the higher values of the somatic anxiety compared to the other two of its components.

To reveal the interrelations, interdependencies, and the influence of emotional intelligence on the components of pre-competitive anxiety the experimental data has been subjected to correlation and regression analysis.

Table 2. Results from the correlation analysis of the researched variables

	Emotional intelligence
Cognitive anxiety	-,529 (**)
Somatic anxiety	-,423 (**)
Self-confidence	,628 (**)

** degree of significance 0,01

There are significant interrelations between the levels of emotional intelligence and the components of pre-competitive anxiety for the whole group of researched individuals (table 2).

Emotional intelligence correlates positively to self-confidence and negatively to cognitive and somatic anxiety. This means that the higher emotional intelligence leads to higher self-confidence and lower cognitive and somatic anxiety.

The influence of emotional intelligence on the components of pre-competitive anxiety is confirmed by the regression analysis. Emotional intelligence, being an independent variety, affects the three components of pre-competitive anxiety, revealing an almost linear dependence (fig. 1, 2, 3).

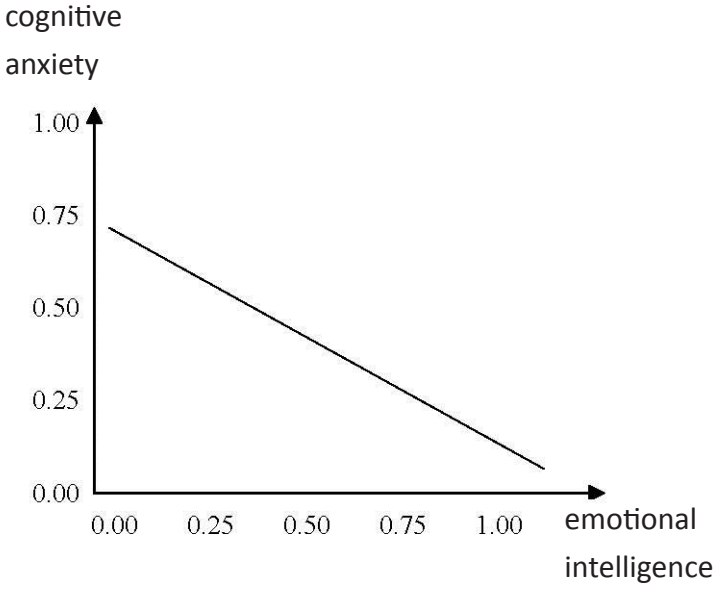

Fig. 1. Influence of emotional intelligence on cognitive anxiety

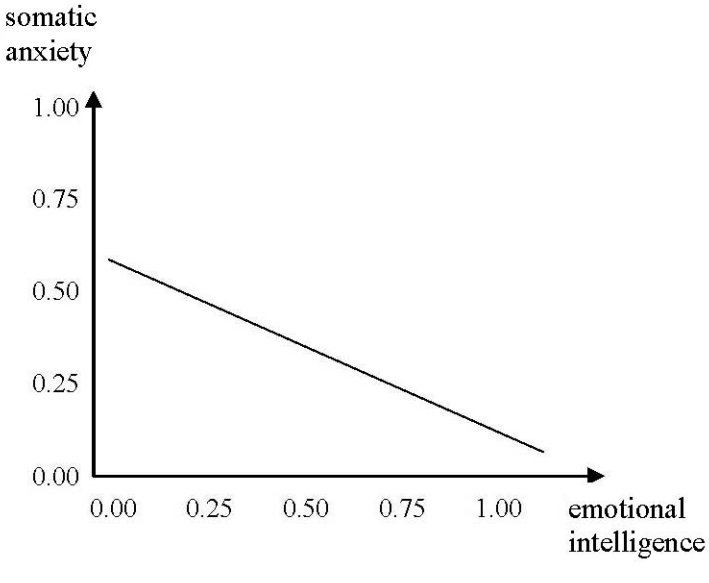

Fig. 2. Influence of emotional intelligence on somatic anxiety

The analysis of the influence of emotional intelligence on the components of pre-competitive anxiety, including the total marks of emotional intelligence does not reveal fully the interrelations between them. The more precise analysis supposes differentiation of the group of researched individuals according to the degree of expressivity of emotional intelligence.

Because of the small number of observed cases the group of researched individuals has been differentiated along the base of the median.

The results from the analysis of the degree of expressivity of the three components of pre-competitive anxiety in the groups with low and high emotional intelligence confirm the results obtained from the analysis of the whole group of researched individuals. The increase in the emotional intelligence goes along with lowering the cognitive and somatic anxiety, and increasing the self-confidence (fig. 4).

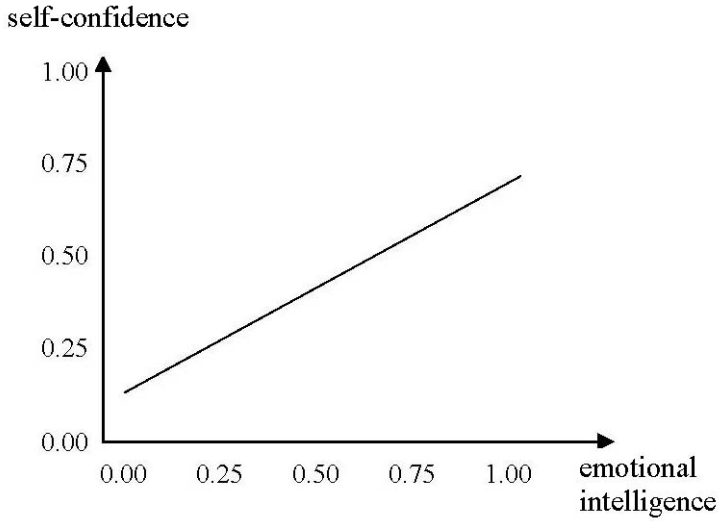

Fig. 3. Influence of emotional intelligence on self-confidence

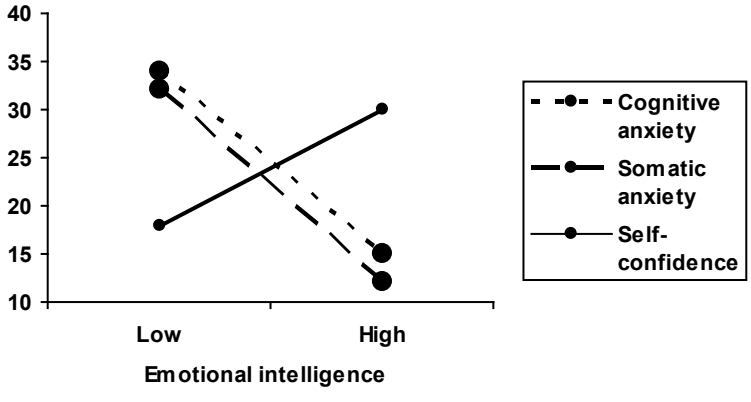

Fig. 4. Average values of cognitive, somatic anxiety, and self-confidence with persons of low or high emotional intelligence

The results from the empiric study show that emotional intelligence of the researched taekwondo athletes, being a stable psychic formation, affects their pre-competitive psychic conditions.

The researched athletes, practicing taekwondo, are characterized with increased emotional stability and adequate psychic conditions in situations of high psychic pressure and stress. Emotional intelligence, being a component of their psychic structure, affects greatly their psychic condition and respectively their pre-competitive anxiety. This defines the necessity of implementing purposeful actions aimed at increasing their emotional intelligence and emotional stability in the process of their preparation.

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TYPOLOGICAL CHARACTERISTICS AND PRE-COMPETITIVE ANXIETY WITH ATHLETES PRACTICING TAEKWONDO

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Key words: typological characteristics, Pre-Competitive Anxiety, taekwondo

Biologically predetermined, the typological peculiarities of a person influence a wide spectrum of psychic phenomena. Their relation to pre-competitive psychic conditions and respectively to pre-competitive anxiety is of utmost importance for the science of sport and practice.

The aim of the present study is to reveal the influence of typological peculiarities on pre-competitive anxiety with taekwondo athletes.

The typological peculiarities are analyzed and surveyed in the context of Eysenck's concept, and the pre-competitive anxiety – in Martens' theory of the multidimensional structure of anxiety.

Hypothesis – taekwondo athletes are characterized with specific structure and presence of stable psychic characteristics arising from the peculiarities and influences of this sport. The stable psychic characteristics affect significantly their psychic stability and pre-competitive psychic conditions.

The aim of the study is to reveal the structure and interrelations between the typological peculiarities and pre-competitive anxiety with taekwondo athletes.

Tasks:

1. To establish and reveal the peculiarities in the dispositional structure of taekwondo athletes.

2. To establish the intensity and peculiarities in the structure of their pre-competitive anxiety.

3. To reveal and analyze the connections and interrelations between the typological peculiarities and the components of the structure of the pre-competitive anxiety.

Object of the research are

METHODS

- EPQ – Eysenck personality test (I. Paspalanov, ... 1984).
- Competitive State Anxiety Inventory - 2; CSAI - 2 (R. Martens, R. Vealey, D. Burton, 1990). The Bulgarian adaptation of the test was made by G. Domuschieva-Rogleva (2006; 2007).

RESULTS FROM THE SURVEY

The individuals researched are characterized with marked extraversion and lack of pronounced introversion (table 1). Taekwondo is a kind of sport setting great requirements regarding the nervous processes – strength, stamina, agility, and the related to them characteristics from the psycho-motorics sphere – quickness of reaction, reaction to a moving object, tempo, rhythm, etc, as well as the attention qualities. The extraverts, with the nervous system peculiarities characteristic to them, face these requirements and possess the ground needed for achieving success in this sport.

Along the index **neuroticism – emotional stability** the researched athletes are characterized with moderate expressivity leaning to emotional stability. They possess steadiness of the nervous processes excitation and repression, and adequacy of the emotional reaction to various stimuli.

The analysis of the pre-competitive anxiety reveals moderately marked values. The results obtained are within the norm. Equal expressivity is observed along the three components defining anxiety – cognitive, somatic, and self-confidence (table 2).

Table 1. Results from the variation analysis of the typological peculiarities

	N	Min	Max	M	SD
Extraversion	32	2.00	19.00	15.46	4.8
Neuroticism	32	1.00	20.00	9.62	4.52
Psychoticism	32	1.00	20.00	6.24	3.26
Lie	32	1.00	19.00	7.45	4.58

Taekwondo, as a kind of sport, requires developed abilities for self-control, self-regulation, and achievement of psychic condition adequate to the forthcoming bouts. The researched athletes possess great sports and competitive experience, as well as the necessary qualities and skills, which explains the obtained results.

Table 2. Results from the variation analysis of the components of pre-competitive anxiety

	N	Min	Max	M	SD
Cognitive	32	10.00	36.00	20.20	6.13
Somatic	32	9.00	36.00	21.17	6.24
Self-confidence	32	11.00	32.00	20.45	5.89

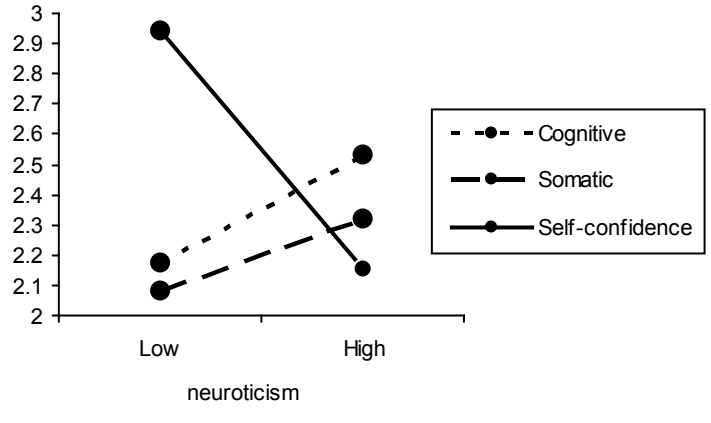

Fig. 1. Medium values of the cognitive and somatic anxiety and self-confidence with individuals of low or high neuroticism

The analysis of the interrelations between the typological peculiarities and pre-competitive anxiety does not reveal such between the extraversion and the components of anxiety. Introverts and extraverts are characterized with similar pre-competitive anxiety with regard to its intensity and quality characteristics. There are no significant correlation dependences between psychoticism and the three components of anxiety. The individuals possessing high level of neuroticism demonstrate higher cognitive and somatic anxiety and lower level of self-confidence.

In order to make a deeper analysis of the interrelations between neuroticism and the three components of pre-competitive anxiety, we revealed their degree of expressivity with the groups of individuals researched with high and respectively low indexes regarding neuroticism.

Because of the small number of the observed cases, the group of researched individuals is differentiated into two sub-groups along the median (8,00). The results from the analysis of the degree of expressivity of the three components of pre-competitive anxiety in the groups of low and high neuroticism confirm the results obtained from the analysis of the whole group of researched individuals. When the level of neuroticism is higher, the cognitive and somatic anxiety increase, and the self-confidence decreases (fig. 1).

The influence of neuroticism on the components of pre-competitive anxiety is confirmed by the regression analysis. Neuroticism, as an independent variable, influences greatly the cognitive (ß=0.39) and somatic anxiety (ß=0.38), and there is an almost linear dependence (fig. 2; 3).

Undoubtedly, the typological peculiarities and characteristics of a person practicing taekwondo, being stable dispositional characteristics, affect his pre-competitive psychic conditions. In order to make a deeper survey of their interrelations, research on a larger scale is needed, with a higher number of researched individuals from various age groups.

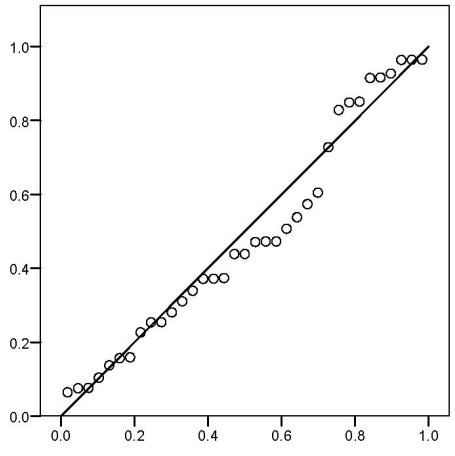

Fig. 2. Regression dependence of cognitive anxiety from neuroticism

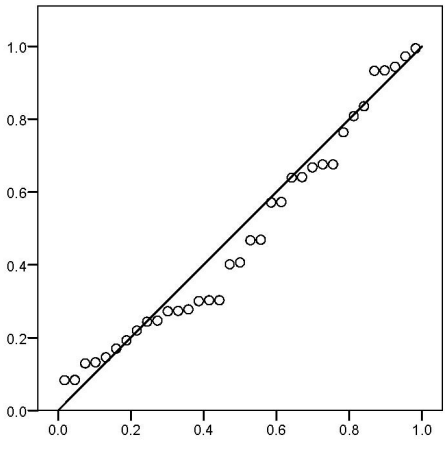

Fig. 3. Regression dependence of somatic anxiety from neuroticism

The results from the survey of the typological peculiarities of taekwondo athletes and revealing their structure are a base for comparative studies about the influence of this specific kind of sport on the personality of the sports person, about the dynamics in the dispositional structure according to the age, about revealing the specific influences of taekwondo in comparison to other kinds of sport, about forecasting the behavior of the athletes in the sports and social environment.

The athletes practicing taekwondo are characterized with higher emotional stability and adequate psychic conditions in situations of high pressure and stress. Neuroticism, being a component of their typological peculiarities, affects their psychic condition and respectively their pre-competitive anxiety to a great extent. This leads to the necessity of applying purposeful actions for increasing their emotional stability in the process of their preparation. Therefore, it is advisable to:

- take into consideration the typological peculiarities of the taekwondo athletes, and take them as a base to optimize the training process along the individual approach when mastering motor habits and forming the individual style of activity. The peculiarities of the typological characteristics are to be used when forming and increasing the emotional stability and adequate reaction in pre-competitive environment;
- apply purposeful actions in the training process aimed at increasing athletes' emotional stability and acquiring psychological techniques for self-control and self-regulation of the psychic conditions.

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INTELLECTUAL POTENTIAL AND COMPETITIVE REALIZATION IN BEACH VOLLEYBALL

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Key words: beach volleyball, intellectual qualities, operational thinking, game performance

INTRODUCTION

Beach volleyball, being a comparatively new sport, constitutes components known from volleyball, but at the same time sets apart its own style of a generally independent sports discipline. The dynamic nature of the contact with the ball requires both players to take correct and winning decisions in the competitive environment of extreme and exceptional variability. This determines the requirement for an adequate level of intellectual qualities of the volleyball players in order to correspond to the desired competition realization.

The aim of this study is to present the intellectual qualities of the volleyball players, as well as their sports and technical success rate in competitions

Considering the goal there are two **tasks a**head:

1. To define the intellectual potential of the beach volleyball players.
2. To establish their game effectiveness in competitions.

The object of this study were 26 elite volleyball players from the Republic of Bulgaria participating in the M-tel Masters tournaments in 2013.

The used **methodology** includes a test establishing the non-verbal intelligence of volleyball players (IQ test), and also a test determining their operational thinking level. We used "the test of intelligence potential" of P. Rzhichan for the first one, and Radionov`s "troika test", modified by V. Yanev for the second one. The tests were realized at the volleyball courts, in practice conditions and parallel to other exercises.

The competitive efficiency has been calculated with the „Data volley" program through which have been recorded the game actions of the volleyball players during the official competitions.

Analysis of the results

The overall intelligence of the volleyball players was determined through 29 logical tasks, each with only one solution. The summarized number of correct solutions form the absolute rating of the intelligence level, and through it is formed the intelligence coefficient. The results are impressive – Fig. 1. As a whole the intelligence level of our best beach volleyball players is between medium and high - with 21 correct answers. Little over 50% of them have a high score however about 40% have a level that doesn`t correspond to the modern game requirements. That is, if we exclude the champion couple from the general list of tested individuals, the result will be an even distribution, in half. It is well known that the speed and the adequate logical thought are a prerequisite for the formation of the game operational strategy, and also a correct decision – making basis.

The "troika test" tasks have three degrees of difficulty – an easy one (five-step); a relatively complex one (eight-step) and a task with a catch (eight-step). The results inform us about the operational thinking level of beach volleyball players reflected in their ability to make decision in a quickly and timely manner. The operational thinking coefficient is calculated based on the number of moves and the time needed to solve each task that has to be solved for the second time.

What impresses the most about the resulting operational thinking coefficients presented on Fig., is that on every task there is an improvement during the second attempt, i.e. the task has been solved with the

nominal number of steps or the time needed to solve it has decreased. This shows the adaptive pattern of the intellectual and acting decision making model.

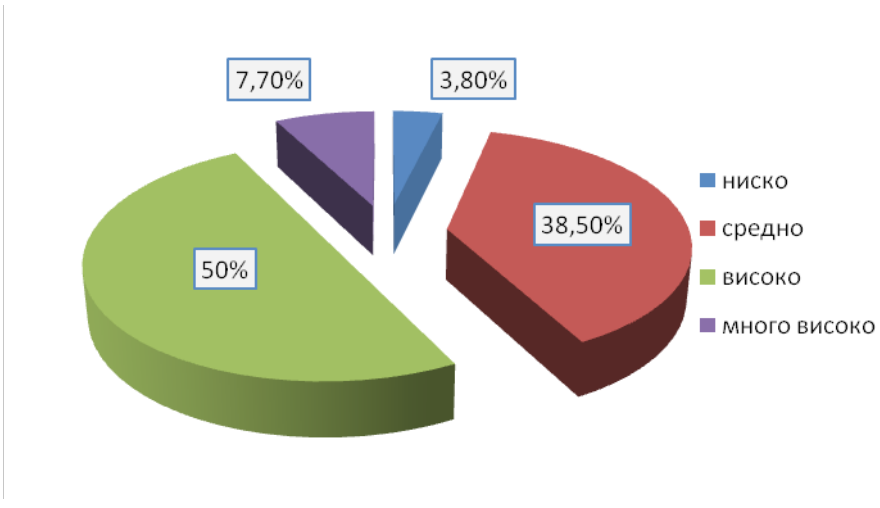


Fig. 1. Distribution of the intelligence level of beach volleyball players

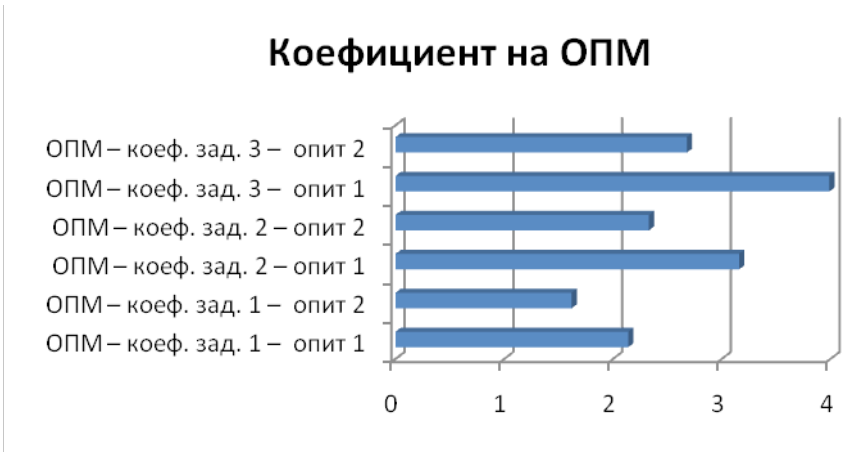


Fig. 2 Average values of the operational thinking coefficients

The indicators value within the different tasks show an arithmetic progression depending on the complexity of the decisions taken. Logically, the operational thinking coefficient of the five-step task shows the best results (Xm=1,88), the next one is the complex task (Xm =2,75) and the catch task shows the lowest result (Xm =3,34).

Usually during the game, the volleyball players don`t tend to solve complicated game tasks. They react to the game situation and look for various solutions through their own intellectual potential which they carry inside them. In other cases, when the situation is strongly difficult for the players, we use preliminarily elaborated tactic patterns with solutions, which the players rank according to their judgment.

Fig. 3 shows that they easily deal with the easy tasks compared to the complex ones. The average values during the re-solution of the five-step task are close to the maximum result. When something elementary is repeated, it is done automatically, without thinking.

The complex tasks pose a problem for the Bulgarian volleyball players. Each novelty is considered as a stressing event (the differences in the first attempts for 2nd and 3rd task). The second attempts neither show significant improvement.

The conclusion is definitive – the Bulgarian volleyball players can`t solve complex tasks emerged during the game in a quickly and timely manner. Moreover, the ever changing game situation puts the players in a stalemate where a mistake is the only solution. It is needless to mention the need of specific intellectual preparation where the correct solutions come together with the victorious actions.

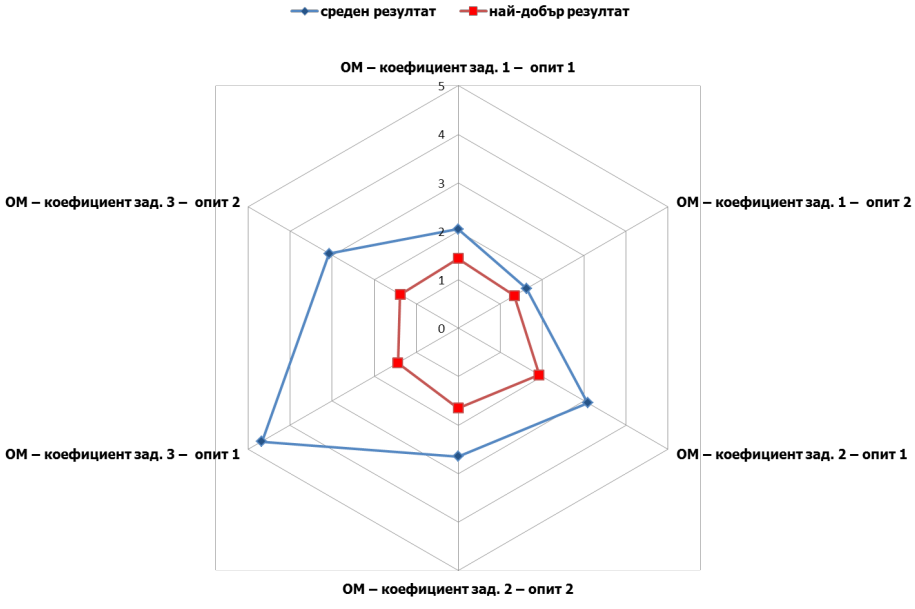
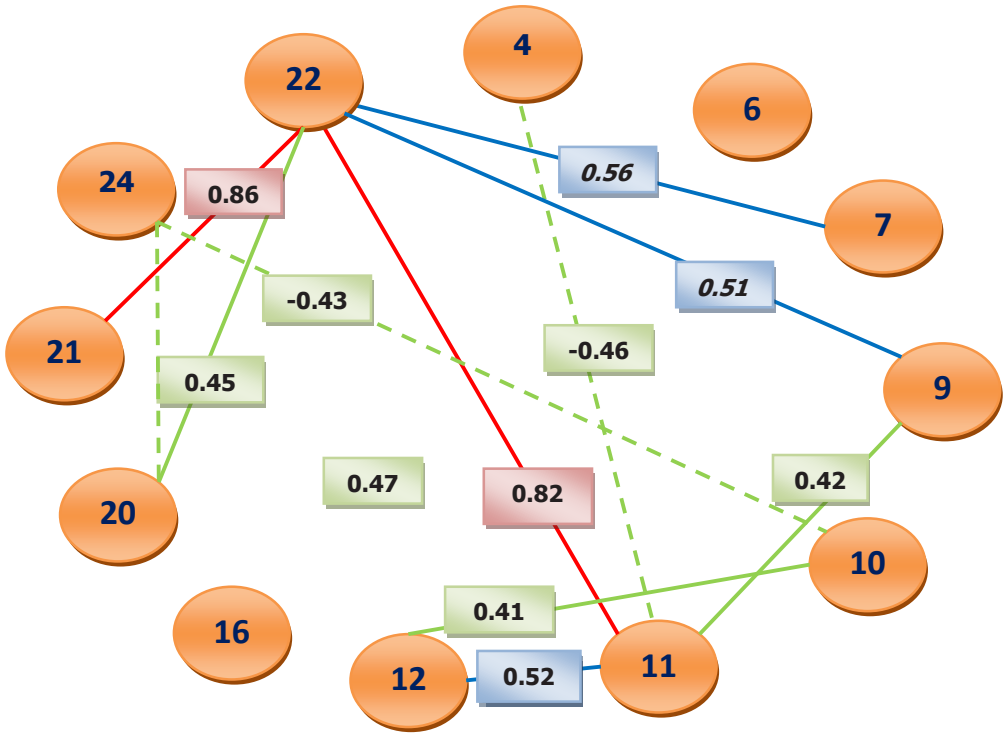


Fig. 3. Correlation between the average and the best results on the operational thinking indicators

Relations and dependencies between the studied indicators



4 – number of moves task 2 – attempt 2
6 - number of moves task 3 – attempt 2
7 – time to solve task 1 – attempt 1
9 - time to solve task 2 – attempt 1
10 - time to solve task 2 – attempt 2
11 - time to solve task 3 – attempt 1
12 - time to solve task 3 – attempt 2
16 - OM – coefficient task 2 – attempt 2
20 – Total coefficient task 2
21 – Total coefficient task 3
24 – IQ

Fig. 4 Correlation and structural pattern of intellectual indicators

Within the correlation and structural pattern (Fig. 4) are observed a number of moderate relations between the times needed to solve the complex tasks. The lack of significant relations between the numbers of moves directs our attention entirely to the time needed to solve the emerging motor tasks. The dependence between the second task operational thinking coefficient second attempts and the moves made to solve the third task (r=0,47). This shows the existing homogeneity and pattern of the complex problem solving approach.

The existing correlation coefficient (r=-0, 46) between the time needed to solve the original third task and the number of steps when repeating the second task confirms the above said. It is obvious that the big number of steps realized for a shorter period of time have influenced the time needed to solve the next task but have not influenced the correct decision.

Based on the general operational thinking coefficients we can assume the existence of significant and high links with the time needed to solve new and unknown thinking tasks. The steps made have influenced in a lower degree the formation of the end coefficients. If we put these conclusions into the volleyball court, this means that there is a lack for the volleyball players` specific timely consideration of the unknown situations and delayed decision making.

The IQ – test values correlate with the time needed to solve again the complex task which again gives us the confirmation that decision making time is the basis of correct victorious actions in beach volleyball.

Finally, it can be noted that the correct decision taken in an unknown or unexpected game situation has a decisive influence for the success of the game. This is visible by the high relation of the general operational thinking coefficient at the first attempts compared to the general coefficient for task three (r=0, 86) which is the most complex one. Every player during their progress acquires a game experience that allows them to solve new situation challenges in a quicker and relatively more correct manner.

The relation between the intellectual qualities of the volleyball players and their game efficiency is indirect. The pass-rate of game situations is a function of many factors. Last but not least we should also mention the subjective factor however in the majority of the cases the conditions in which the volleyball abilities of the players are demonstrated are a priority. The beach volleyball player is put under stronger extreme situations compared to the traditional volleyball players. The challenges of opposing the rival, the sand court, the big spaces to cover, the atmospheric conditions and the audience put the beach volleyball players under many hardships. The success is big and exciting when a certain point is scored.

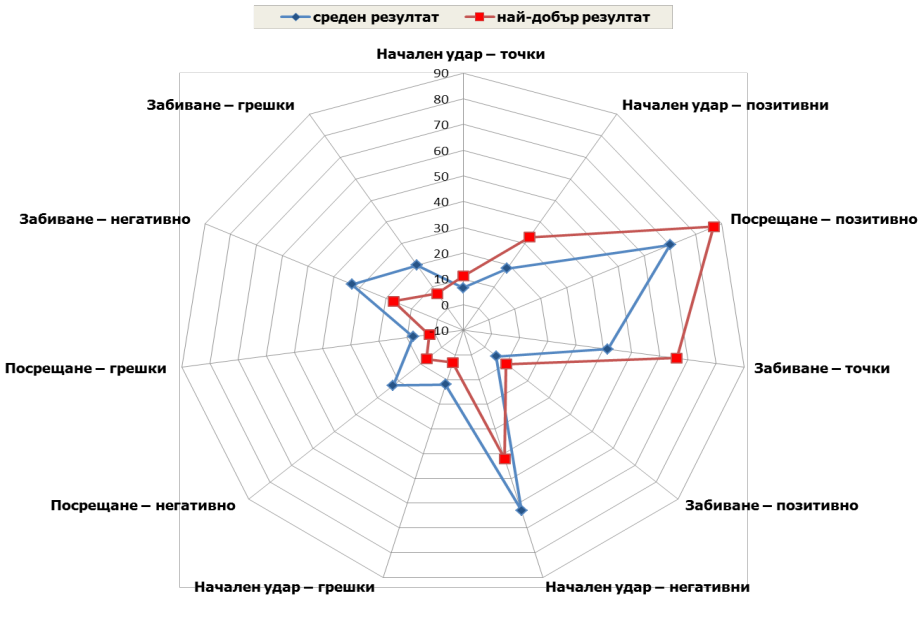


Fig. 5 Correlation between the average and the best values of the competitive actions

What turns out in practice for Bulgarian volleyball players (Fig. 5)? They don`t make mistakes in serving but they find it difficult to score direct points. They manage to receive servings successfully but their skills in smashing the ball are quite inconsistent. It is easy to score points in game advantage situations (a suitably passed ball on the net without or against a delayed block). In such cases the defense is poorly organized. There are also game situations where the mistakes in smashing the ball are predominant. It is in those defensive or attacking game actions when the intellectual qualities and the experience of the volleyball players can be distinguished.

In order to smash the ball in a point-scoring manner against a well organized defense and in a complex situational precondition for smashing (after a poor passing by a co-player or a difficult moving to the net after a successful defense by grounding), it is necessary to consider the situation extremely precisely and quickly and to make the most adequate decision to take an action in accordance with the options standing in front of the player. In such situations quick thinking is a must! In situations where the opponent is organized for an attack but the net blockade is delayed, the defender should estimate in the same way the possible actions of the forward and to choose (anticipate) the most probable one in order to successfully receive the ball and right after that to be able to prepare their own attack. This is an extreme situation which makes the beach volleyball game attractive to watch and to practice, isn`t it!

CONCLUSIONS AND RECOMMENDATIONS

The following practice based conclusions were formed:

1. Within the ever changing complex game situation the Bulgarian volleyball players have difficulties solving in a timely manner tasks which are adequate to the achieving a positive sport result requirement.
2. Their overall intelligence level helps them shorten not only the time for the second solving of similar tasks emerged within relatively short periods (But not to find the most direct way to solve the tasks).
3. The lack of a quick and timely consideration of the unknown elements of game situations by the beach volleyball players pushes them towards a delayed decisiveness to successful actions.

Within the context of the study this article is based on, we can formulate one main recommendation to suggest to the beach volleyball players, that is:

Searching for the successful game actions should be initiated even in training conditions and must be preceded by sufficient theoretical and cognitive procedure towards the main technical and tactic elements of our own game with which we would like to achieve victory.

THE INVESTIGATION OF ANXIETY LEVELS OF SUB-ELITE VOLEYBALL PLAYERS

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Keywords: *Anxiety, Voleyball, Turkey Universities Volleyball Championships*

INTRODUCTION

Success at sport requires high level of physiological, motoric and psychological factors. One of the psychological factors is anxiety.

It has been recognized for many years that psychological factors, in particular anxiety, play an important role in competition (1). In sport psychology, anxiety refers to an unpleasant emotion which is characterized by vague but persistent feelings of apprehension and dread (2). Spielberger describes the anxiety in the sport atmosphere as an in general state anxiety while dividing the anxiety into two as state and continuous anxiety (3).

According to our review of literature, The State Anxiety Inventory is one of the most long-standing and frequently used measures of anxiety. The scale has been translated into numerous languages (4) and has been studied on many people includes athletes from different branches, different types of works and disability people or their families (5,6,7). Although the studies in the literature on anxiety levels of athletes found to be common, the effects of competition stress on psychological symptoms are restricted.

Therefore, the aim of this study is to determine state anxiety levels of sub-elite voleyball players.

MATERIAL AND METHOD

Participants

In this study, 85 male and 36 female totally 121 voleyball players which were participated to Turkish Universities Volleyball Championships in Kayseri, were participated volunteerly

Socio-demographic Data Form which was included 4 personal questions and The State Anxiety Inventory were applied to athletes a hour before competition in the sport fields.

Data collection method

Socio-Demographic Form:

This form was included 4 personal questions as age, gender, sport age, and league level

State Anxiety Inventory:

Spielberger et al (8) were originally developed this inventory to seperately determine state- trait anxiety levels. It was adopted to Turkish by Öner and Le Compte, who also conducted reliability and validity studies (9). This inventory contains 20 questions are for state anxiety. Participants rated each feeling item on a 4-point scale ranging from 1 (never) to 4 (always). Participants answer to this interval for each question. In the questionnaire 1, 2, 5, 8, 10, 11, 15, 16, 19 and 20th items are reverse expressions. The others items are direct expressions. The points respondents give for each question are summed to find reverse and direct expressions. The total point of reverse expressions is subtracted from the total point of direct expressions. Finally, 50 point is added to the obtained score. This result is state anxiety score (7).

Statistical Analysis

Data were analyzed by using SPSS (version 16.0). The t-test for comparison between two independent groups and ANOVA for analysis of more than two groups were used. Post Hoc Tukey test was used to find the statistical difference among groups. The level of statistical error was 0.05.

FINDINGS

Table 1. Group Comparison According to Gender

Anxiety	Gender	N	Mean±SD	t	P
State-Anxiety	Male	85	38,78±10,15	1,92	,157
	Female	36	35,00±9,31		

As shown in Table 1, statistically significant difference was not observed in state anxiety levels of volleyball players according to gender (p>0,05).

Table 2. Group Comparison According to Age

Anxiety	Age	N	Mean±SD	F	P	Difference
State-Anxiety	18-21[a]	56	37,18±9,70	2,27	,108	-
	22-25[b]	51	36,73±10,45			
	26-30[c]	14	42,93±8,62			

According to Table 2, statistically significant difference was not observed in state anxiety levels according to age (p>0,05).

Table 3. Group Comparison According to Sport Age

Anxiety	Sport Age	N	Mean±SD	F	P	Difference
State-Anxiety	Under 5[a]	7	37,18±9,70	5,25	,007	b-c
	6-9[b]	47	36,73±10,45			
	Above 10[c]	67	42,93±8,62			

In table 3, while statistically significant difference was observed in state anxiety levels of b and c, statistically significant difference was not observed in other sport age groups (p>0,05).

Table 4. Group Comparison According to League Level

Anxiety	League Level	N	Mean±SD	F	P	Difference
State-Anxiety	1st league[a]	39	34,00±10,75	2,794	,043	a-b
	2nd league[b]	45	39,93±10,94			
	3rd league[c]	27	38,44±8,37			
	Regional [d]	10	39,50±8,11			

According to Table 4, statistically significant difference was observed in state anxiety levels of a and b. Statistically significant difference was not observed in other groups

DISCUSSION AND RESULT

The state anxiety levels of sub-elite voleyball players were determined in relation to demographic variables in this study.

Statistically significant difference was not observed in state anxiety levels of voleyball players according to gender (Table 1). Dönmez (10) were studied on state levels of basketball players who participated in inter-university 1st League basketball competitions and found significant difference according to gender. In another study, Civan et al were stated that gender was not an affecting factor of state anxiety levels among sportsmen doing individual and team sports (11). Both studies were reported that female athletes had higher state anxiety scores than male athletes. In our study, state anxiety scores of female voleyball players were lower than male voleyball players. This is an unexpected situation at this study.

The findings don't suggest any statistical difference between age and state anxiety levels of voleyball

players (Table 2). Yücel (12) stated that age was not an affecting factor of state anxiety levels among sportsmen doing taekwondo. In another study, Erbaşı and Küçük were studied on state anxiety of elite basketball players and didn't find significant difference at age parametre (13). Many studies at literature reported that age had a negative relation with state anxiety level (11, 12, 13) but in our study, 26-30 aged voleyball players showed higher anxiety level than other age groups. it was thought that older players were playing in high league levels of Turkish Voleyball Federation. Voleyball were a job for these players. Because of that situation, they felt fear of an unexpected injure which could affect their voleyball carrier negatively.

According to sport age groups, statistically significant difference was observed in state anxiety levels of 6-9 years and above 10 years (Table 3). Yücel studied on sportsmen doing taekwondo and found that high or low level of state anxiety did not depend on the year of experience in that sport (12). In another study, Başaran et al (14) were studied on state anxiety levels of sportsmen who participated in different types of sports such as basketball, volleyball, handball, taekwondo and wrestling and found significant relationship in results. These different results indicate that it is necessary to do further studies on different sport age groups.

According to league level groups, statistically significant difference was observed in state anxiety levels of 1st league and 2nd league players (Table 4). Competitive sport can make even the world's most successful athlete feel nervous. Many factors such as expectations, perfectionism, fear of failure, lack of confidence, induce feelings of anxiety in athletes (15).

In conclusion, the game stress had an effect on high level of state anxiety scores of volleyball players who participated in our study. It was thought that trainers should develop training programmes which contains psychological states of voleyball players and these trainings could be helpfull for reaching the expected anxiety levels of voleyball players

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SELF-LEADERHIP – A NEW APPROACH FOR LEADERS AND TEAMS IN SPORT

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Key words: *self-leadership, teams, sport, group efficiency, motivation, goal-setting*

Self-leadership the process of self-influence on one's thought and behavior patterns is growing in its importance due to increasing demands for organizations and sport teams. This type of leadership gaining an importance due to the increasing challenges for organizations in rapidly and dynamic changing environment. The growing worth of autonomy and self-determination in organizations (Wood, Stride, Wall, 2004) demonstrates the need for each individual to have strong self-leadership skills. **Self-leadership means a process of deriving voluntary efforts and contributions for the group goal**. In other words, self-leadership means leadership that controls individual's free will, establishes his own goals and changes his thoughts and behaviors to the direction having a positive effect on the organization through self-motivation and then has influence over him (Park, Moon, 2014). Self-leadership concept is important from few aspects.

The self-leadership behavior leads and direct oneself behavior into the reasonable direction which leads to the emphasis of autonomy and responsibility. The tendency is considered to be consistent with the self-leadership in fostering appropriate talents in modern sport world. Self-leadership is a leadership that an individual controls free will, sets a goal, and self-motivate and by doing so, changes thoughts and behaviors in the direction of having a positive impact on the organization through self-motivation. It is a new leadership from the perspective that it is difficult to improve the performance of sport teams and its members any longer with the traditional leadership that emphasizes instruction and control in the past.

These skills are needed at the **individual level** (e.g. self-organization or work process and successful time-management), at the **group level** (e.g. self-managed teams, shared leadership) and the level of organization (flat hierarchy, performance oriented organization culture). Self-leadership is a learnable and competency-based skill, which has not much been empirically investigated so far. Two self-leadership training studies are described in literature both with unsatisfactory result.

Neck and Manz (2004) integrate the constructive thought patterns (thought self-leadership) into their training. Another research from Steward et al. (1996) showed no significant major effect on the self-leadership training. Muller and Weise (2010) assume that there is a general lack of solid and comprehensive self-leadership training interventions.

Theoretical background

Self-leadership is management concept, and also development of the **behavioral self-management approach** (Manz and Sims, 1980) and it is defined as a **"the process of influencing oneself"** (Neck and Manz, 2010). It consists of behavior-focused strategies, controlling and self-regulatory components as well as motivational aspects (Deci, Ryan, 1985). The persona thought and behavior are aligned with the achievement of (intrinsic) set goals. Houghton and Neck (2002) underlie the three primary category of self-leadership strategies: **behavior-focused** strategies (subcategories: self-goal settings, self-reward, self-punishment, self-observation, self-cueing), **natural-reward strategies** (related with intrinsic motivation) and constructive thoughts patterns (subcategories: visualizing successful performance, self-talk, evaluating beliefs and assumptions). Attention is drawn to our own behavior in the behavior focused strategies. If discrepancies are perceived between a current state and a specific goal or standard or desired situation then there will be attempts to reduce them with self-regulatory strategies. The current state is noticed through self-observation which is followed by proactive self-goal setting to reach a

desired situation (Furtner, Exenburger, 2012).

Self-leadership theory draws from several psychological theories that include: self-control theory Cautela, 1969), social learning theory (Bandura, 1977), and self-regulation (Carver & Scheier, 1981; Kanfer, 1970). In relation with social cognitive learning theory of Bandura (1991) the second root of the self-leadership construct is Carver and Scheier's (1981) **self-regulation theory.** According to that theory people proactively set goals and cause a deliberate increase in discrepancy or goal progress during the process of goal achievement. Self-reward and self-punishment systematically reinforces desirable and weakens undesirable behavior. At the same time self-cuing is based on external memory aids like memos, post-it, motivational posters and social cues (Neck and Houghton, 2006). Natural-reward strategies are based on intrinsic motivation and put their focus in pleasant and enjoyable characteristic then the performance of that task of activity will already be a natural reward for the acting person (Deci and Ryan, 1985, Manz, 1986).

There are two possible strategies to **raise intrinsic motivation:**

- ✓ A person is increasingly removing from the unpleasant characteristic and is concentrating more on the natural rewarding aspect of a task;
- ✓ A person is increasingly installing pleasant and enjoyable characteristics into a task so that the performance of it is already natural rewarding (Neck, Houghton, 2006).

These strategies associate feelings of competence and self-determination (Deci and Ryan, 1985). Constructive thoughts pattern relate to positive self-influence and control of habitual thought patterns (Neck and Manz, 1992). The individual motivation can be improved or maintained through the usage of visualizing successful performance, a positive influence and evaluation of own beliefs and assumptions and self-talk regarding the process of goal achievement.

Constructive self-leadership strategies

Behavior-focused strategies: Behavior-focused self-leadership strategies are designed to encourage positive, desirable behaviors that lead to successful outcomes, whilst suppressing negative, undesirable behaviors that lead **to unsuccessful outcomes** (Neck & Houghton, 2006). Behavior-focused strategies include using self-goal setting, self-observation, self-cueing, self-reward and self-punishment (or constructive self-feedback) (Manz & Neck, 2004). Behavior-focused strategies raise awareness of when and why individuals engage in specific behaviors. As such, the resulting self-awareness is a critical precondition for changing or eliminating ineffective and inefficient behaviors. **Self-goal setting enables** the focused action that is required to achieve behavior change. If these goals are achieved, self-rewards may be applied by the individual when, for example, mentally congratulating oneself for an important accomplishment, or imparting a physical reward as a 'prize' for completing a difficult project. Similarly, individuals who apply self-leadership using behavior-focused strategies would also self-punish as a means to discourage negative behavior that results in undesirable consequences they recognize.

Natural reward strategies: Natural reward strategies are designed to enhance the intrinsic motivation vital for performance (Manz & Neck, 2004). They increase the subjective experience of competence and **self-determination through the enhancement and focusing on enjoyable task features** (Alves et al., 2006). People apply two primary natural reward strategies because they are motivated by inherently enjoyable aspects of the task or activity, first building more pleasant and enjoyable features into a given activity so that the task itself becomes naturally rewarding, or shaping one's own perceptions by focusing attention away from the unpleasant aspects of a task and refocusing it on the task's inherently rewarding aspects (Manz & Neck, 2004; Neck & Houghton, 2006). Essentially, the former strategy represents changing the task itself in order to make it better, whilst the latter involves cognitive reframing of the task in order to make it seem better.

Constructive thought strategies: In contrast to behavior-focused or reward-focused strategies, constructive thought strategies facilitate the formation of constructive thought patterns and **habitual ways of thinking that may positively impact performance** (Neck & Houghton, 2006). Being geared towards the creation of positive thinking, constructive thought strategies attempt to reduce dysfunctional be-

liefs; assumptions and negative self-talk, whilst also increasing positive self-image (Alves et al., 2006). Individuals apply constructive thought strategies when they engage in visualizing performance, engage in positive self-talk, and examine individual beliefs and assumptions to align cognitions with desired behavior (Neck & Manz, 1996; Neck, Stewart & Manz, 1995).

Criticism against the self-leadership notion: Despite intuitive appeal and substantial research support, questions have been raised about the notion of self-leadership. Firstly, is s**elf-leadership not simply a recasting of individual difference** variables included as a part of existing personality constructs, such as conscientiousness? Secondly, other authors have questioned the uniqueness of self-leadership strategies, because they are founded upon, and operate within, the context of **other established theories of self-regulation, motivation and self-influence** (Guzzo, 1998; Markham & Markham, 1995, 1998). Houghton et al. (2012, p. 220), in response to these criticisms, emphasized that **self-leadership is a normative** or prescriptive model rather than a deductive or descriptive theory. Normative theories, such as self-leadership, are prescriptive and emphasize how something should be done, whereas descriptive theories seek to explain the basic operation of various phenomena without giving normative information for applying an approach. The conceptual distinction between self-leadership and other theories has been a subject of persistent debates (Neck & Houghton, 2006). It therefore remains important to consider the possibility that specific self-leadership strategies are distinct from general dimensions that may underlie their operation. Whilst self-leadership consists of a particular set of behavioral and cognitive strategies that are based upon, and related to, other theories of personality, motivation, and self-influence, such as self-regulation theory and social cognitive theory, self-leadership strategies remain distinct from these approaches (Neck & Houghton, 2006).

Self-leadership as a global factor

When considering the domains within which self-leadership may occur, namely thought, behavior and reward, it becomes evident that self-leadership may **represent a dynamic interaction** of cognitive, behavioral and affective elements all geared towards self-influencing the actions of the individual. Contemporary views that attempt to explain behavior adopt systems approaches that incorporate elements that span across different domains of functioning. For example, the cognitive-affective system theory of personality (Mischel & Shoda, 1995) proposes that stable systems mediate how individuals select, construe and process information before generating behaviors.

These interdependent systems encompass the respective domains of thinking about behavior, feelings toward these behaviors and, lastly, engaging and disengaging in behaviors. Following this interdependence logic, it can be speculated that self-leadership strategies that focus on behavior, natural reward and constructive thought are influenced by an underlying, general predisposition to **influence the self. If a general latent dimension of self-leadership exists, then it would be observed as a single underlying factor driving self-leadership strategies, such as those outlined above**. As such, a hierarchical view of self-leadership is proposed where a general self-leadership predisposition influences the operation of specific self-leadership strategies).

Need for Autonomy and self-leadership

Need for autonomy influences self-leadership and helps motivate autonomous action (Deci & Ryan, 2000; Edmunds, Ntoumanis & Duda, 2006; Yun et al., 2006) as explained by the self-determination theory (Deci, 1975; Deci & Ryan, 1985, 2000). Self-determination theory explains that the degree of a person's self-motivation is determined by the extent to which his or her behavior or actions are autonomous or controlled (Deci & Ryan, 2000). External forces that pressure an individual to engage in particular behaviors describe controlled actions, whereas freely initiated behaviors that emanate from within a person explain autonomous actions (Edmunds et al., 2006; Reeve, 2002).

Some researchers underlie the connection between self-leadership behavior and innovation leadership. The innovative behavior means that members of the sport teams develop, suggest, apply and carry out various ideas in relation with performance or task. It can be explain such as wider concept that focuses on the generation of new and useful idea in respect of willingly accommodating and utilizing other people's ideas or opinions (Scott, Bruce, 1994).

The existing researches on self-leadership have been carried out from the perspective that self-lead-

ership has an impact on organizational commitment, organizational performance, job satisfaction, and psychological empowerment among members. Neck & Manz (1996) found that self-leadership has a positive impact on positive emotion and satisfaction. In addition, Houghton et al., (2004) studied the relationship between self-leadership and personality variables such as extroversion, conscientiousness, and stability in college students. Kim Yeonseon & Kim Sunghyuk (2010) found in a research on five-star hotel employees that self-leadership does not have an impact on organizational commitment. However, most studies found that self-leadership has an impact on organizational commitment. Song Jeongsu & Yang Philsuk (2008) found that the intrinsic **compensation of self-leadership has a positive impact on performance as self-leaders.**

Modern sports really puts all participants - players, coaches, spectators - to more and more challenging issues. Achieving of of high sports results, setting new records requires finding of new and productive model of leadership, both in the teams and to individual in sports. At present the concept of self-leadership is still new and made numerous challenges of researchers in the field. This concept is also related to some personality traits.

Sport competitions contestants undergo a certain type of psychological tension to all participants – coaches and athletes. Due to this specific field of sport activity, it is really important for athletes to be trained in principals and methods of self-leadership. Self-leadership concept covers both aspects of human behavior and certain cognitive and mental techniques designed to deal with high level of stress and aside mind with positive attitude towards the upcoming championship. Achieving goals is of key importance in sport. According to this self-leadership provide complete and comprehensive psychological training of the athlete and coach. Although designed for another area of human labor self-leadership concept finds its application in the sports field, and shows extremely positive and encouraging results in training of athletes.

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RISK PROPENSITY AND THE INDIVIDUAL BOXING STYLE

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Keywords: willingness to take risk, individual style of play, boxing.

The words which almost every competitor repeats before getting into the ring are usually: "Victory above all - victory or nothing, victory at any cost ..." In order to achieve that goal players very often take risky actions that are dangerous and hazardous and place a very thin boundary between winning and losing. [1]

The term "risk" (risiko) has Latin origins and means danger, uncertainty and decision whose outcome is unknown. It is often associated with the possibility of damage, failure or loss, thus its significance determines its negative connotation. On the other hand, the possibility of obtaining profit from taking risky actions is related to its positive side. Risk is unavoidable in nature and affects all aspects of social and economic life. It exists regardless of whether it is conscious or not , whether it is present or absent, reported or ignored. Risk is always associated with elements of danger to the individual and /or their activities. Taking action in dangerous situations creates mental tension increasing the threat of adverse factors and other bad consequences. [4]

Due to the propensity for risk-taking a person could win, defeat the enemy or deal effectively in difficult situations. But irresponsible risk-taking often leads to loss: while risking a man can lose everything. Risk appetite, as a personality trait in different areas manifests itself in different ways. Same people choose different levels of risk depending on the circumstances and conditions [3].

In modern psychological theories dominates the idea that certain personality traits play a deterministic role in the perception of risk and attractiveness to different people.

Risk appetite is not an end but a means to achieve success. However the efficiency of the activity and the achievement of objectives depend not solely on the ability and courage to take risks. Many other sustainable personal and situational factors determine the effectiveness of each activity [4].

Although regarded as a sustainable personality trait the propensity for risk-taking is not a constant. Risk-taking is different in the various social situations. It is largely related to the current needs and motives that are of subjective importance to the risk-taker and the likelihood of their fulfillment. [5] When participating in sports activities – the resources are limited – there are three first places and without taking risks - thoughtful and reasonable and sometimes unreasonable - success is unthinkable. We assume that the propensity to take risks is associated and related to the individual style and behaviour, respectively to the individual playing style of boxers and also to the boxer`s sport experience. We assume that more experienced boxers tend to take less amount of risks. The present study is aimed at detecting the propensity to take risks in boxers and # how does it correlate to their individual style

The study includes eighteen athletes of the boxing team of the National Sports Academy. These are students from 1st to 3rd course at NSA, boxing specialty, of between 4-7 years of sports experience, aged eighteen to twenty – three, each of whom should have a certain number of completed boxing games – twenty seven to forty eight. All of whom have won medals at championships for juniors, youth competitions and men. The basis for their selection was their individual style. It was executed on grounds of the expertise of the coaches at the NSA.

The individual playing style is determined by the physical and psychological characteristics of the competitors and the views of their personal trainer for the most successful for each one of them style. The styles of play are not so strictly distinct, but within the range passive - active output there exist three basic styles: active - aggressive, active - defensive and combinatorial. In the present study the competitors are divided into three groups, each of which consists of six players characterized by the respective styles of play. The active-aggressive style is characterized by a constant strife on the part of the contestant to bridge the gap, come into close contact and start exchanging sharp blows with his opponent. Upon a successful realization of the technique, they accumulate points and can make their opponent give up fighting or knock them out. But it often happens and they themselves receive heavy blows and get into a knockdown or knockout. The typical active-defense style presents a very good protection. Competitors using this style deliberately cause their opponents to active, aggressive actions that they successfully defend or are able to counter with by one or more consecutive blows.

Combinatorial athletes are equally good at both active aggressive and active defensive boxing styles and are good at successfully applying them to the specific situation and opponent in the ring.

One of the established and most commonly used methods of conducting research into the individual differences in risk-taking behavior is a scale proposed by Zuckerman, called Sensation - Seeking - Scale - SSS-V. This is a standard self-estimation questionnaire designed in four subscales:

- Search for excitement and adventure.
- Search for new experiences / knowledge.
- Bridging the prohibited.
- Intolerance to boredom.

However like any self-estimation questionnaire SSS-V has its drawbacks and often the results obtained by it are being questioned.

In this study the tendency to take risks is investigated by an objective method based on the Atkinson`s concept of risk taking.

METHODOLOGY

(Risiko - Risk Choice)is a computerized program, a part of the development programs for psychological research - SCHUHFRIED

Method of work. The Green ball is moving on the monitor screen. The studied person via joystick should „hold“ the ball in the circle. The more the ball remains within the circle, the higher the number of points obtained by the tested person. But the number of points also increases the size of the circle. The smaller the circle is, the more points are accumulated. The tested person decides what size of the circle to work with. And namely taking that decision reflects the propensity to take risks. Indicators that are registered in the program are:

- willingness to take risks;
- total score;
- productivity;
- standard deviation of the size of the circle.
- Study Results

The results of the variation analysis reveals varying degrees of markedness of susceptibility for risk – taking and the total score. The group of athletes possessing active - aggressive playing style- their values are the highest (M = 12, M = 160). For athletes with active-defensive style the values are - M = 8; M = 130, and for athletes with a combinatorial playing style the results are - M = 6; M = 124 (Fig. 1.2).

Active-aggressive ; Active-defensive ; mixed – Combinatorial

The established characteristics of susceptibility to risk-taking and the individual boxer`s playing style boxers give reason to assume that between them there are particular relationships. The results show that with the greatest propensity for risk-taking are competitors in the group of active-aggressive

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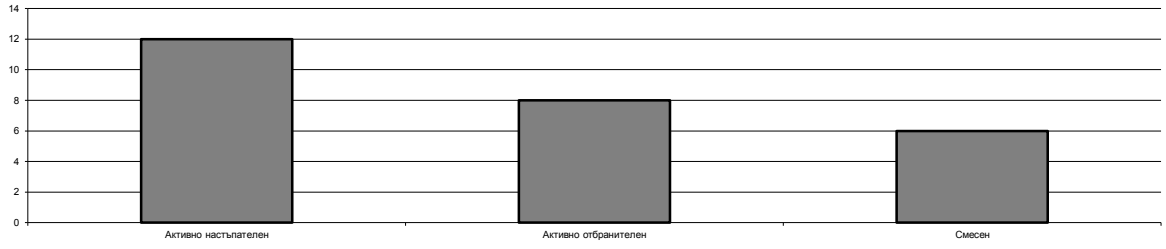

Fig. 1. Risk taking inclination among boxers of different styles of play

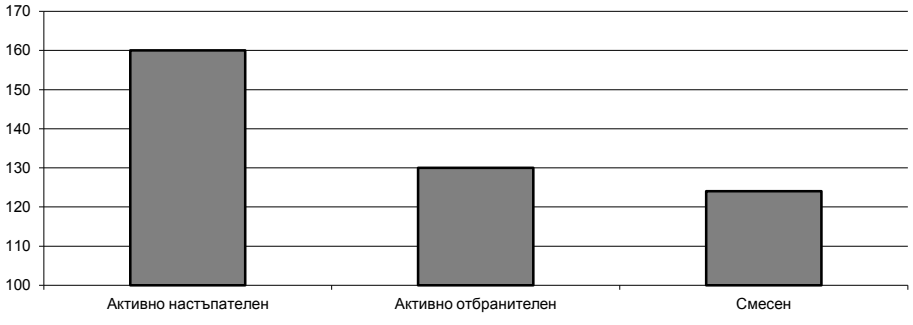

Fig. 2.Total number of points at different willingness to take risk.

We believe that this tendency is due to several factors: temperament, mental stability, anthropometric features.

This study can provide guidance for the disclosure of certain features associated with risk assessment and productivity as well as in boxing and other sports.

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We recommend that the survey be extended to other martial arts, so as to compare results. For more precise conclusions and findings, additional research with a larger number of athletes should be carried out and should be tested primarily with regard to their behavior, way of playing and performance during competition.

SOCIOL ASPECT OF SPORT AND PHYSICAL EDUCATION – SOC

IDENTIFICATION OF THE LEADERSHIP SKILLS OF THE TRAINERS ACCORDING TO ATHLETE OPINIONS

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INTRODUCTION

Now sport is a social reality that affects people and it is varied according to aims.

Such terms as: sport, sportsman, health, nutrition, leadership in sports and coaching occurred as traits of how sport can be done.

Leader is the one who coordinates the team, makes plans, and speak on behalf of the team and his or her main aim is to provide fair play and success in sport.

One couch should use his knowledge for a effective leadership. We think that couches who do not have leadership characteristics are not able to teach their knowledge successfully.

Having both leadership and coaching knowledge are key factors for success in sport.

MATERIAL AND METHOD

Research has been made among the sportsmen of kick box, box, karate, judo, aikido, and muay thai in Muğla, Marmaris and Bodrum provinces. Subjects are active sportsmen as: 27%(44) in kick boxing, 11,7%(19) in boxing, 14,7%(24) in Judo, 11.7%(19)in karate, 9,8(16) in taekwondo, 5,5%(9) in aikido and 19,6%(32) in muay thai branches.

Examples below are consist of table that evaluates the perception of sportsmen between 19-25 about the leadership skills of their trainers for all terms statistically and contain parallel assessments proper for all other criteria. The age range is the best range that contain different education levels, duration of the activity in different sport branches and different durations of training together with different trainers. Since the evaluation in this part is consistent with general and detailed evaluation, there is not problem if to accept it as a general evaluation.

TABLE: THE ASSESSMENT OF THE AVARAGE SCORE, WHİCH SHOWS THE EDUCATİONAL AND INSTRUCTIONAL BEHAVİOURS OF THE COEACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD

Sports	Kick Box.	boxing	judo	karat	taekwondo	aikido	othe	As a	Avarag	Standard
Score Avarage x 20	86,37	85,31	91,23	84,70	87,35	90,77	92,92	87,59	88,28	2,81

When table data and graphic charts are examined it is seen that 19-25 year old athletes trust in their trainers. Sportsmen in Muay Thai and Judo are seen to have the highest thrust rate; however, that the low thrust rate is 85,31 shows that generally all athletes thrust in their trainers. Out of 100, the average is 88.2. That the low rate of standard deviation 2.81 shows that athletes in these ages thinks similar to

each other on the trainer behaviours of their trainers. According to athletes under 18 years old there is a slight decrease about 2, however when the age increase thrust level decreases.

GRAPHIC: **THE ASSESSMENT OF THE AVARAGE SCORE, WHİCH SHOWS THE EDUCATİONAL AND INSTRUCTIONAL BEHAVİOURS OF THE COEACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD**

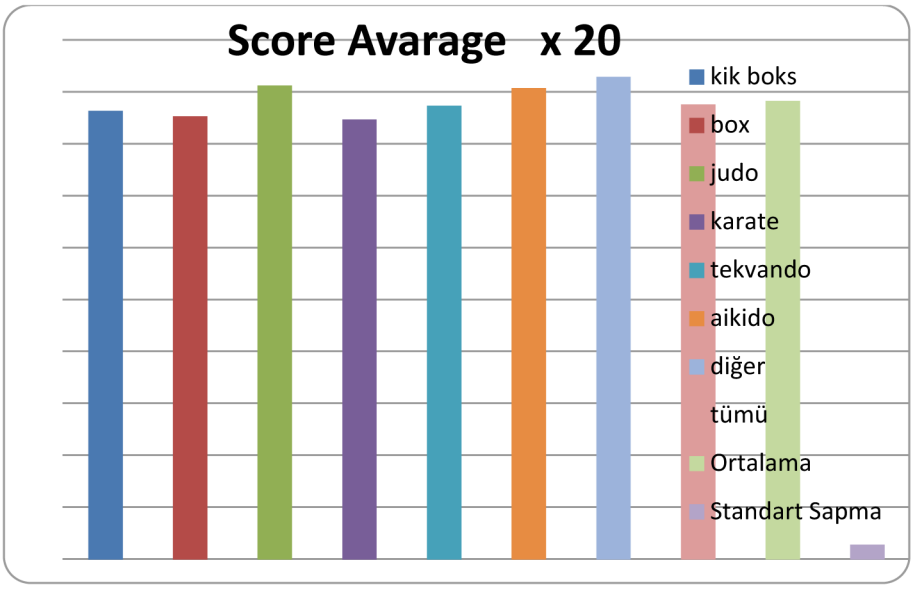
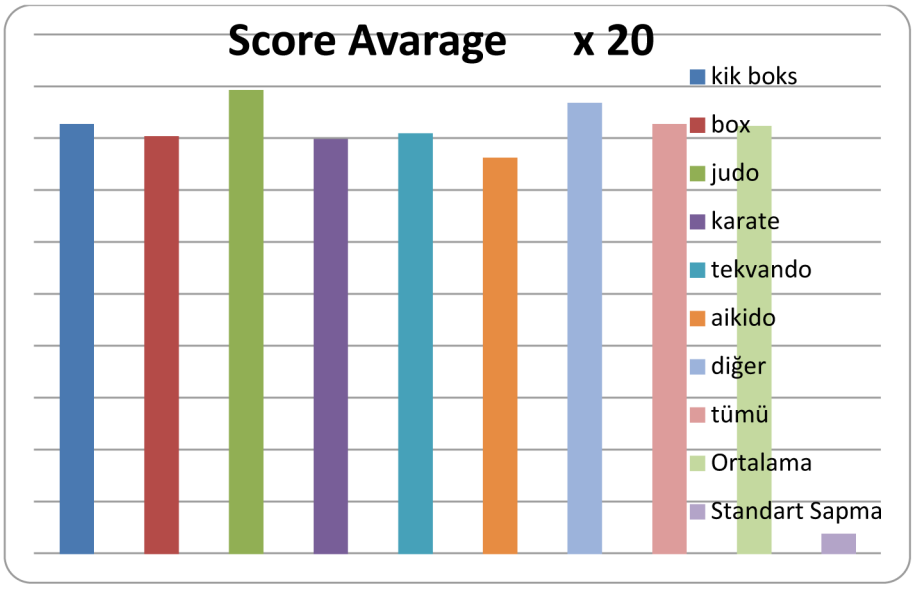


TABLE: THE ASSESSMENT OF THE AVARAGE SCORE, WHİCH SHOWS THE DEMOCRATIC BEHAVİOURS OF THE COACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD

Sports	Kick Box.	boxing	judo	karat	taekwondo	aikido	other	As a whole	Avarage	Standard Dev.
Score Avarage x 20	82,75	80,43	89,33	79,86	80,99	76,30	86,89	82,75	82,41	3,84

GRAPHIC: THE ASSESSMENT OF THE AVARAGE SCORE, WHİCH SHOWS THE DEMOCRATIC BEHAVİOURS OF THE COACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD



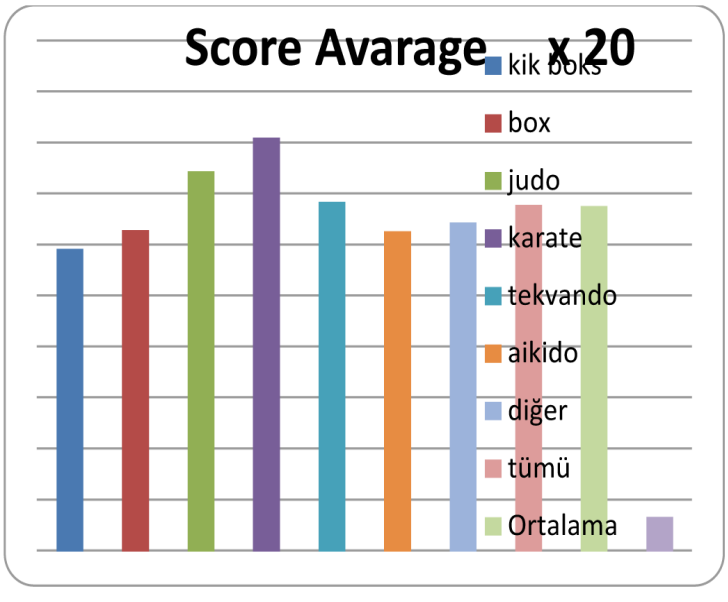
When the data in the table and graphic charts are examined, it is seen that 19-25 year-old athletes thrust in their trainers' democratic behaviours. Those in the branch of Judo are the ones who trust their trainers the most; however, that the point of those who trust their trainer the least is 76,30. The fact that average is 82.41 out of 100 proves that sportsmen between these ages trust their trainers. That

the standard deviation is not so high: 3,84 show that sportsmen in different branches do not have different opinions. But sportsmen in these ages trust their trainers' democratic behaviours less than the younger sportsmen.

TABLE:THE ASSESSMENT OF THE AVARAGE SCORE, WHICH SHOWS THE AUTROCRATICAL BEHAVIOURS OF THE COACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD

Spor Dalı	kick	boxing	judo	karat	taekwondo	aikido	other	As a whole	Mean	Standard dev.
Puan Deviation	boxing 59,24	62,91	74,40	e 81,00	68,44	62,67	64,40	67,80	67,61	6,64

GRAPHIC: THE ASSESSMENT OF THE AVARAGE SCORE, WHICH SHOWS THE AUTOCRATICAL BEHAVIOURS OF THE COACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD



When table data and graphic charts are examined, sportsmen between 19-25 thinks different from each other on the issue of their trainers autocratic behaviours. It is seen that those who thinks that their trainer are autocratic are mostly in the branch of karate, and those who thinks that their trainer are not autocratic are mostly in kick box. That standard deviation 6,64 is so high shows that sportsmen in different branches have different opinions on the fact that whether their trainers are autocrat or not

TABLE: THE ASSESSMENT OF THE AVARAGE SCORE , WHİCH SHOWS THE SOCIAL SUPPORT BEHAVIOURS OF THE COACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD

Sports	kick	boxing	judo	karat	taekwondo	aikido	other	as a whole	avarage	standard dev.
Score Av.	78,81	78,41	83,25	78,13	72,78	90,00	84,00	79,56	80,62	4,79

If table data and graphic pictures are examined, it is seen that athletes between 19-25 ages are unanimous on the fact that trainers provides social support for their students. It is seen that those, who are in the opinion that trainers provides social support are in the branch of aikido, and there is no one that thinks that trainers do not provide social support. That the rate of standard deviation is so high as 4.79 shows that, athletes in this group according to sport branches are thinking that trainers social support levels are either good or very good.

When data in table and chart examined, it is seen that athletes between 19-25 ages are agree on the fact that trainers are giving positive feedbacks to their students. Especially athletes in Aikido are much agreeing this opinion and no sportsman in the groups thinks that trainers gives negative feedbacks .

That the high rate of standard deviation 4.20 shows the fact that opinions of athletes in these branches about their trainers are either good or very good. It means that there is deep interest in these branches that are surveyed.

GRAPHIC: THE ASSESSMENT OF THE AVARAGE SCORE , WHİCH SHOWS THE SOCIAL SUPPORT BEHAVIOURS OF THE COACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD

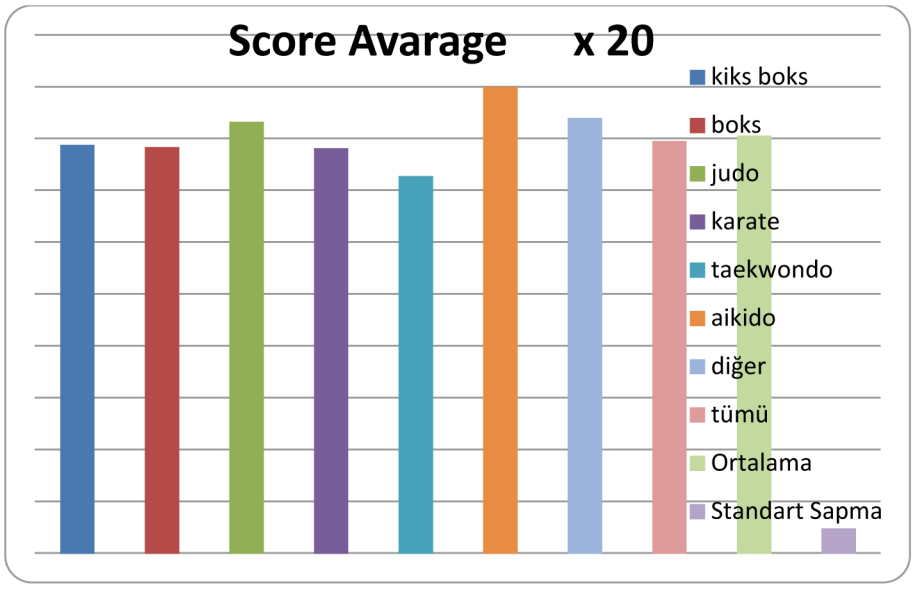
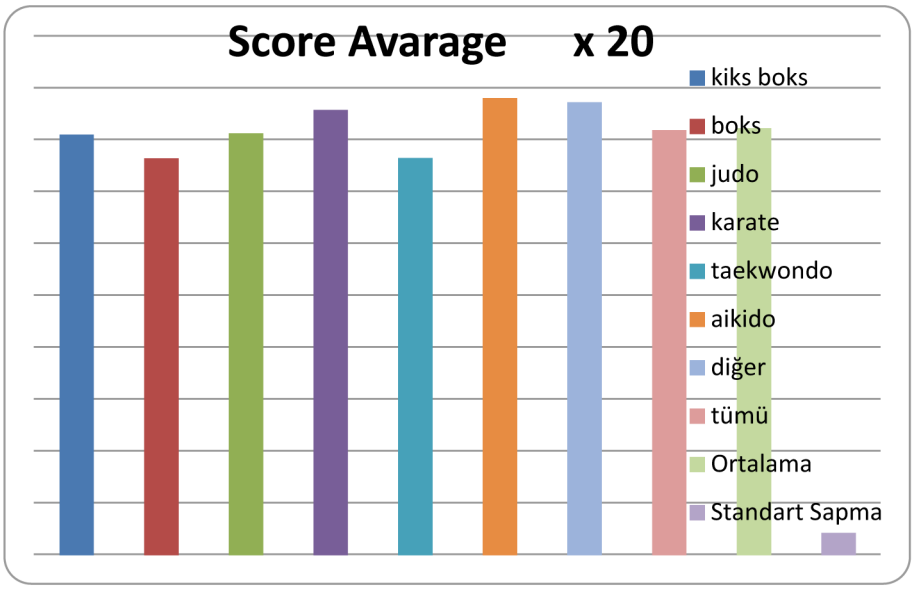


TABLE: THE ASSESSMENT OF THE AVARAGE SCORE, WHİCH SHOWS THE POZITIVE FEED-BACK BEHAVIOURS OF THE COACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD

Sports	Kick Box.	boxing	judo	karat	taekwondo	aikido	other	as a whole	avarage	standard dev.
Score Avarage x 20	80,95	76,36	81,20	85,75	76,44	88,00	87,20	81,85	82,22	4,20

GRAPHIC: THE ASSESSMENT OF THE AVARAGE SCORE, WHİCH SHOWS THE POZITIVE FEED-BACK BEHAVIOURS OF THE COACHES OF ATHLETES, WHO ARE 19-25 YEARS OLD



DISCUSSION AND CONCLUSION

The aim of this research is analyze the leadership behaviours of couches in different branches according to perceptions of sportsmen and to define whether these perceptions are changing or not according to some factors.

Sportsmen who have been active between years 2009-2010 in Muğla in the branches of kick boxing, boxing, judo, karate, taekwondo, aikido and other (muay thai) defined have defined the universe of the research and 163 people chosen from these fields who are voluntarily joined the research defined the sample.

Detection of couches behaviours version of the scale developed by Chelladurai and Saleh(1980) has been used in the research. Validity and reliability Turkish version of the scale of leadership in sport has been conducted and reliability degree has been defined as %87.

Leadership behaviour dimensions, arithmetic mean of the scores they get, standard deviation tests and excel graphics and charts has been used. To define trainers behaviours standard deviation differences, the highness of arithmetic means of scores and the consistency of this quality with scores and standard deviation has been used.

In the survey, that the arithmetic mean of the trainers leadership behaviours according to the perceptions of sportsmen in various branches is 80.97 on the sclae of 100 shows that for all criteria sportsmen are generally accord with and have pozitive opinions about the leadership skills of their trainers.

Moreover, again in this survey that the general standard deviation 5.12 on the scale of 100 is not a so high number shows that what sportmen of various branches think about their trainers is not so different, on the contrary they are consistent with each other.

In brief all athletes without exception who have been joined to the survey are thinking their couches as a leader.

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EXPLORING ASPECTS OF MANAGEMENT OF A GOLF TOURNAMENT - "THRACIAN CLIFFS"

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Keywords: *Golf, Event Management*

The sport events provide an environment and possibilities for presenting a complex of motor and personal abilities, sport-pedagogic and technical-tactical skills, entertainment, social contacts and leisure, but in the meantime some of them are also an arena of economic activity for a town, country or a region [1].

Sport, as a socially significant activity, has already become a global area, and is being developed in accordance to the dynamic nature of the increasing needs in the society as a whole, as well as of the individual person. The last are ambiguous for the different social groups. [3]

In the beginning of the XXI century the sport phenomena is perceived as a main area and institution of development of the modern society, together with the family, education, culture, politics, economics, religion and mass media [2].

In the last years an increasing role of the private business is observed, which increases its investments in golf in Bulgaria. Because of the nature of the game, the cash flow, which is pouring into this sport, is vital for the quality and the management of tournaments of all levels. Still there is no synch to be observed between the public and the private sector, which is presenting a big problem for spreading this relatively new for Bulgaria sport in the country. Establishing a good relation between the two sectors will lead to quality changes in the interest of the public to the game. As one of the biggest positive effects of improving the management will be the increase of the number of people, who practice golf actively.

The tournament we analyze has been established in the beginning of the XX century, when Golf starts gaining momentum in the sports family. At the time, M. McCormack created the company IMG and recognizing the opportunity, that the game reveals, he establishes the "World Match Play Championship", combining the "eternal triangle" of the most successful sport events – sponsors, media and players. [7].

During the years IMG has been established as a company, which prepares programs for support and optimization of other companies to achieve their marketing targets, regardless if it is about reaching the masses or reaching a concrete target group. By creating huge production possibilities, memorable hospitality and incentive programs that help the companies build their business relations and environment, IMG has established itself as a main player in the complete service and management of Golf events worldwide. . [6].

IMG help to increase the sales of the Golf tournaments worldwide, including the championships of the large tournaments, shown on television. In the beginning of 1964 they start with the World Match Play Championships. In the last four decades, IMG has presented a television distribution, technical services, media guidelines, licenses and marketing expertise to all big tournaments in Golf. They also own the international TV rights for the Olympic Games, as well as many marketing rights of some of the biggest names in the male and female golf. Working in close collaboration with some of the most famous world companies for developing and performing unique and intriguing marketing solutions for golf, IMG are focusing on the increase of investments and creating a real value.

Analyzing the marketing conditions, IMG Consulting Golf are looking for the right opportunities to spread Golf in countries such as Bulgaria, through a detailed ad hoc planning in order to fulfill each detail with a high precision. According to IMG a very important factor for spreading the game is the

strategy of the sponsor. According to them the big corporations should aim to develop new golf territories, giving the opportunity to develop golf worldwide. They present a very good example by their cooperation with Volvo, staging events not only for professionals, but also for amateurs. Since 1988 as a part of their program for spreading golf, Volvo, together with IMG, organize several amateur events, one of which is the prestigious "Volvo World Golf Challenge" where over a million people of more than 30 nationalities have participated so far. [5].

Golf has been recognized for a long time as one of the preferred platforms for sports marketing. Its demographic is appealing to many corporations that aim at creating authentic relations with their clients. In the last several years Bulgaria is becoming a more frequent destination for the big companies and corporations in Golf. Evidence to the potential of golf in Bulgaria is the organization of the "Volvo World Golf Challenge" right after the professional "Volvo World Match Play Championship" on the "Thracian Cliffs" course in Kavarna.

The first golf course in Bulgaria with 18 holes was open on 10th of June in 2000 in the city of Ihtiman, by golf club "Air Sofia". In 2001 the Bulgarian Golf Association has been established. In 2001 BGA is officially recognized by "R&A St. Andrews" and the European Golf Association as their member – an act, which includes Bulgaria in the international Golf society [2]

HYPOTHESIS

Our hypothesis is that by conducting an expert study we can reveal some of the problematic areas in the management of a golf sport event. We suggest that this will lead to improving the complete organization and management of future tournaments of all levels in Bulgaria.

Aim and tasks

Main aim of the current article is to study and analyze the management of the sport event "Volvo World Match Play Championship" and the accompanying "Volvo World Golf Challenge" at "Thracian Cliffs" – 2013 and present possible solutions based on the conclusions for improving the management of future tournaments, organized in Bulgaria.

In order to achieve this aim, the following tasks had to be completed:

- A study and analysis of literature sources and documents, concerning the theoretical, scientific-applicable studies in the field of sports event management and marketing;
- A study and analysis of documents in the practice of the organizing parties;
- A study and analysis of the main elements of the management of the golf tournament "Volvo World Match Play Championship" and the accompanying "Volvo World Golf Challenge";
- A study and analysis of the opinion of participants, taking part in the amateur tournament in the schedule, about the opportunities, threats, the strengths and weaknesses through an inquiry;
- Based on the conducted studies to summarize conclusions and suggest recommendations for the improvement of the management of future golf tournaments.

METHODS

In order to achieve the aim and complete the tasks of the current study, the following methods were used:

✓ Analysis of specialized literature sources, regulation documents, programs, etc.:
  - Scientific literature in the field of Management;
  - Scientific literature in the field of Sport Management (in the aspects of management, law, social, economics, etc.);
  - Analysis of documents (laws, regulations, programs, statutes, schedules, etc.) representing the management and development of sport organizations;
  - Scientific literature about history of golf and tournaments through the years;
  - Analysis of literature about the history of the "Volvo World Match Play Championship";
  - Study of literature about the history and current state of IMG;
  - Analysis of main documents about the management of the "Volvo World Match Play Championship" and "Volvo World Golf Challenge" – Thracian Cliffs.

✓ SWOT analysis
✓ Mathematical and statistical methods
- For data processing the SPSS 19 for Windows has been used;
- Methods for qualitative analysis were used for the results of the study.

✓ Inquiry
- For the needs of the study a questionnaire about the management during and after the "Volvo World Golf Challenge" were developed. They were filled by 20 of the participants in the event with handicap between 0 and 28. The questionnaire has 2 parts: the first one was adapted for the Bulgarian conditions by V. Dimitrov and S. Mladenov from Michael D. Vogt, a golf management specialist; the second part was additional author's study through internet. The questionnaire comprises of a total of 42 questions, divided in 4 groups.

ANALYSIS OF THE RESULTS

The promotion of the golf game in Bulgaria starts with the tournaments that the foreign diplomatic missions are organizing. The traditional diplomatic golf tournament, organized in the past in the neighboring countries has already 29 years of history. The first Bulgarian club that has the development and popularization of golf in its statute is the "Tennis, ski, golf" Club in Sofia, with headquarters the sport complex "Peace and Friendship". Thanks to the common efforts of the chairman of the Bulgarian Olympic Committee at the time – Ivan Slavkov and the rector of the National Sport Academy – prof. G. Kaburov, the TSG Club, Hard Gebler (Germany), in 1991 the first training course is build – the driving range at the National Sports Academy. [4]

In May 2013, Bulgaria, represented by the golf club "Thracian Cliffs" was the host to two of the biggest and most famous golf tournaments in the world "Volvo World Match Play Championship" and "Volvo World Golf Challenge". Certainly the prize fund and the viewing figures are record high not only for Bulgaria, but for the Balkan Peninsula.

A list of participants, the rules and final rankings for the "World Golf Challenge 2013" is shown on table 1. First place for "A" division gives the opportunity for the winner to represent Bulgaria at the world finals of the "Volvo World Golf Challenge" in 2014. The tournament started simultaneous for all participants.

Table 1. Rankings in the „World Golf Challenge 2013" Bulgaria

Volvo World Golf Challenge Bulgaria			
Number of participants 84			
Divisions	**Handicap**	**Rules**	**Rankings 1/2/3 place**
- A	0 – 9	Individual stroke play on 18 holes	Andon Tushev Champion of Volvo World Golf Challenge 2013
- B	10 – 19	Individual stableford on 18 holes	Dimitar Savov/ Sofia Seldemirova/ Sergey Stoykov
- C	20 – 28	Individual stableford on 18 holes	Gabriela Blasius/ Veselin Velev/ Fabio Furnari

One of the biggest attractions in organizing a tournament of such rank is the possibility for involvement of volunteers. Over 300 volunteers from all over Bulgaria took part in the tournament. Their responsibilities are shown on figure 1.

Golf tournaments exist as a conception for competitions since centuries. A lot of research has been conducted in this area. Michael Robert Melton, in his work "Two essays on tournament theory" analyzes the tournaments in golf. He studies the effects in two very distinctive contexts.

In the first part he analyzes whether there is a motivational effect in the professional golf tournaments. In the second – he studies if the behavior of the managers and investors is characterized by the tournament behavior.

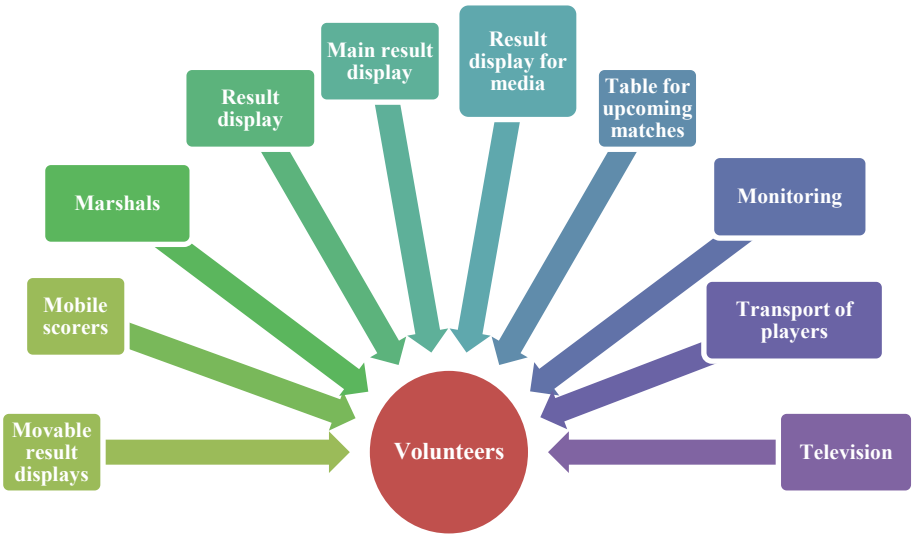

Figure 1. Participation of volunteers

Using data of previous studies (1994 and 1995) from the Professional Golf Association (PGA) the first essay is testing the efficiency of the sequence of the tournaments in the calendar year of the PGA, as a method to motivate the efforts of the teams working with the clear idea of the purpose of the tournament regarding the amateur tournaments.

Studying the quality in organizing professional and amateur golf tournaments, Melton uses as an example other authors, working on the subject, whose analyses are with contradictory conclusions regarding the prize fund as a stimulus. According to Melton the motivation of the players and the organizers is closely related and affected not only by the rank and prize fund of the event, but also by the place and date of the tournament. Nevertheless the author suggests that the management of the filled with tradition and rich history tournaments are not affected by the before mentioned factors. The revolutionary decision of the main PGA Tour, aimed at uncovering this question and the accompanying conflicts, not to eliminate the players until the end of the tournament, is used as an example.

The opportunities that the game is presented in Bulgaria are many. There are however still many uncertainties about the cooperation between sport and management. According to R. Damyanova (2002)[1], golf is not a traditional for Bulgaria sport, and the reasons that the game is still unpopular, are based mainly in the lack of information about the history and nature of the game; the positive sides of the game; the lack of popular and specialized Bulgarian literature; lack of facilities, qualified personal, etc.

A big increase in the interest of the people towards the game is observed in the last years, which creates the need for scientific studies in many of the areas that accompany the golf sport.

After the analysis of the received data, it is revealed that the percentage of the competitors, that have bought any of the advertised products, memorabilia or other type of merchandise, offered by the sponsor company, is relatively large (60%) (Table 2).

Table 2. Marketing evaluation of the tournament

Event marketing		Responses	
№	**Questions**	**NO**	**YES**
1	Have you bought any of the advertised products offered during and after the tournament?	40 %	60 %
2	Did you use the lodging, offered by the golf complex?	60 %	40 %
3	Has the advertisement slogan of Volvo reached you?	-	100 %
4	Would you consider using any of the promotions and services, offered by Volvo?	-	100 %
5	Would you participate again in this tournament in his following issues?	-	100 %

Lesser is the number of competitors, that have used the lodging in the golf complex. According to all of the participants the advertisement slogan and the tournament idea has reached them. Accordingly all of them respond that they would consider using the promotions and services, offered by Volvo. All 20 respondents answer that they would participate again in this tournament in his following issues.

According to 95%, the field conditions during the game were good (table 3). Also a big percentage (80%) is on the opinion, that the preparations before the start of the game are also good, and 20% have evaluated it as medium. All participants respond that the staff was well prepared as well as the tournament was well organized.

Table 3. Evaluation of the management

	Management of the event	Responses		
№	**Question**	**Bad**	**Medium**	**Good**
1	Conditions on the field during the game	-	5 %	95 %
2	Conditions on the field before the start	-	20 %	80 %
3	Level of competence of the field staff	-	-	100 %
4	Evaluation of the organization level of the tournament	-	-	100 %

As evidence to the good organization of the tournament is the international award, that the team of the "Thracian cliffs" golf course has received in 2013.

In figure 2 the teams for the organization of the tournament can be seen.

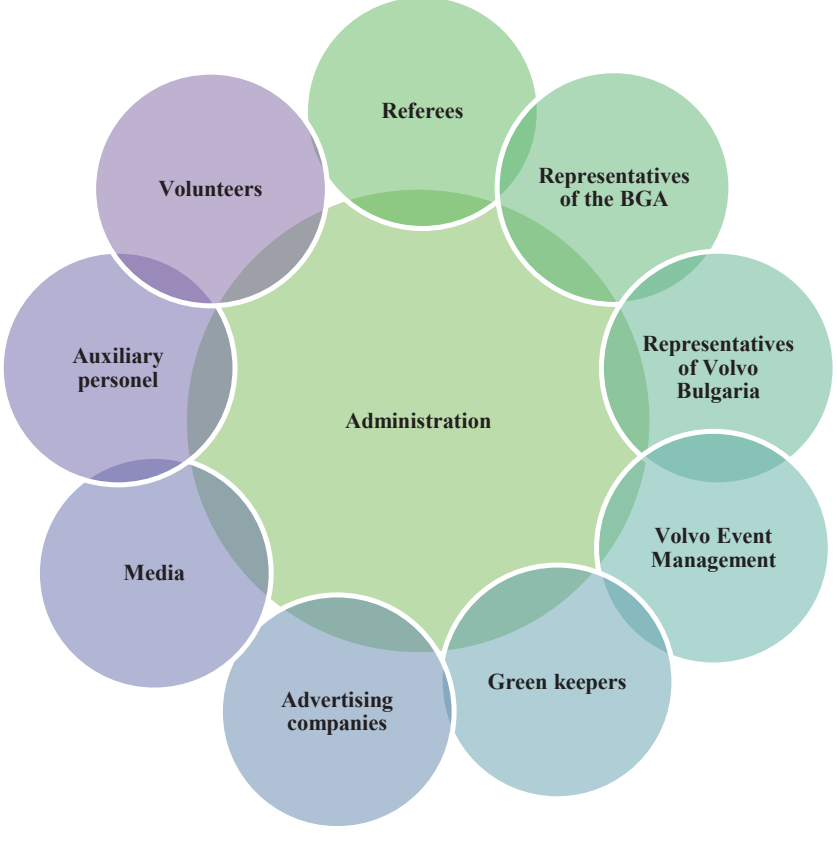

Figure 2. Teams in the organization of the tournament

CONCLUSIONS

The result of the analysis of literature and documental sources in the sports event management and marketing, we can conclude that the management is a subject to theoretical and scientific studies, as well as practical experience.

Golf is one of the dynamically developing sports worldwide and very appealing on professional and amateur level. This suggests an interest to the offered products during and after the tournaments, as it is shown in the first issue of the "Volvo World Match Play Championship" in Bulgaria.

After the study and the analysis of the documents, provided by the organizers from IMG and BGA it is revealed that there is an established structure, aims, functions, activities and large media and advertising program.

In order to improve the management and the organization of the tournament in the future the human resources should be considered.

Table 4. SWOT Analysis

Strengths	**Weaknesses**
1. The experience of IMG. The experience gathered over many years for organizing tournaments by the IMG has been a premise to the successful realization of the Volvo chain of tournaments in "Thracian cliffs" in May 2013. 2. Good advertisement of the tournament. 3. Large publicity of the tournament through internet and media.	1. Lack of communication between the volunteers and the responsible team. This lead to some pressure during the tournament. 2. Lack of preparation and knowledge of the volunteers regarding the tournament and the sport, which made their duties more difficult. 3. The time that was spent on training the volunteers was too much.
Threats	**Opportunities**
1. Difficulties in the realization of larger tournaments and events without the help of management companies such as IMG.	1. Popularization of the game among the people. 2. New work places because of the increase in the golf tourism. 3. Promoting volunteering as a form of participation in sport events. 4. Popularization of the golf course "Thracian cliffs" due to the successful organization of the tournament. 5. Economic boost through better infrastructure, build for the tournament. 6. New club members. 7. Easier acquiring of sponsors for future tournaments on the course. 8. Better partnership with other organizations (domestic and international) in the organization of different initiatives and projects.

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CONTEMPORARY MEANS OF COMMUNICATION AND E-LEARNING IN THE EDUCATION PROCESS OF SPORT MANAGEMENT

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Keywords: *e-learning; communication; education process; sports management;*

INTRODUCTION

The theory explains communication on one hand as a process, in which information passes from one entity to another, and on other hand as a system, containing certain elements, that produce meaning[1].

The Internet and the fast developing mobile technologies open new horizons in e-learning, helping students in all form of education to utilize their time and acquire knowledge in almost every setting. The current pilot study is aimed at revealing the habits of mobile devices and Internet use among the students in National Sports Academy, in particular the Sports Management majors.

METHODOLOGY

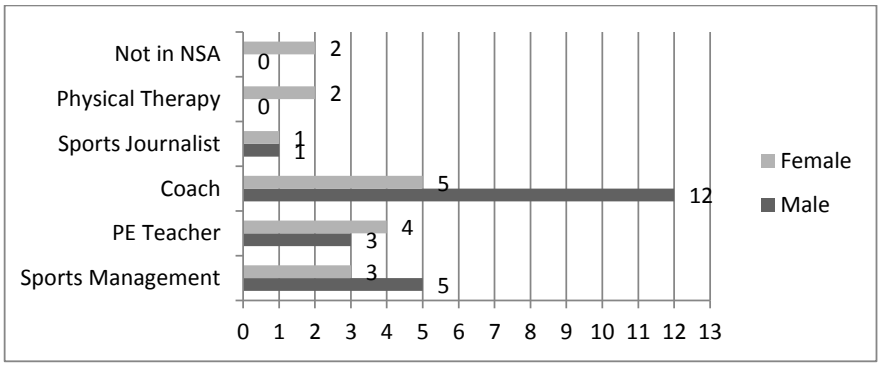

Figure 1. Participation of students, according to their major and gender

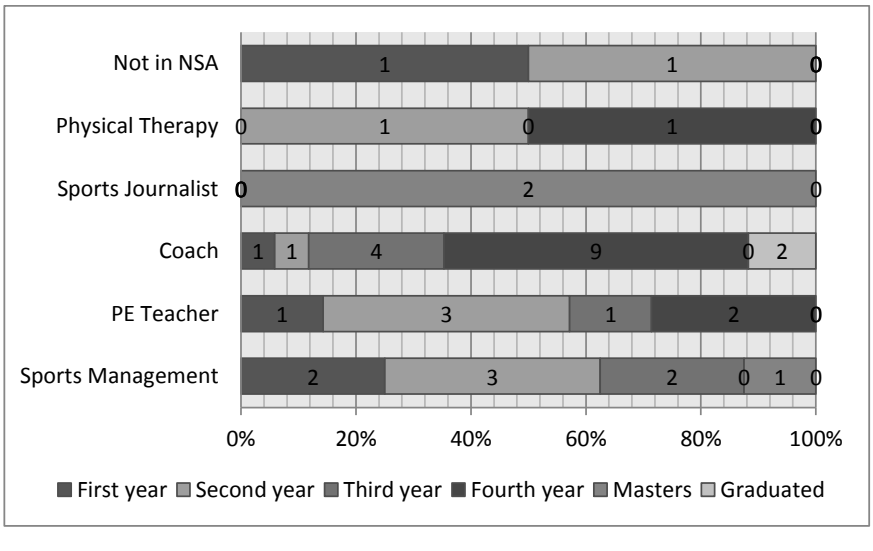

Figure 2. Participation of students according to their major and year of study

The methods, used in the study include observation of the use of contemporary means of communication in the educational process and an inquiry of students about their personal evaluation of usage of such means. A total of 38 former and current students participated in the study (Figure 1 and Figure 2).

The questionnaire included 23 questions on the use of mobile devices, e-mail, e-learning environments and social networking sites. The study was conducted entirely online and the inquiry was delivered through e-mail and social networks.

RESULTS

All the participating students respond, that they have mobile phone number, as one third of them state that they use two or more numbers at all time. The majority of the students prefer yearly contracts with their mobile carriers, while the prepaid services, the month to month and the two year contracts are all equally distributed with around 5 or 6 responses each

Over one fifth (21,1%; 8 responses) of the students respond that one of the numbers they use is issued by their employer. One third (14) of the students state that they carry at least two mobile devices (Figure 4).

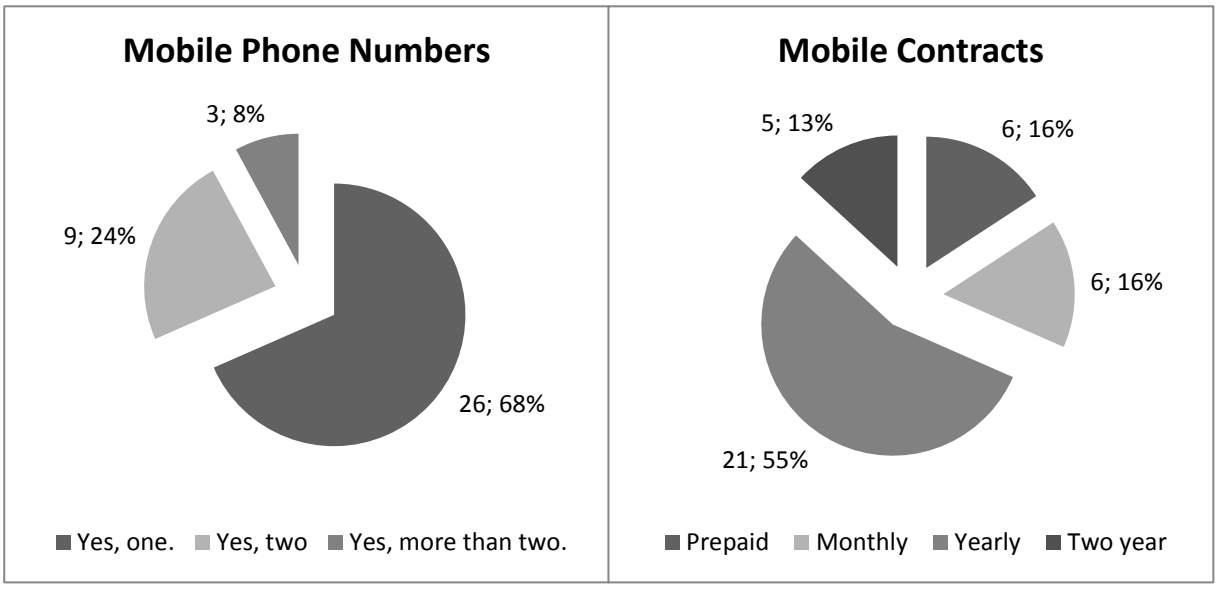

Figure 3. Mobile phone numbers and contracts

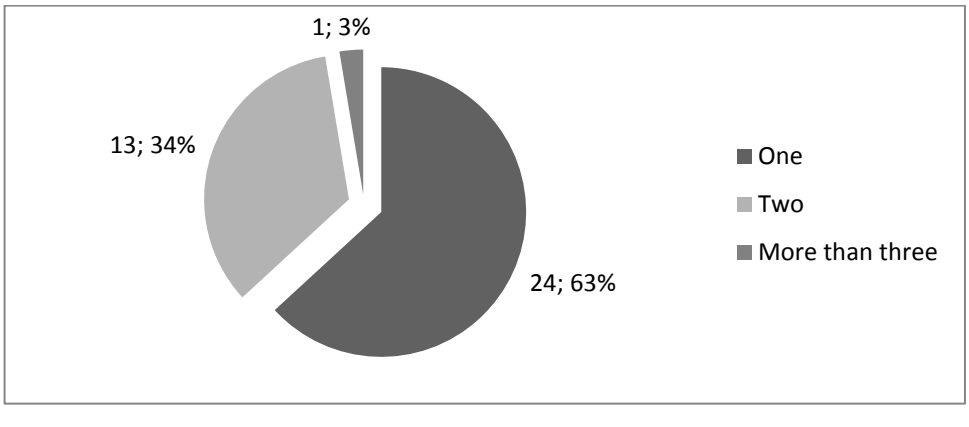

Figure 4. Number of mobile devices

Not all of the respondents carry a device that can connect to the internet. A small portion of 10% does not use mobile internet at all (Figure 5).

The rest use several devices, which is why the total sum is over one hundred percent. Greatest number of responses receives the smart phone, followed by the mobile internet modem.

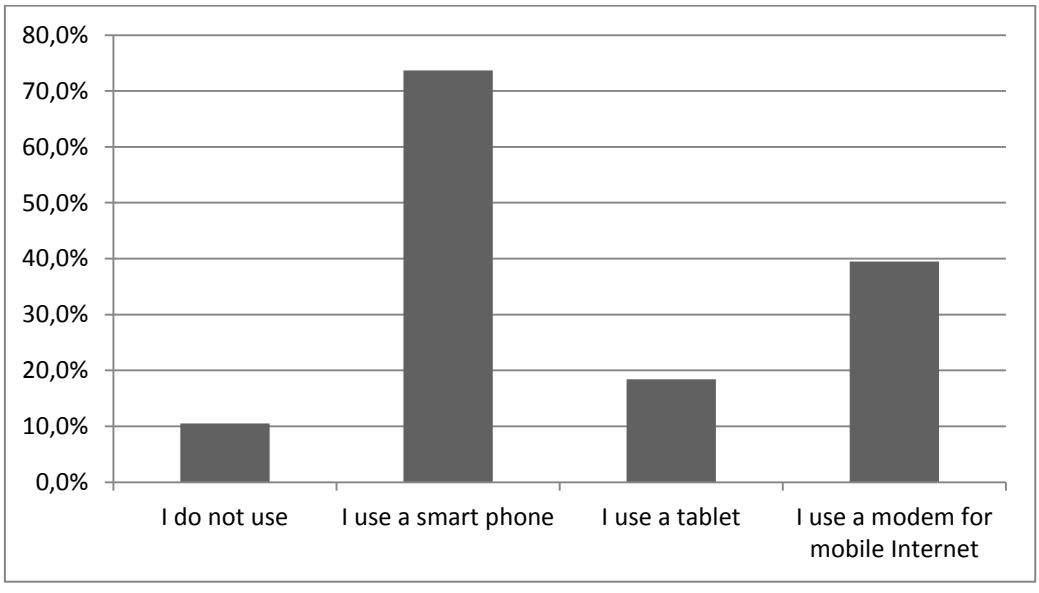

Figure 5. What kind of mobile devices do you use for access to internet?

As per their use of internet, all respondents use e-mail services, as 53% have more than one address. For the most part they use only web based e-mail services and do not utilize a mail client to facilitate their e-mail correspondence. Still a small portion of 4 students state that they do use a client with an IMAP access. This kind of e-mail protocol allows the use of one address on multiple devices with the need for internet access only for synchronization [2,3](Figure 6).

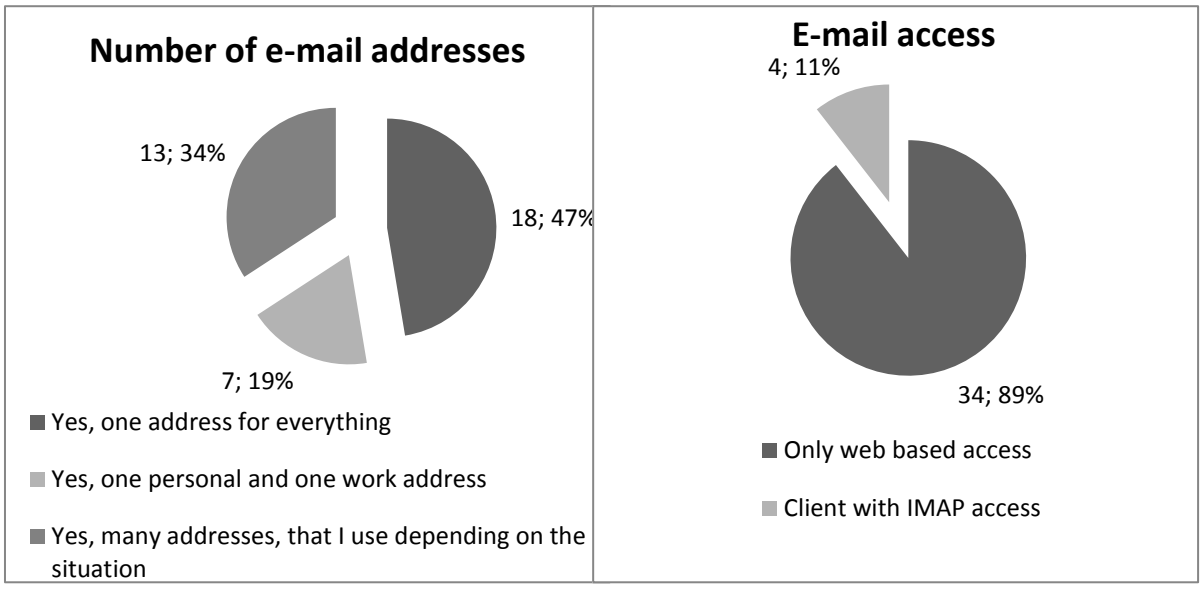

Figure 6. Number of e-mail addresses and access to them

Practically all of the students have accounts in the biggest social network Facebook™ (Figure 7). The second most popular among them is YouTube™ and third, but with a bigger difference is Google+™. The professional social network LinkedIn™ is on one of the lowest positions.

As for the usage of these means of communication in their education, it turns out that the students prefer or have easier access to the professors through e-mail, than through telephone (Figure 8). The opposite goes for communication with the administration of the university, where the telephone is more preferred. As expected, the communication with professors is more frequent than with the administration, but both are largely surpassed by the communication with the costudents, especially using the telephone, with more than 60% responses for daily use.

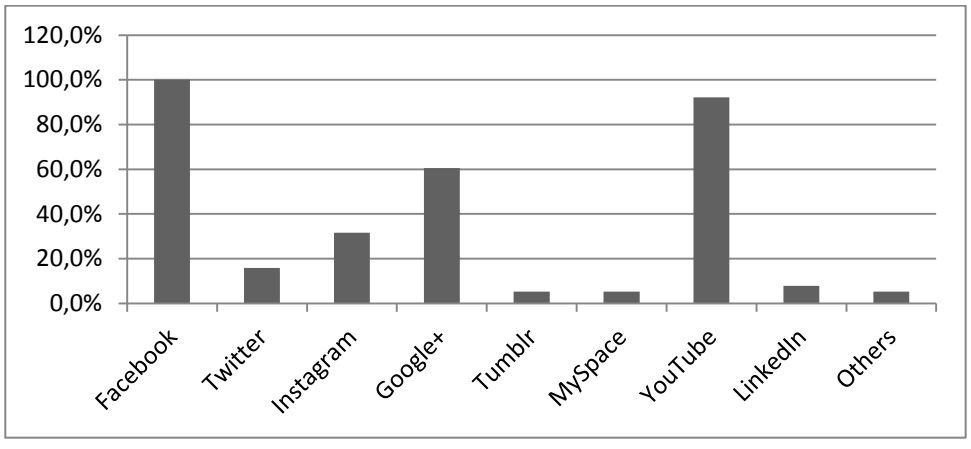

Figure 7. Registration in social network sites

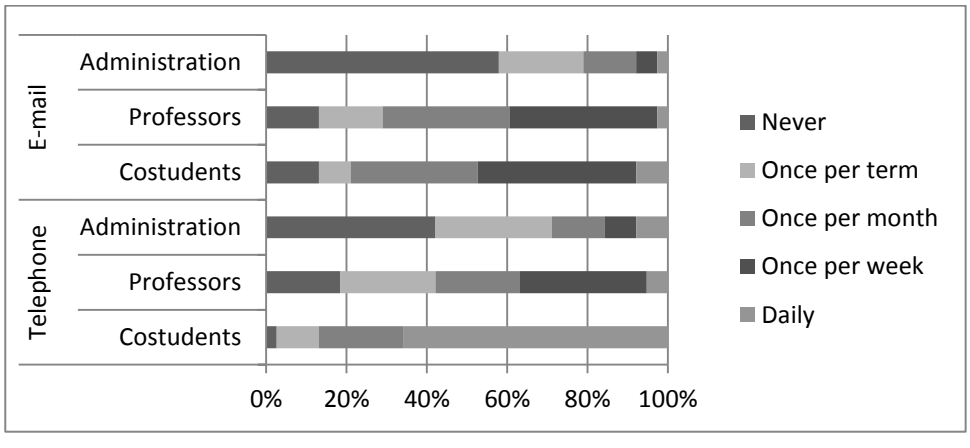

Figure 8. Usage of e-mail and telephone for communication with costudents, professors and administration

Out of a total of 453 hours, spent on the phone by all of the respondents, 76 hours and 20 minutes, or around 17% are education related conversations, while out of 7448 mail messages, 648 (9%) are education related e-mails.

The usage of social networking is presented on the next figure. The biggest reason to use them is the ability to keep in touch with friends and on second place is being informed of the news. Still more than 20% respond that they do not use the social networks for organization of the educational process and close to 40% do not use it for sharing of educational resources. Only video sharing is evaluated lower than the educational needs, which comes as a surprise given our observation of the information in the most used networks.

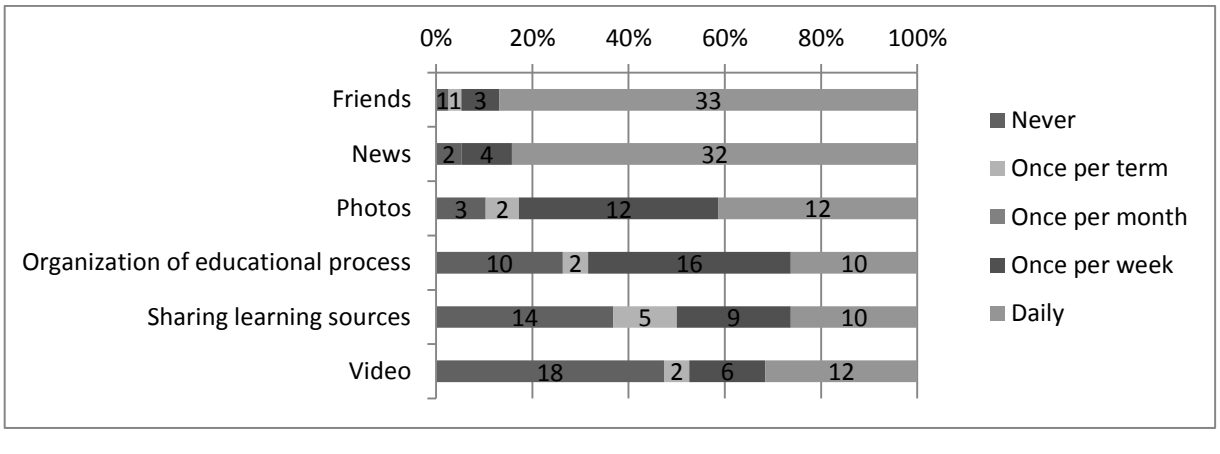

Figure 9. Usage of social networks

Nearly 90% of the students have used the newly established e-learning environment of the National Sports Academy – virtual.nsa.bg. Two of the respondents have stated, that they have used the Moodle e-learning environment, and four have said to have experience with other environments, such as foreign language, specialized work related courses, etc. Two thirds of the students are sharing the opinion that e-learning is best used for studying and examination. Only a small part of them feels comfortable using the e-learning environment for interactive and group tasks (Figure 10).

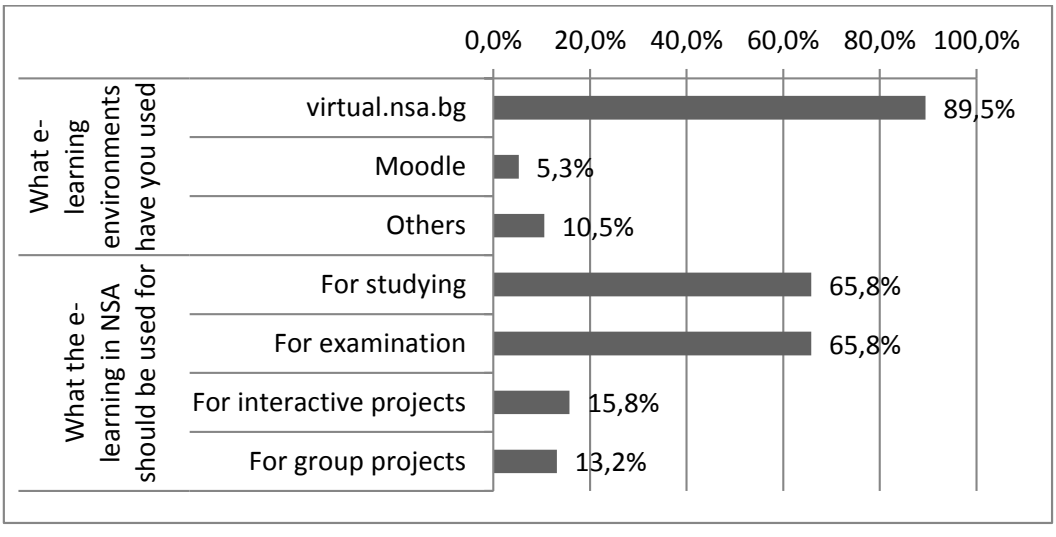

Figure 10. E-learning environments and their suitability for education in NSA

According to the students, the easiest forms of educational materials in e-learning environments are the videos and the text, and most difficult to acquire new knowledge is by audio lectures.

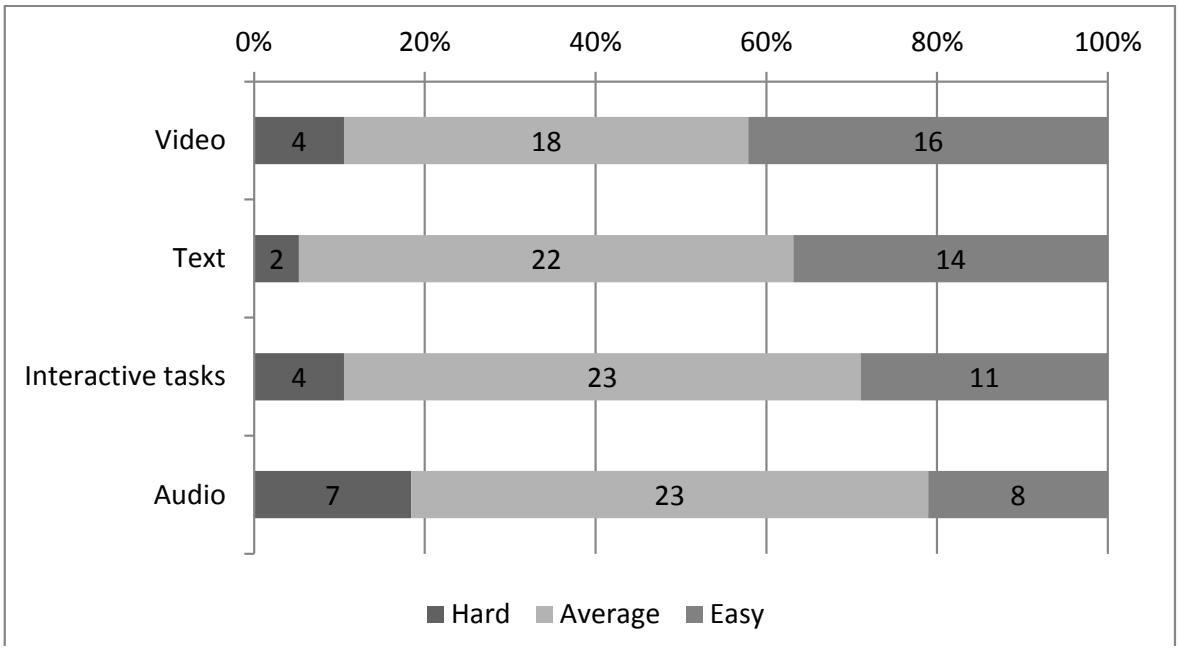

Figure 11. Acquiring knowledge through e-learning environments

-The respondents feel that the most suitable role for e-learning environments in the NSA "Vasil Levski would be for it to replace some of the subjects, studied in the distance learning programs with close to 80%, and also to replace some of the subjects in the regular study program with the back-up of half of the students. Still most of them are not sure, that e-learning can completely replace the distance learning in the National Sports Academy (Figure 12).

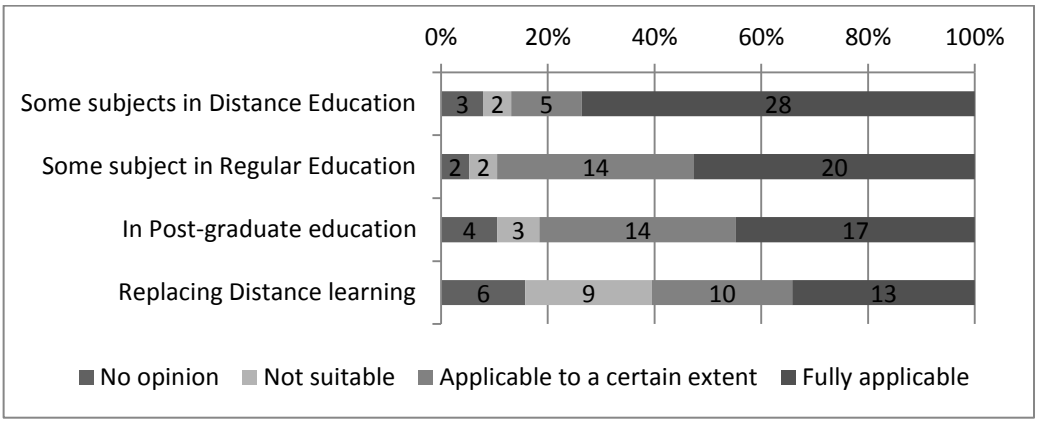

Figure 12. How should e-learning in NSA be used?

DISCUSSION AND CONCLUSIONS

According to the results of the study it is revealed that the telephone, as a more familiar form of communication is still preferred in the process of education. The exception in the communication with the professors is probably due to the possibilities of attaching documents and the usage of e-mail as a form of presenting personal projects in the classes.

The more modern social networking communication is mainly used for friends and entertainment, than learning. This could present an opportunity, since it is widely used by the students and can be utilized by the universities in order to facilitate the education process. Professional networking is also not well recognized by the students, and can be improved by better interaction between professors and students in the social networking.

E-learning environments are new to most of the students in the National Sports Academy, and they are keeping to more traditional forms of acquiring knowledge, such as reading text or watching videos. The true positive sides as group projects and interactive tasks are something that they consider difficult at the moment.

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THE INDUSTRIAL TRANSFORMATION AND INSTITUTIONALIZATION OF SOCCER IN SPORTS

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Keywords: *Sports industry, institutionalization, sports economy, strategy*

1. INTRODUCTION

Due to globalization, the world is in a big wave of transformation. Sports industry, which has become a sector in this wave, is experiencing a big change with the development of technology since the 1990's. Together with globalization, with the process of institutionalization and/or professionalization, the culture of winning and the will of gaining success have counteracted the sportsmanlike values.

Football, which compasses the biggest field of sports economy, has rapidly receded from the Olympic concept and has become buying and selling merchandise. For many years, sports have taken an important place in human life both directly and indirectly in different ways. This activity that people have experienced in different ways has been beyond a social fact but now it is as becoming a field of analysis scientific research in sports economy, sociology, psychology and management so it has been accepted as a discipline.

Due to football as an industrial business line, the growth of economy, harboring groups and individuals of different expectations and sports clubs in sports organizations of one each owning club structures fulfills the needs of the wide socio-cultural and economical atmosphere and manages these dynamics precisely.

2. LITERATURE REVIEW:

2.1. Institutionalization in Management:

Management is defined as a period of coordinating human power, money, equipment and place in the most effective and organized way to reach the aim of the organization and also keep it in a dynamic balance under different circumstances.

The most important functions of the management are carrying out the missions of *"planning, organizing, guiding, coordinating and inspecting".* In the function of the fields mentioned above, it is necessary to show effort firstly in planning to find how to reach the anticipated vision and aim by what kind of work to be done, which order to be put, how to do and what period to be reached in order to produce the projects; secondly in organizing possibilities required people, tools and equipment are determined and provided for reaching the business plan. Organizing them in an effective way and determining authorized body and responsibilities create group thinking as works to be done [7]. In being guided to set an action, the order could be provided by planning and organizing, by telling the subordinate what to do by leading them in developing all kind of their efforts and the area of specialization, by motivating them and making them to communicate with themselves effectively [3], by coordinating the efforts under specified time frame, by inspecting and controlling, by comparing the actual results with planned ones and by showing effort in corrective act if necessary [4] to fulfill the missions given.

The aim of institutionalization is to have a managerial philosophy that brings up the responsibilities and obligations that aims to protect all the rights of the stakeholders. To institutionalize the organization, studying according to the basic principles of institutional management such as equality, transparency, explanatory and taking responsibility has to be determined. In this sense "relationship management, risk management, performance management focused on the aim and following [1] strategic manage-

ment, total quality management, human resources management, and similar management techniques need to be applied effectively.

Institutionalization is the basis of developing the quality of the management and to sustain this development. In these structures, there is an agreement between the subjects on what is going to be done by who on what purpose, when, how and with whom. The communication is provided with the unabridged vertical and horizontal flow of knowledge. Decision points are reached quickly if there is not any distortion of information. In institutionalized structures, while people define themselves much better, they also exploit from objective data. Different ideas can be easily defended by transparency thus management is much more human oriented.

2.2. Sports Management:

Today, mentioning how to overcome the definition of sports management and economical problems of sports, creates an impression as not enough importance has been shown to this matter. The problems that the management face are not only economical and this reality is considered by all sectors in sports field. The differentiation and development with several complexities of sports institutions have increased since the 2000's.

The definition of sports management refers to "the management of all the activities that are needed to be carried out to fulfill the missions within performance period [6].

While the functional fields of sports management are examined, sports economy, sports psychology, sports law and sports sociology which are sub-disciplines of sports science have to be applied for the development of sportsman skills, medicine, biomechanics, training science, pedagogy, psychology and sociology which are also seen as related fields.

2.3. Club Management: "The Present Problem Spots in Turkish Football"[5]

The Turkish Football Federation has managed Turkish football under an autonomous structure since the 1980's. 85% of the General Administrative Board that is the highest level of the federation is composed by club managers whose professions are not about football and/or sports management, and most of the decisions of this board are focused on finding cues to the daily anxieties of football, and however solutions are really far from scientific approach.

Under the light of UEFA Criteria's, considering the existing organizational executive and financial structures, following problem areas are examined by personal observation and by professional experience:

2.3.1. ***In Existing Organizational Structure [5]:***

The big majority of clubs in club structure are composed by General Assembly with members and candidate administrators. In this model; the institutional administration and the sustainability of the administration is difficult. As the members are not financial shareholders, they have no commercial connections. The main criteria are sportsman success. It is seen that administration is continually changing with a system appertaining to the personal sources and management skills of the club administration. In this capacity, there are no executives to apprehend the transformation dynamics of the football industry, not much of an importance has been shown to long-term permanent strategies, control mechanisms are not used, the duty allocation is not done clearly, strategic counseling services are not used, there is too much substitution of trainers and players and the needs of economical and commercial rationalism are not carried out.

2.3.2. ***In Administrative Structure [5]:***

In administrative structure there is no transparent connection network and defined roles appropriate to the corporate structure, a practiced mechanism and systematic strategic planning based on a system is not accepted, the media is not managed correctly and the corporation cannot create its own social media network, there is no call to account, the targets are not definite, there is a tendency of insisting on incorrect acceptance, there is a prevailing belief that changing the trainer will refresh the team, there is a need of approval of the supporters, there is habit of working with people, who has grown up with football culture, authorization period has not been done, there is the lack of sports professionals perfect and technically well raised, the image, esteem and brand of the club are not developed, the

responsibility differences between the upper level and trainer is not brought up and the balance of power is not provided, patience is not shown to trainers for long periods of working, an effective and productive sub structural system is not developed, there is no appropriate structure for corporate activities and interior-exterior inspections to audit the financial structure and the capacity and designs of the stadiums, that is one of the biggest asset for the corporation, is not reunited for today's appropriate modernity.

2.3.3 ***In Financial Structure [5]:***

In Financial Structure, profitable and long-term sponsorship agreements haven't been done with major commercial companies, new and associative attempts have not been formed financially, which has no direct interest in football, there has been uncontrolled debt, no importance is shown to the footballers transfer income, which is one of the basic incomes of the clubs, high transfer fees are paid while buying footballers and sold at the given price, the appropriate records and files accepted by accounting standards are not appropriate for the auditing , they cannot protect the credits of the clubs.

3. PROPOSED STRATEGIC MODEL: "RESTRUCTURING THE SPORTS CLUBS IN THE LIGHT OF UEFA CRITERIA" [5]

Union of European Football Association (hereafter UEFA) is a representational democracy formed by 53 National Football Federations, and has come into prominence by FIFA as a federation of one of the six continents. The vision of UEFA is "*A European football family trying to develop the pleasure of the game*."[8] UEFA is active in a wide range to recognize and develop European football with the philosophy of "Football First" to arrange senior games for national teams, to arrange games for the best clubs in the world, to develop the concept of coaching and football grassroots and to co-operate with national federations. Whilst it was planned for all clubs to get their licenses according to determined criteria before the 2004-2005 season, the validity was firstly extended to 2007, then to 2014. The implementation period is still observed by some local federations, and in some countries, the criteria are not required for teams that are not competing.

Criteria are gathered in five groups and clubs that have not got their licenses are not able to compete games in Europe. UEFA demands this from national leagues including Turkish Football Federation (TFF) .The criteria are listed as the following [6]: Sports criteria (for young players); Youth setup criteria (viewing circumstances, stadium criteria), Personnel and Management criteria (professionalization), Legal criteria (collaborative legal youth setup), Financial criteria (rate of wages, transparency, salutary economical structure). Thus the proposed model is suggested to easily adopt such criteria proposed by UEFA.

3.1. Administration Model: For creating a competitive power, football clubs transforming into an economical organization are in the need of being managed as corporate with special administrative model. Corporate administration with an exact administrative philosophy aims to betray the responsibilities and liabilities of the company and also protects the rights of the shareholders and stakeholders. In light of these, plan including several phases should be done for institutionalization. Following phases explain the plan:

In the First phase, strategic management model for the institution and the general definition of the organization are set:

- **Vision**: To create a club that is proud of its success.
- **Mission**: To develop elite sportsmen and provide sustainable success in every sports field that activates social unity and interdependence.
- **Business Philosophy**: Completing the administrative functions, determining the management style and approaches, developing the club and football management.
- **Organizational ID**: As a part of the vision determined, in the institutional structure that the club will compose on the incisive devices, high brand value, effective marketing and communication skills, and skillful human sources. In the end all of them should be internalized.

In the second phase, the quality concept should be accepted and the business operations have to be done in accordance with this concept. Main purpose of the administration is to actualize the vision; to

fulfill the duties of "Planning, Organizing, Leading, Coordinating and Supervising". It should be known what kind of work to do, how to do and when to complete them. The efforts should be coordinated, the time should be managed, the progress should be monitored and the results should be compared and if needed, the process is recovered. To manage this period correctly, there is the need for Duty Definition Forms and Procedures of Managing Business Periods and Standards.

In order to the works to be done and standards to be determined under the quality concepts in the club's activity fields, the names of the procedures of sports, personnel and financial affairs, purchasing, and store management types that are desired to be in a sports club are listed in Table 1:

Table 1. Procedures

Sports Procedures	**Managerial Procedures (including Personnel Management)**
Professional team, bonus, payments and discipline, List of claim and allowance of sportsmen and personnel clothing, Sports schools (football, basketball, volleyball, tennis) activity principles, Football academy activity principles, Transferring professional and amateur footballers Medical services Competition and protocol services.	Security Rules of correspondence and paper work Package food service and food supplies Determining/implementing the wage Schedule of sports schools, football pitch and Synthetic pitch Camping foundations – guesthouse Personnel affairs and employee rights Personnel and sportsmen rewarding system Communication and public relations Process of travelling abroad Composing a duty definition form
Financial Affairs and Purchasing Procedures	**Merchandising Procedures**
Expense entries Principles of preparing annual budget Management of purchasing and outcome evaluation Bonus system of business developing, advertising and marketing Principles of financial affairs	Sportsmanlike products and store management

Lastly in the third phase, continuation in institutionalization culture and sustainability should be provided. Within the context of this work, the first phase is very important. During these phases several strategies are envisaged in related fields as the following [5]:

General Strategy: is to create a club with Powerful Institutional ID, High Brand Name, Economically Sufficient and having a place at the top league and European Cups.

Sports Strategy: in accordance with short and mid term aims, for the success of the club, there is the need of a team appropriate to strategies and need of appropriate transfers, technical staff permanency, and a powerful substructure.

Structure of the Team: the criteria of the possibility of a player's injury, lack of fitness, illness, deficiency of performance, creating rivalry, financial disagreements are to be considered during team creating phases. In the league marathon, there is the need of enough numbers of players, a balanced structure and a system determined by the trainer

Transfers: The structure of the professional team players should be planned for the following year. In this plan, the transfer committee should continue working on transfers in every period. In case of agreement with the players financially that are planned for the team, the transfers should be done at

the most appropriate transfer season. In all transfers, the approval of the transfer committee report for financial affairs department, human sources and technical team should be preferred.

Substructure and Institution Investments: The substructure has an important place in strategic vision. Successful substructure system could assist in the development of the next generation sportsmen and also be a source for the technical team. In the development of sportsmen, scientific methods should be applied. As such, all the sportsmen of the substructure should be watched as they develop and the program provided for them. When the players reach an enough level, they should join the professional team with the approval of the technical team. For the team and substructure, the institutional investments should also be determined appropriately to the investment strategies.

Brand Strategy: To create a successful profile for the club brand; Club Company, regional supporters and the degree of perception in the country should be positioned correctly. Thence, a brand management plan should be prepared appropriate to the company's general strategies, including communication and marketing strategies and within these plans, increasing the brand value should be preferred.

Communication Strategy: In the light of the general strategy, supporter clubs, web sites, official corporations, the press and the broadcast organs should be used effectively. In the following year's communication plans should be prepared to provide coherence and holistic views for the messages that the represents the club. the technical team, sportsmen, workers and supporters should take role in integrating the club in hard times. The aim should be carrying the effective communication strategies and brand values to upper stages.

Marketing Strategy: While reaching the targets betrayed by the club, marketing strategies should be created for sustainable success. By gaining success, as the brand value increases new projects and sportsmanlike products should be developed. Income producing skills in existing business lines should be developed and marketing plans should be made to create income entries with commercial investments. At the implementation of these plans, besides the income entries, activities providing extras to the club advertisement should also be planned and in the end of every year budgets should be done in the context of envisioned plans for the following year.

Financial Strategy: So as to be a worldwide club, strong financial strategy is needed in business structure. Planning effective financial plans and having a financial discipline can accomplish strong financial structure. The investments and payments can be done under target budget and institutional principles. In the end of every season, targets reached within that year and the targets of the following year should be evaluated and the following year's budget should be prepared considering to the financial conditions. An effective plan can only be done by a disciplined implementation and after reaching the target; the financial period can be realized appropriately within "On-site Observation Principle".

Investment Strategy: The most correct commercial and sportsmanlike investments should be in line with the determined targets. The needed investments have to be determined with plans concerning all departments and the time frame such as short (one year), medium (three years) and long terms, and in the end of every season the investments have to be observed and the following year's investments have to be revealed. The club must be developed only if by permanent investments.

Human Source Strategy: The human resources should also be included in the short-medium and long-term plans. It should be recognized that sportsman do not only achieve sustainable success by himself, it is possible with the other workers of the club, so holistic view should be adopted for human resources strategy. The workers in the club should also act like the owner of the brand and they should be aware that they are not working for an average institution. Therefore, the concept of working should be focused on results that include the professional staff and systems. To support this concept, the workers should be informed about the club's history and aims from the very first day that they start working. The expected success can only be reached by the high performance of the workers.

The performance management system and targets of the club have to be transformed into the target of the workers. Besides, the performance of the workers should be monitored objectively and feedbacks could be used for determining high vs. low performers.

Quality Strategy: The operations should be carried out under the model of perfection. Under such conditions the sustainable success could be achieved. The quality concept of the club should not be limited with only product and service quality, under the model of perfection, every working period should be examined and the efficiency should be continually developed. These determined strategies should be communicated with the workers in every level by messages and by periodically studies and projects. Besides, the workers have to be motived to create ideas.

Rivalry Strategy and Profitability: According to sustainable growth and profitability, a system of "Risk management, Internal Controlling, Internal Supervision, An Effective Financial Process Function and Independent Financial Reporting with Independent External Supervision" should be created. The potential risks with should be continually considered and precautions should be taken considering risks.

4. CONCLUSION AND MANAGERIAL IMPLICATIONS:

Today, sport is a fact, which develops the individual physically, spiritually, emotionally and socially, and forces the community to change economically, socially and culturally. Developing technology, great investments, will of being powerful, new searches for civilization and being human cause sports which is as old as mankind to be more developed meta [2]. Today, sports philosophy is in a rapid change from the past 20 years. The organizational structure of clubs comprising incomes, the feature of the supporters, the physical conditions of the stadiums, physical and technical capacity and quality of the sportsmen, technical and tactical application skills of the coaches and the written and mass media are all effective in managing the dynamics of sports. Football, which composes the repellent power of sports, is the most important part of sports industry and sports clubs which have been managed by amateurs kept failing in the past, so restructuring in economical, financial, legal, social, cultural and organizational ways is necessary.

Sports clubs, managed with budgets of millions of dollars, are in the tendency of institutionalization under the pressure of UEFA with a stability, by focusing on an aim accepted by all the shareholders (player, coach, manager, supporter and press) with more contemporary and professional managers. It is considered that the basic of the problems in sports clubs are insufficiency of the administrators, incoordination between the levels in managerial segment, between the original structure of the sector and the exact needs.

When the local, national and international power of the sports organizations are considered; it is inevitable for the clubs to transform their economical, financial, legal, administrative and organizational structures into modern ones.

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CHESS PLAYERS AND EVENTS DEVELOPMENT

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***Keywords**: chess development; performance indicators; active players; open and round robin tournaments.*

Study, commissioned by the FIDE Development Committee revealed that in recent years chess has grown strongly over the world. Statistics show that over the last 5 years the number of players with international rating has almost doubled. For the same period open tournaments in the world grew by 37%.

The aim of the study is to define several important indicators by which to measure the development of chess. After a lengthy discussion, Development Committee has considered six indicators. These indicators have been measured by Martin Huba, the President of Slovakian Chess Federation. Four of them are directly related to the sporting side of chess, while the last two relate primarily managers and chess tournament organizers.

We will look more closely at four of them.

Number of active players with FIDE rating

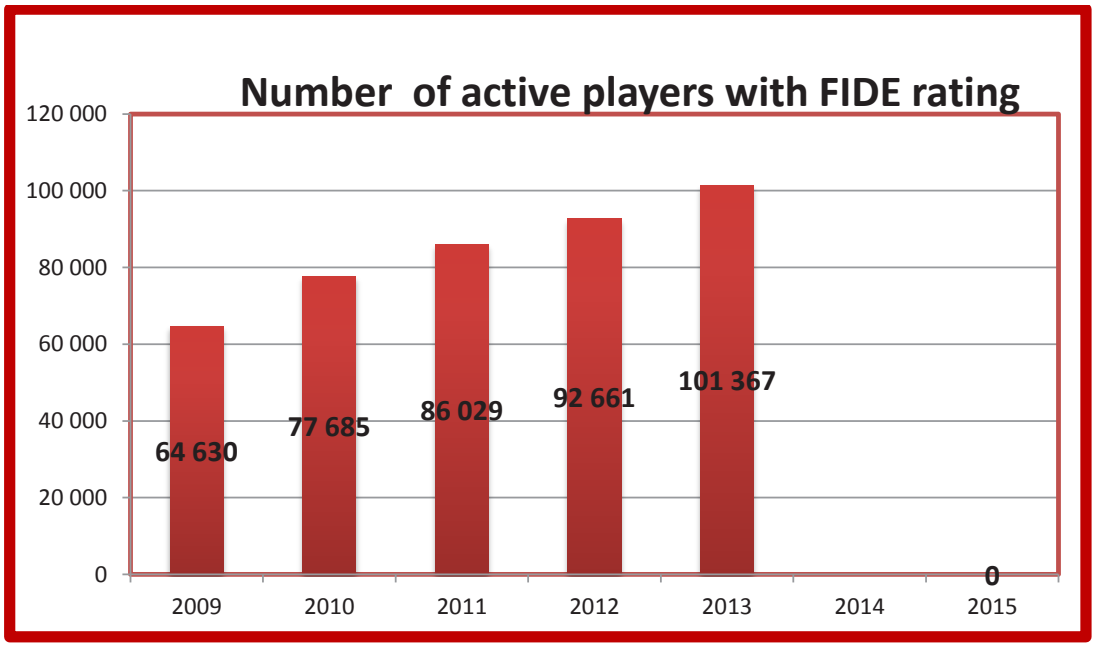


Fig.1 Number of active players with FIDE rating

It is evident that during the last five years the number of active players with FIDE rating has been almost doubled. These players represent 164 national federations. The prevalence of the game, its great accessibility to different age groups and social strata, its Independence of ethnic, religious and government policies, as well as its good structuring in National federations indisputable are among leading reasons of that. The fact that FIDE does not require any fees and registrations of players with international rating also contributes to an increase in their number.

The following table shows the national federations with the largest contribution to this statistic at the end of 2013:

Table 1 National federations with the largest number of active players with FIDE rating

#	Federation	2009	2010	2011	2012	2013
1	Spain	6 973	8 430	9 195	9 527	10 149
2	Germany	7 538	8 258	8 553	8 780	9 384
3	France	5 409	6 684	7 606	7 986	9 019
4	India	2 475	3 736	4 735	5 209	7 014
5	Russia	5 196	5 704	6 268	6 511	6 649
6	Czech Rep.	2 297	2 879	3 123	3 463	3 703
7	Italy	2 318	2 811	3 087	3 279	3 437
8	Poland	2 442	2 788	3 062	3 256	3 385
9	Hungary	2 534	2 967	3 060	3 150	3 350
10	Greece	1 214	1 571	1 813	1 985	2 201

The trend observed without exception in all federations in the ranking is a progressive increase in the number of active players with international rating every year. Logical is the fact that in typical chess countries like Spain and France, growth is the most stable and most even. Against this background definitely strikes surge in India, where players with ELO FIDE have increased by almost 5,000 in the last 5 years. This is explained mainly by the immense popularity that the game has gained along the reign of Viswanathan Anand of chess Olympus (in 2000 he became the first Indian to win the World title) and with the increased number of international tournaments that take place in the country also. Throughout the country now there are many chess clubs, and in many primary and secondary schools chess came as optional subject. This boom led to a serious increase in the number of Indian Grandmasters from three to 34 in the last 3 years. Statistics shows that 74% of all active players are representatives of the 20 federations. Chess remains the most popular on the continent, as only two of the countries on the list - India and the U.S. - are outside Europe.

The next indicator is

Number of open tournaments

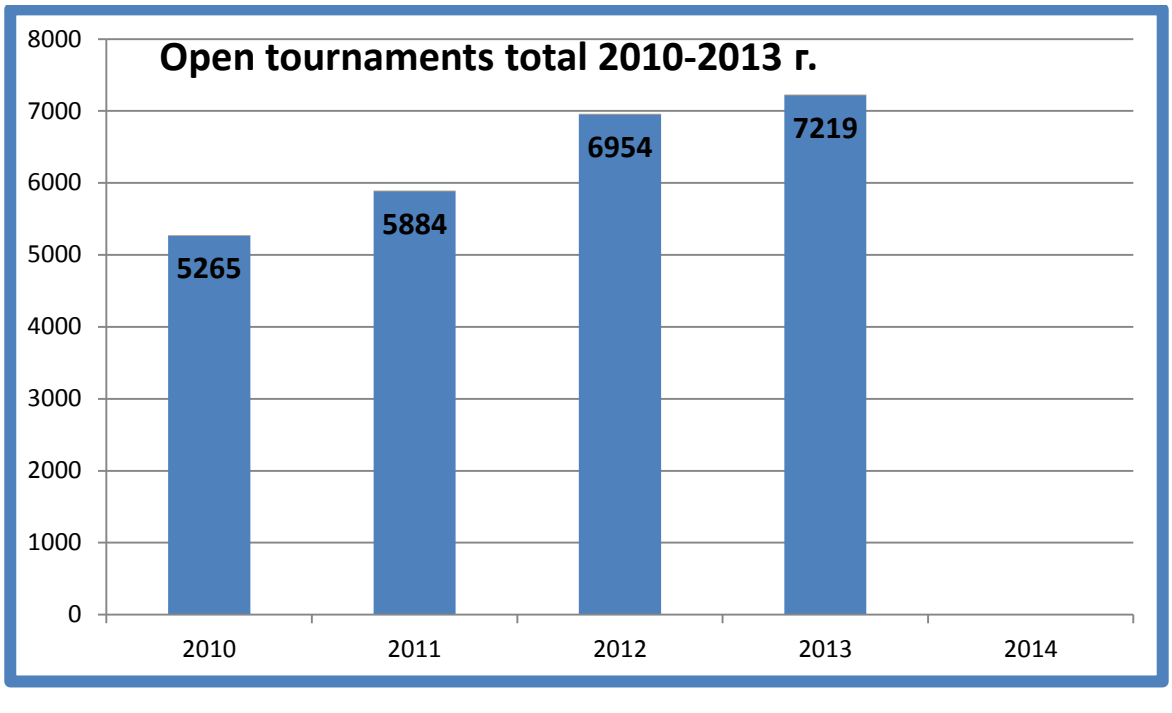


Fig.2. Number of open tournaments)

Due to the large number of participants open tournaments are the best advertisement for chess. They enable players of all chess levels and of different nationalities to compete with each other. In the most common of them, so called chess festivals, involving several different tournaments, the number of participants exceeds 1,000. For example, in this year's Moscow Open organizers reported participation of nearly 1,800 players; one of the most popular festivals - one in Gibraltar include seven tournaments that bring nearly 1,000 participants. Most visited are summer opens where chess players combine their fight for the first places with vacation. Due to the fact that in these tournaments there are many players without FIDE rating, they are not included in the statistics of the International Chess Federation.

During the observed period, the number of opens has increased by 37%. The next table gives response where most of them are being organized:

Table 2. National federations organized the most of opens

	Federation	2010	2011	2012	2013
1	**France**	629	565	697	703
2	**Spain**	479	497	570	512
3	**Russia**	354	417	517	503
4	**Italy**	419	454	515	486
5	**Germany**	299	311	331	363
6	**Poland**	230	280	325	344
7	**Greece**	186	212	259	258
8	**Hungary**	154	155	172	250
9	**USA**	155	212	245	211
10	**Netherlands**	149	168	166	200

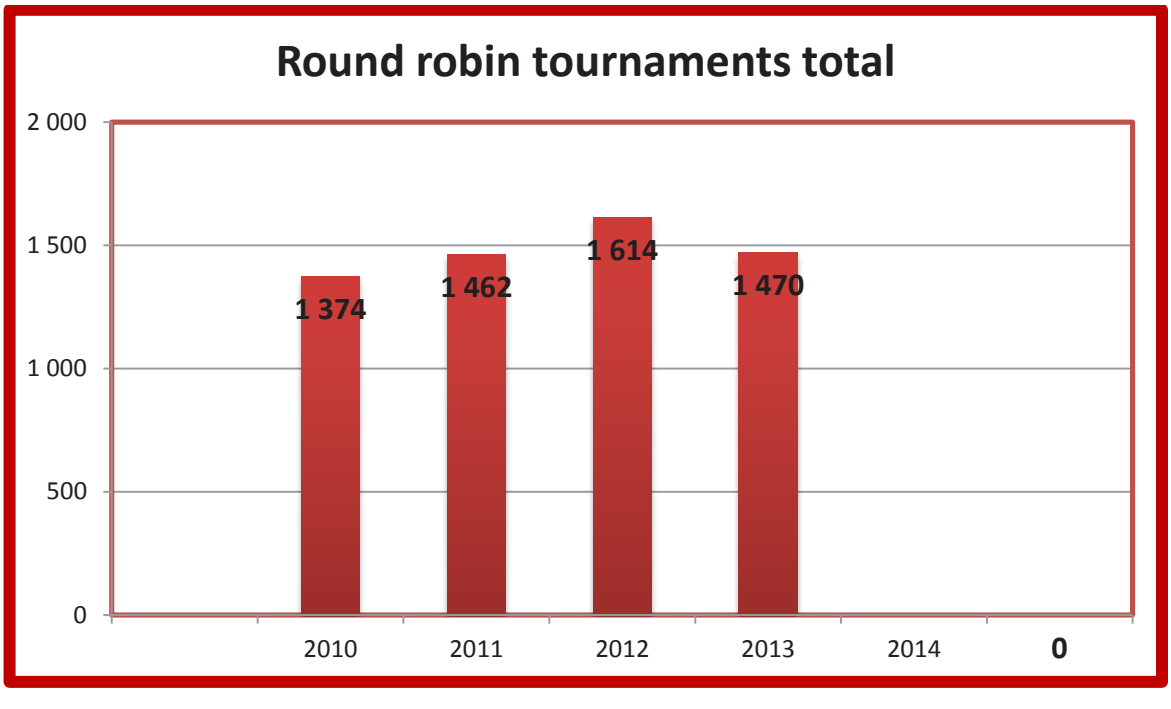


Fig. 3. Number of round robin tournaments

The top 20 federations organized 71.45% of all open tournaments in the world. Huge share again belongs to European countries, with the exception of the United States and India, Brazil is the third non-European Federation found a place in the top 20. It is worth to note serious leap of Turkey, where in 2013 were held 51 open tournaments more than in the previous year. Undoubtedly, this is due to large

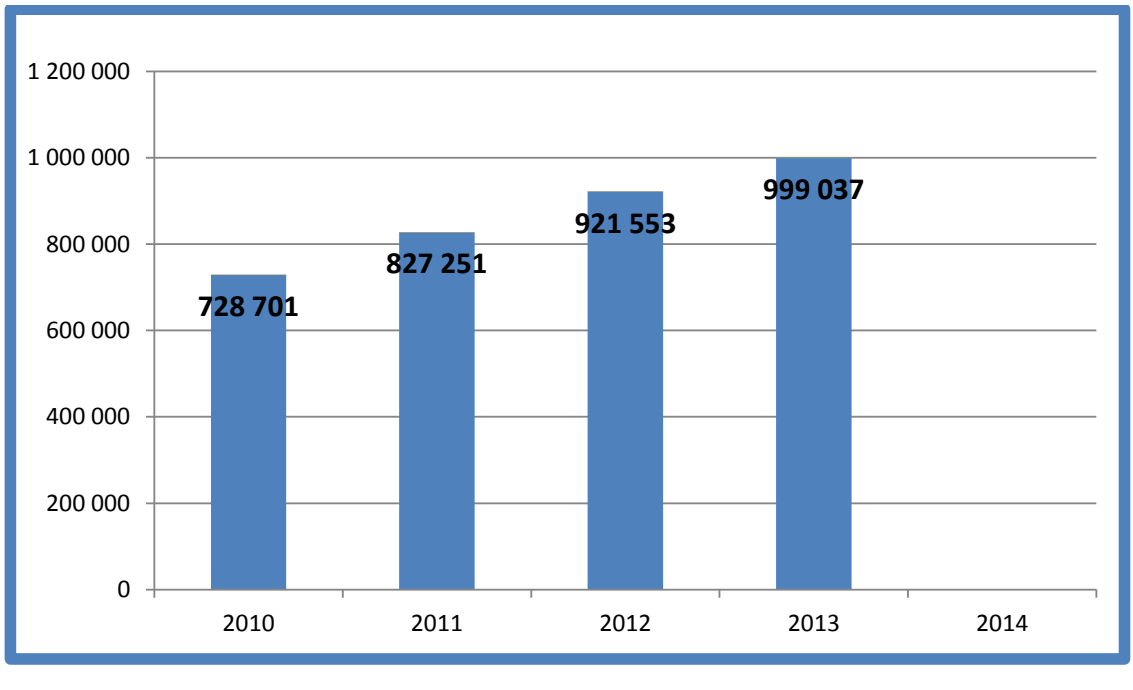
funds that have being invested in the Turkish chess in recent years, during the local federation is headed by the Vice President of FIDE Ali Nihat Yazıcı.

The third parameter to measure the popularity of chess is the number of round robin tournaments in which, as is known, only participate personally invited Grandmasters. The cost of such competitions is mainly by the sponsors as it does not rely on income from participants' fees. This highlighted the managerial skills of the organizers, and the economic situation at the moment.

Last year, the number of round robin tournaments decreased worldwide and it is mainly related to the withdrawal of sponsorship support for them. The global economic crisis is still having a great impact on chess and its elite vision - round robin tournaments. Round robin tournaments, especially those of high level have become „boutique" projects of chess patrons with serious possibilities. Prize funds of these tournaments are not usually advertised and personally invited participants play for individually negotiated fees. The largest such event in 2013 was Memorial „Alekhine", which took place in two major European culture capitals - Paris and St. Petersburg. Ten top grandmasters played the first part of the race in the Louvre, and the second - in the State Russian Museum in St. Petersburg. The idea to connect chess with art appealed to participants, the media, and the audience, and success encouraged sponsors who have pledged to support the project in the future.

Table 3. Top 10 federations organized the most round robin tournaments

#	Federation	2010	2011	2012	2013
1	**Denmark**	71	139	155	187
2	**France**	102	79	165	141
3	**Russia**	139	171	145	105
4	**Spain**	86	81	77	82
5	**Hungary**	84	97	95	76
6	**Germany**	67	70	56	62
7	**Ukraine**	74	58	52	56
8	**Sweden**	30	35	34	46
9	**USA**	33	44	53	41
10	**Poland**	46	40	37	35



(Fig. 4. Number of games played in total around the world

Statistics shows the top 20 federations organized 71.43% of all round robin tournaments. Leadership of Denmark surprise, but the ranking is based on the number of tournaments without assessing their quality. The strongest round robins undoubtedly take place in France and Russia. Over the past few years in Russia a modest but strong patronage lobby has been formed, which aims to return the previous chess glory of the country. Prestigious round robin tournaments, however, generally do not bring the sponsors anything but personal satisfaction.

The number of games played by chess players with international rating is a direct result of those present indicators. There is a direct correlation between the number of international tournaments and that of professional players.

In 2013 there were almost one million FIDE rated games played in total around the world. This makes 2737 games per day!

Table 4. Countries with the highest number of games

#	Federation	2010	2011	2012	2013
1	**Spain**	155 675	163 243	174 018	189 945
2	**India**	86 652	125 131	131 830	182 640
3	**France**	127 061	151 458	160 598	180 281
4	**Germany**	114 761	119 678	121 692	139 928
5	**Russia**	121 929	134 884	137 486	137 614
6	**Poland**	57 665	65 598	64 807	81 508
7	**Czech Rep.**	62 943	67 633	63 577	78 871
8	**Italy**	59 849	70 263	74 314	72 702
9	**Hungary**	60 046	61 747	59 942	71 116
10	**Greece**	37 055	53 985	52 584	55 841

Quite expectedly leaders in this group are countries with the highest number of tournaments - Spain and France. The development of India on this indicator is the most promising.

CONCLUSIONS

1. The number of players with international rating is rising constantly worldwide.
2. Increased number of chess players leads to growth of open tournaments – up to 37% during last 5 years.
3. Europe is still the main area of chess battles. With the exception of the United States and India, Brazil is the third non-European Federation found a place in the top 20 National federations organized the most of opens.

VIOLENCE IN SPORTS

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Key words: *violence, sports, society, ethnos, religion*

At the heart of sports` enduring popularity lies people`s desire to measure their own ability against the ability of other people. This may be related to the desire to win, to gain superiority over others and occupy a higher place in the social hierarchy. Moreover, sport plays very different and positive functions [6, 7, 9, 10], but it should never be forgotten that it largely relies on competition between the participants. The nature and social function of sport as a social institution is namely the transformation of the social interaction into a type of competition, but as a struggle between social actors to reach a goal e.g. fighting for domination over certain limited resources, i.e. competition, rivalry.

Each type of competition is more of less based upon aggression, especially in combat sports where we have a direct confrontation between rivals. It is obvious that the presence of aggression in the majority of cases is restricted to a minimum, but its occurrence in its extreme cases is called violence.

„Violence can be described as a misuse of power (physical or) in violation of a law, individual rights and sovereignty of people. When it comes to sports violence consists in breaking the rules by the participants, or in public nuisance on the part of spectators. So formulated violence should not be confused with either the fighting spirit or an aggression which could be a good thing when used without brutality in keeping with the rules/when observing the rules“[14].

According to Gilbert`s Typological analysis, martial arts fall into the so-called hard violence [13], where „the aim is to cause pain and suffering or physical injury to the enemy“ (Clement, 1985; Atlas, 1997, Payne, 1993), but according to sport`s rules, i.e. violence in sport is institutionalized.

„Sports violence is any behavior that causes physical or psychological harm associated with direct or indirect sporting experience“ - Jemieson, L., T. Orr (2011) [12].

Hypothesis: We assume that in the course of the present study various predominant reasons and factors for violent behavior will be reviewed, including ethnicity and religion, among people parctising martial arts as well as among non-training people.

The purpose of this study is to determine the reason, factors (including ethnicity and religion) and peculiarities of violence among athletes practicing hybrid martial arts.

So our goal is to define the following tasks:

- To reveal the causes and factors leading to violence (including ethnicity and religion) and their impact over the people practicing martial arts;
- To underpin and analyses the interrelationships and interdependencies between sport and violence among athletes practicing martial art as well as among non- training people;
- To draw theoretical and practical conclusions and provide recommendations regarding sports activities, aiming at violence prevention.

The subject matter which is being researched is the causes and factors leading to violence in combat sports.

The people **objects** to the empirical survey are divided into groups:

- Practicing boxing and kick boxing at NSA “Vasil Levski” – 50 % and at South Western University “Neophyte Rilski” – Blagoevgrad, non-trainers - 50%, total 44 students – men;

- The majority about 90,9% are aged 20 to 27 years, while 4,5 % are below or above that particular age group.

In order to solve the main problem of achieving the goal and proving the hypothesis, we apply a methodology of studying literature sources, observation as well as conversation with the respondents. We also employ a questionnaire on the issue of violence in sports and how to overcome it. It consists of 28 open and closed questions.

Sample methodology used in the survey. We have attempted to carry out the present research among students from NSA "Vasil Levski" (Coaching Faculty) and at South – Western University "Neophyte Rilski" Blagoevgrad (Faculty of Philosophy) , I and II course at both universities. The respondents 'selection is random and they are divided into 2 groups in advance - practicing martial arts and non-trainees (before processing the data array).

On the basis of expert evaluation when analyzing the data acquired, we focused our attention upon some basic questions, connected to martial arts violence.

The data was subject to mathematical statistical analysis [1, 2] using the SPSS 19 program. The resulting information was processed by calculating the absolute and relative frequency in one-dimensional distribution of the data.

Organizing the conducted research

The scientific research was conducted at The National Academy of Sport "Vasil Levski" - Sofia and at South -Western University of Blagoevgrad " Neophyte Rilski" in May and June 2014.

ANALYSIS AND INTERPRETATION OF THE RESEARCHED DATA

When analyzing the questionnaire results we found out that according to the group of students practicing boxing and kick boxing, violence is a poorly distributed social phenomenon - 40, 9%, while 59, 1% of the non – training hold the opinion that it is valid to a certain extent.

The interesting thing is that, coming second according to the evaluation of all respondents` reaction comes the statement "I am not sure" - 13, 6 %, however among the non- training there is another answer corresponding in percentage to the previous " violence is widely distributed". The non-training are divided regarding their opinion on the issue in question. May be this is due to the fact that according to a part of the group of non-training are practising a certain type of sport from time to time - 40, 9% (fitness, football, aerobics, dancing), however non-professionally.

That group associates sport predominantly with the benefits it brings to a person`s health and for this reason 50 % respond that sport help them in different aspects of their lives.

According to them the positive sides to training are: enjoying good health, habit formation, breaking away from the busy lifestyle.

While according to the group training boxing and kick – boxing, the positive sides of this particular sport are connected mainly to discipline, order, habit formation, character formation etc. The goal is to reach an appropriate socialization according to the specific sports activity [3] and it includes six basic elements: maximum physical activity, perfection, mobility, developing an appropriate attitude towards the sports activity. The essence of sports activity and namely among the martial arts contestants, as a specific type of human activity reflects the material and subjective reality in their unified whole - interconnection and subordination. Theory and practice confirm the unity of conscience and action.

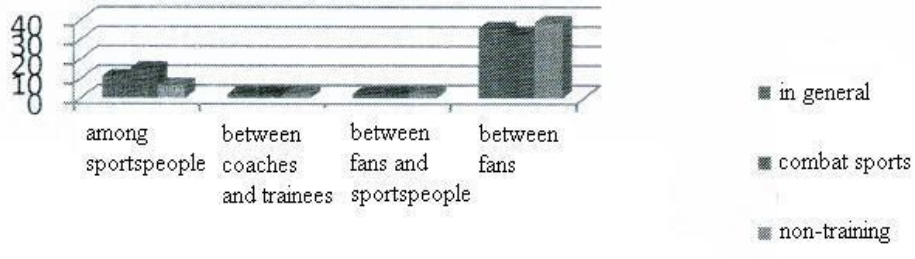
To the question "**If you had given up a sports career what the reasons for that would have been?**" 68, 2 % of the respondents believe that the reasons are complex. The main types of difficulties regarding the different types of crisis in a sports career at this stage are deemed to be the harshest for most contestants and are evident in the answers of the respondents.

Another interesting answer is the predominant 27, 3 % answer to the question "**I have chosen a different career path**" while among the non-training it is 50%. That could be viewed through the prism of the shorter career path of martial arts contestants, which lasts f only for a few years` time when compared to other careers. Other reasons among boxers and kick-boxers are: trauma during or following a work-

out 18, 2 %; due to bad relationships with teammates, with coaches, with the leadership of the Federation – 13, 6% and the same percentage for financial reasons, etc. This reveals that overall violence is hidden and sometimes abandoning one`s sports career is a result of several types of violence - physical, psychological and economical.

To the question "**In the relationship among which groups is sports violence most common?** " - the first place 35, 6% of respondents indicate that violence most commonly occurs among sports fans (Fig. 1) That view is unanimously supported by both groups in the study. Sporting challenges draw attention on themselves because of their elaborate spectacle and aesthetics and present a special form of satisfying certain psychological needs (identification, projection, response, mythical ritual. The root of spiritual self-identification in contemporary culture is the ancient warrior of ethos and fighting [11].

Fig. 1.
In the relationship among which groups is violence in sport common?



Viewing spectacular performances are some of the most important regulators in the life of the socium. The spectacle is inconceivable without an audience - they represent one of the participants of the sporting event and are also consumers of the public show [7]. But in this case the respondents associate it with a negative connotation. "The fans" form so-called subculture of violence according to Zlatanova (2005) [4].

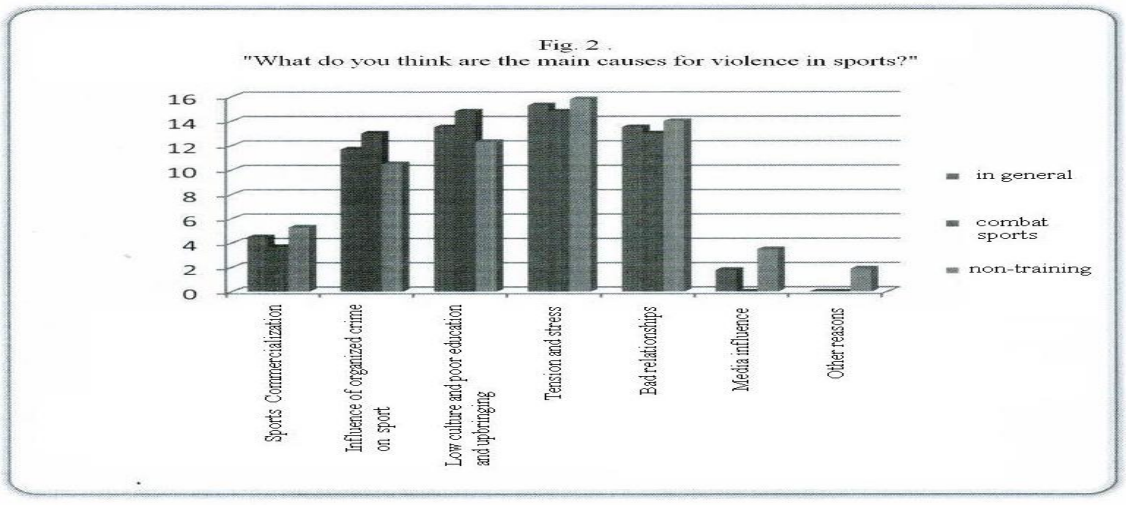
Coming second, as a distribution of violence in sports generally and in the group of practicing martial arts is the answer "between athletes" - 15, 2%.

Viewing aggression as a source of violence, it is necessary to focus not so much on the biological factors (according to experts' evolutionists, instinctivists, ethnologists, behaviorist, geneticists and biosociologists) as an "instinct to fight," and on the psycho - cultural plane – is the "archetype of war." Moreover the conscious grounds for practicing martial arts and sports challenges may occur due to subconscious motives associated with the cultural heritage archetype. Acting out upon the need of "The role of War'' instinct is one of those hidden necessities [11].

In the course of competition and in the spirit of fair play, consistent with the obtained results we notice a certain reduction in violent behavior. That, to a certain extent is due to the adoption of strict punishment measures against any aggressive type of behaviour that is outside the appropriate norm [6]. But task assignments to "win at all costs" when participating in competition leads to excessive dedication on the part of the competitors, which could erupt into violent behavior [8]. Among both the groups tested, a small percentage of the respondents believe that between coaches, sportspeople, and fans there exists violence. Perhaps that is due to personality conflicts or other conflicts which have grown into psychological violence or simply violence at the workplace.

As an answer to the question "What do you think are the main causes of violence in sports?" (Fig. 2) the first place according to all respondents is tension and stress – 15, 3%. This is due to the specific type of sport activity and the enormous amount of expectations placed on them by coaches, managers,

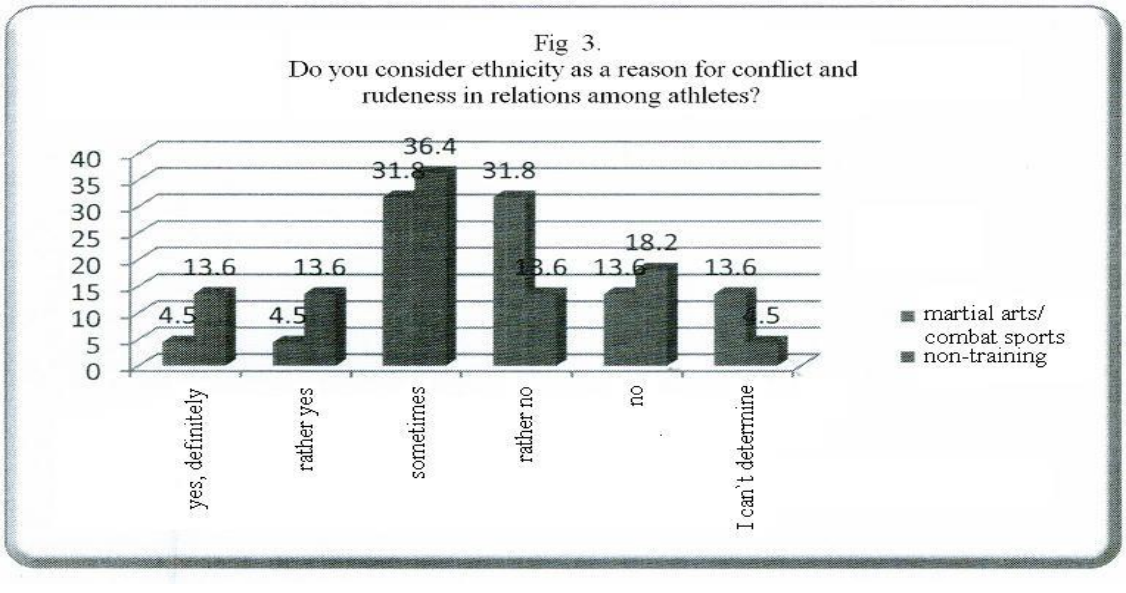
spectators. But to the martial arts practitioners uniform in power is “low culture and the poor education and upbringing of the sportspeople” -14, 8%, as opposed to the not practicing, which have rated it as the third most important reason for violence in sports - 12, 3%.



Second in place range the answers - „poor relationships between sports clubs and teams“ – 13, 5%, due to direct competition with each other for funding, media coverage, advertising, ratings, prestige, popularity and more, and „low culture and poor upbringing on the part of sportspeople“.

Thirdly, for all students tested 11, 7% is the answer to the question – „What is the influence of organized crime on sport“. In trainees the percentage was higher – 13% and lower – 10, 5% in the non-training group of participants.

Providing a similar answer to the question „Would you exercise violence for payment“ a number of respondents made it clear that they have participated in pressure groups and provocations during the protests in 2014



Coming fourth in place, according to the two groups is the answer „commercialization of sport in“ – 4, 5%, the difference in percentage between them is minimal. Spectacular performances when it come to sport are common, fascinating visitors with its unpredictable ending, equal opportunity at the start, but uneven alignment at the end, alignment according to the qualities and skills of the competitors. The intense commercialization of contemporary sport is associated with a higher income: sponsorship to the sale of television rights, advertising companies, ticket sales, attributes of contracts between players and teams.

The question „Do you consider ethnicity as a reason for conflict and rudeness in relations among university students and athletes?“ (Fig. 3) the interesting fact is that martial arts trainees put the answers „rather not“ and „sometimes‘‘ in the first position. This is due to the clear integrative function of sport, overcoming national barriers, promoting international cooperation, etc.., including reasonable ethnic and religious tolerance. According to Pierre de Coubertin „sports through its powerful physical and spiritual effects will prove to be a valuable tool for establishment of social peace“[9].

Answers „sometimes“ are a reflection of interpersonal and ethical conflict, lack of enough opportunities for social expression outside sports. Coming as explanation for all of these factors are provided some structural factors outside sport like discriminatory policies and practices, unemployment and poor living standards.

According to all respondents religion is not the cause of conflict and violence in the relationship between sports people.

CONCLUSIONS:

According to the group of students practicing boxing and kick boxing, violence is

a rarely distributed social phenomenon; however the results of the survey - 40, 9 % prove that this is not the case. Maybe that is due to the fact that violence is exerted more often outside the field of sports - and namely in the streets, at restaurants etc. The data acquired as a whole supports the hypothesis that has been put forward in the present research with the exception of religion as a reason for violence in sports.

The people practising combat sports are adequately socialized **towards the peculiarities of sports activities as a whole.**

The reasons for giving up a sports career are complex – according to some 68, 2 % of the interrogated. This fact reveals that on the whole violence is hidden and giving up a sports career more often than not is due to a combination of several types of violence – physical, psychological, economical. The main controversy determining some critical periods in a sports career at this stage are really severe for most players and are reflected in the respondents’ answers.

Violence from a sociological perspective constitutes a socially reproduced behavior and has been learned while interacting with others. The motivation for such behavior may be different, the primary objective is to avoid responsibility. That behaviour reveals inadequate socialization of the social participants in terms of norms, values and rules in society.

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PHILOSOPHY AND ESTABLISHING KINESIOLOGY

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Key words: *science, philosophy, kinesiology, scientific method*

INTRODUCTION

The aim of this article is, by means of a concise cross-sectional view of the process of scientific development and the development of distinct scientific disciplines, to demonstrate how and why it is possible to establish kinesiology as an independent scientific discipline. It was philosophy (a science) which originally implicitly included the totality of all human knowledge, whereas in recent times it merely classifies to a degree new scientific disciplines, or, as in ethics, deals with borderline issues of particular scientific disciplines.

Our hypothesis states that a quantitative growth of knowledge in a scientific field necessarily leads to the formation of new (narrower) specialized fields (scientific disciplines) and so too in the case of kinesiology. Here, nevertheless, we must add that the history of physical and health education is not to be equated with the history of kinesiology.

We wish also to demonstrate how the future of kinesiology lies in the broadness and interdisciplinary character of the study of laws determining the functioning of kinesiological systems and the management thereof.

METHOD AND RESULTS

In this paper we use the descriptive method for our presentation of scientific, philosophical, medical and technical achievements in mankind's history. Special attention has been devoted to facts and events relevant to the development of modern science and so too of kinesiology. The expected outcome is a demonstration of the validity of the claim that kinesiology is a relevant scientific discipline involving the respective segment of human knowledge and activity.

DISCUSSION

Science in its broadest sense may be defined as a group of systemetically and methodically attained and structured varieties of knowledge, but it is also the activity through which such knowledge is attained. [6, 1285] There are, generally speaking, several periods in the history of science development. Notably, in its initial period science was put on par with philosophy. Thus ancient Greek thinkers (eg. Pythagoras 582-496; Plato 428-347; Aristotel 384-322) were versed in the whole of human knowledge. The accelerated development of modern specialized sciences begins in the Renaissance (c. 14th-16th centuries). The development of science affects the development of society, is a projection of it in its own way, but also drives it forward. On the one hand, scientific insights and non-scientific experience secure the advancement of society, while on the other hand science as a social category evolves from particular social phenomena and social organization. [16]

1. Antiquity

Evidence that man existed dates back four million years. The use of tools and weapons presupposes certain skills, and a primitive and naive formulaton of a natural law presupposes, as far as man is concerned, the capacity for abstract thought by means of which a certain pattern in nature is expressed. As concerns nature, the formulation of a natural law presupposes that nature as it appears is not a chaotic confusion of disconnected events, rather there exists a certain order in animate and inanimate natural phenomena. It is precisely due to the orderliness of nature and the capability to think abstractly that man formulates natural laws and manages to accelerate considerably everyday production skills. [16]

Greek philosophers (cosmologists) sought the first principle of nature (*ἀρχή)*. Thus, Thales (640 or 624

- c. 547) discovers water to be the first substance from which all things come to be, while it remains - being indestructible - the permanent principle (substance) of all that occurs. For Anaximenes (585-525) the principle is air, for Heraclitus (c. 535-475) it is fire, for Empedocles (495-435) there are four elements, namely, water, fire, earth and air. Parmenides (515-450) in negating motion proposes that the *‚One Being'* is the foundation of existence, while Anaxagoras (c. 500-428) gives preference to the eternal *Mind* as the cause of harmony and order in the cosmos. [1, 983b-984b] We see that, as the first principle, some choose the material (palpabale), others the „spiritual" (impalpable and omnipresent). Both, however, affirm man's mental capacity to create abstractions - generalizations with respect to all aspects of reality.

Sophisticism (5th-4th centuries) places man, laws and customs at the focus of philosophical reflection, while Socrates (470-399) through consciousness of his own ignorance („I know that I know nothing") raises himself with self-awareness above the masses, above even state laws. [12] It is precisely his persona that stands at the beginnings of philosophical ethics , but also at the beginning of the meta-physical period in the development of Greek philosophy. Rare examples (such as Pericles' democratic Athens) are an important step away from (slave-owning) cultural and civilizational achievements and toward the institution of modern social forms. Plato's (427-347) *Republic* offers a vision of a just social order [11], while Aristotel's *Politics* explores existing social systems [2, 1279a-b]. Outlines from the *The Republic* are to be found in Augustine's work *De civitate Dei* at the beginning of the Middle Ages, but also in More's *Utopia* as the Modern Age commences. [8] In *The Republic* the uncivilized ancient world comes to the realization that an ordered political entity is a necessary framework which people are impelled to accept in order to fulfill their manifold needs, while Rousseau's Modern Age advocates a return to nature and an anullment of the social contract. [15]

Following an incidental reference to the beginning of scientific research and social structure, one must also mention medicine, a skill which always went hand in hand with philosophy. Hippocrates (c. 460-370) formulates the medical code of ethics and separates medicine from magic and religion (notes that an unhealthy environment causes illness, stresses nutrition, purgatives, baths, fresh air). Galen (131-201) bases his philosophy on the carefully elaborated Hippocratic teaching on bodily fluids (blood, phlegm, yellow bile and black bile) and the four Empedoclean elements (air, water, fire and earth). [7] He is significant here due to his biological approach to kinesiological phenomena, namely, he conducts experiments on muscular contraction during the motion impulse, differentiates motor from sensory nerves, explains the difference between agonists and antagonists and gives a description of muscle tone. It must be noted that the development of mechanics (Aristotel does gait analyses; Archimedes, 287 - 211, discovers hydrostatic principles and the law of the lever) has repercussions in the application of mechanical laws to man. However, the concept of biomechanics should not be linked to the concept of kinesiology: mechanical principles applied to man involve morphological characteristics which are merely a part of the anthropological system. [9]

2. The middle ages

If at the end of antiquity and at the beginning of and during the Middle Ages we have the philosophical (and religious) thought of Aurelius Augustine under the pronounced influence of (Neo) Platonism, then at the end of the Middle Ages, at the dawn of Humanism and the Renaissance, philosophical and religious thought is inclined totally toward Aristotelism and the natural-scientific orientation. This reversal occurred through the mediation of philosophical writings which at the beginning of the 13th century were transported from the East to the West and were incorporated into European thought through the efforts of Albert the Great (1206-1280) and Thomas Aquinas (1227-1274). In the meanwhile Romanesque and Gothic art styles are developing in the West, literacy and spirituality are being nurtured in Benedictine monasteries, speculative thought is reaching unanticipated heights in Scholasticism and slave-ownership is replacing feudalism. At the epitome of the Middle Ages there appears the concept of two truths: theological truth which entails the content of dogma and scientific truth to which rational knowledge is applied (William Occam 1300-1349).[5]

3. The modern age

The Modern Age (from the fall of Constantinopolis in 1453, or rather the discovery of America in 1492 to the end of WW I) is of interest to us here under the aspect of new method application which has its foundations in the Renaissance-Humanistic period (14th-16th centuries). The new method implies a description of all natural phenomena by means of mathematical relations, a carrying out of systematic observations and experiments, and finally, an empirical verification of all hypotheses. The importance of such an approach to reality was noted by Francis Bacon (1561-1626) and René Descartes (1597-1651). They established two different methodological and cognitive-theoretical directions: rationalism and empiricism. The first is logical-mathematical with apriori deductive research at its base, while the other is experimental, empirical and synthetic with *a posteriori* inductive examination at its base. [5, 17-20). Attention is devoted to the observation of phenomena, they are listed and described, individual features analysed, those that are crucial are determined and one (mathematical) expression is derived therefrom which ultimately may become a valid general natural-scientific law. [3]

In the Modern Age there emerges a different image of man and of a state grounded in a quantitative-mechanistic observation of nature (Nikollo Machiavelli, 1496-1527), or again a totally idealized and programmed society (Thomas More, 1478-1535). The Enlightenment (17th-18th centuries) establishes educational idealism and a redefinition of the relationship between the state and the individual. [3] Jean Jacques Rousseau (1712-1778) establishes the theory of a negative education and of a natural society. [14]

Of course, the experimental method was translated from theory into practice. Excellent results were achieved in civil engineering and medicine. Diverse technical discoveries linked with the *scientific revolution* made possible a more effective prevention and treatment of disease. The physiology of muscle activity is particularly significant for us as it sees a rapid development at the end of the 18th century. Kinesiological biomechanics today is a discipline which, due to the development of instrumentaria, makes possible a very effective analysis of stance and movement, the results of which contribute to the efficacy of motor movement. Biomechanical measurement, analysis and diagnosis are procedures which play a decisive role in the development of techniques and management of the training process. Particularly vital is the biomechanical analysis in high-level competitive sports, since small differences in the performance of motor stereotypes, crucial to the result, cannot be established through the visual inspection of experts. The development of biomechanics was necessarily linked with the development of anatomy which resulted also in the development of the functional anatomy discipline. [9]

4. The contemporary age

As opposed to the positivistic attempt to structure philosophy according to principles of natural science (Auguste Compte, 1798-1857), but also as a reaction to Kant‘s metaphysical agnosticism, there developed at the end of the 19th and the beginning of the 20th centuries in Germany (W. Dilthev) and in France (H. Bergson) the so-called *anthropological philosophy* or *the philosophy of life (vitalism)* which gives absolute primacy to life, that is, that particular layer of reality at which the will operates. According to Edmund Husserl (1859-1938) and his *phenomenological philosophy*, philosophy sets out from facts, but does not deal with them in the way that experiential sciences do, rather it strives for the knowledge of essence. *Existentialist philosophy* (20th century) places its focus upon man‘s existence. Almost parallel to the aforementioned disciplines, *logical empiricism* represents a radical scientistic view of philosophy: philosophy must be transformed into science in terms of natural-scientific methods. Thus philosophy, once „queen of all sciences“, becomes mere methodology and a theory of science, the role of which is formal-logical research. [4]

The development of physiology continued naturally and culminated in the 19th and 20th centuries. Knowledge gained significantly advanced kinesiological practice. A more intensive study of motor abilities began in the 1970‘s in Croatia and demonstrated that manifold tests may be compiled for each motor ability. This is significant because the large number of available instruments made it possible to establish the factor circuits of motor abilities, and also, due to diverse kinesiological activities, it was possible to select measurement instruments suited to specificities. [9]

Human activity can be explained by not a single sum of laws of individual sciences, for the effects of this activity are not merely a sum, rather are suprasummative. Kinesiology studies the influence of a system of anthropological features and abilities upon motor performance in the process of distinguishing kinesiological activities and the effect of kinesiological impulses (consisting of kinesiological operators and energy) on the adaptation processes of the same anthropological system, as well as upon health and education. [9]

By accepting the cybernetic manner of reflection, biases in resolving kinesiological issues are neutralized. Kinesiology's problems involve the study of laws on the functioning of kinesiological systems and the management of these systems. The systems are, in themselves, interdisciplinary and must be regarded as such. To look upon this problem through the prism of only one scientific discipline or, for example, only the natural or social sciences, sets scientific limitations to kinesiology. [9]

CONCLUSION

In the article we have presented several periods in the history of science development.

We have pointed out the discoveries of Greek cosmologists and the search for the first principles of the world. They derive their conclusions through observation. An important contribution to the development of society, culture and also religion was made by the Sophists who seek to examine man, laws and customs. Plato in his *Republic* notes that the state is a necessity which people are impelled to accept so as to fulfill their numerous needs, while Aristotel schematizes political systems in the Greek polis. We pointed out the emergence of the biological approach to kinesiological phenomena, the first experiments on muscle contraction as well as the application of mechanical laws to man.

We have stressed especially the tendency during the Modern Age toward a new method in science and noted that it implies the description of all natural phenomena through mathematical relations, the conducting of systematic observations and experiments and also the verification of all hypotheses. In philosophy disciplines emerge which are the reverberations of a new method (positivism and neopositivism, logical empiricism as well as phenomenalism and others) and disciplines which return to the concept itself of life as something which exists, but also to a new method of measurement of the unattainable (vitalism, existentialism, and others).

The development of physiology continued naturally and culminated in the 19th and 20th centuries. Knowledge attained significantly advanced the practice of kinesiology. It was noted that for each type of motor ability it is possible to compile manifold tests because human activity can be explained by not one sum of laws of individual sciences. We stressed that kinesiology, among other things, examines the effect of systems of anthropological features and capabilities upon motor efficiency in the separation of kinesiological activities and the effect of kinesiological impulses, which are composed of kinesiological operators and energy, on adaptation processes of the very same anthropological system and upon health and education. Thereby biases are neutralized in the solving of kinesiological issues. Kinesiological systems are in themselves interdisciplinary. To look upon them through the prism of only one scientific discipline or, for instance, only the natural or social sciences, sets scientific limits to kinesiology equally.

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NECESSITY OF INTRODUCING THE EUROPEAN DIRECTIVES FOR STAFF CERTIFICATION IN THE SPA & WELLNESS & THALASSO TOURISM

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Key words: Water culture, SPA& Wellness & Thalasso tourism, Staff certification, EU directives

INTRODUCYION

Bulgaria has rich traditions in balneology, and the presence of a large resource for SPA tourism (3rd in Europe and 5th in the world), but the SPA & Wellness & Thalasso tourism is still developed spontaneously, without a clear concept, unable to compete with even the countries of Central Europe. Service standards in the SPA industry have not been implemented. In the west from Bulgaria, the World is “SPA and Wellness”. The modern SPA & Wellness & Thalasso tourist market is aimed primarily on users who live at high speed and need to have efficient and quick recovery without to be associated with healing mineral water. First of all they needed comfort, relaxation, recreation, manual therapies, beauty treatments and a balanced diet. Was significantly increased the proportion of active healthy holidays. SPA&Wellness&Thalasso tourism practiced more than 4 million people worldwide [4]. SPA & Wellness & Thalasso methodologies and practices can be seen as “... creating polyvalent SPA culture …“ [3], it is important to “... discuss recuperation problems, significance of physical activity in the aquatic environment and the direct link to improving the quality of life and the health status of the practitioners …“ [5], to create skills for aqua relaxation, health prevention and recreation [15], or selects the preferred “…clusterized destination…” [18]. In Bulgaria, SPA & Wellness & Thalasso influences are completely new direction in the tourism, regulated by the Law only in March 2013 with the natural resources like mineral or spring water, which is “... a gift from the gods ... “ [4] and “... today perceive water as a vital element and we can not imagine the existence without it…“ [2] used for various recreation and relaxation practices that are unifying factor in this new social and personal preventive health culture - „Salus per Aquam“ [22].

Globally finding highly qualified staff for SPA & Wellness & Thalasso centers is a major problem that the U.S. economic analysts call a “War for talents” [9]. According to the research team of the Global SPA & Wellness Association (Annual Repor 2011-2012) [20], with the study of the industry, “... 95% of the leaders of the SPA & Wellness industry said they are facing serious problems in recruiting SPA & Wellness managers / directors / managers with right mix of skills and experience. Over 52% of the owners of the centers stated that the issue of qualification of the staff remains the same or even worse ... “ [20]. The needs of practice grow, and definitely not enough staff. Therefore, a person’s particular situation in which the dynamics of the SPA & Wellness tourism on the demand for specialized packages outstrips with great growth rates operation of services with qualified personnel certified through educational programs, fellowships, training seminars or received certified competencies. According to the same association in 2013, there are about 4,000 students enrolled in the program related to the management of the SPA & Wellness industry [21]. Currently about 130 - 180 000 SPA & Wellness managers / directors / managers / consultants working in the SPA & Wellness businesses worldwide. This fact is not a constant but a dynamic process and progressive continues to grow. It is also found that the number and scale of educational programs at different levels, related to the management of SPA & Wellness Tourism does not satisfy the needs of the SPA & Wellness industry “... to hire well-trained management personnel ...” [7] and they are that generate „…the immaterial aspects of the innovations ...“ [19]. The reasons for the challenges facing the management of the SPA &

Wellness staff are numerous and complex and relate not only relevant objects, but also for the entire industry [1]: 1.Economic factors; 2. Product lines; 3. Equipment and Apparatus Sets and standards; 4. Competitiveness; 5. Specific procedures and rituals; 6. Tourist destinations.

Over the past 20 years, one leading economists from the United States found that global problems with staffing of SPA and Wellness centers are related to: 1. Shortness of specialized persanal; 2.Insufficient skilled and talented staff; 3.Lack of trained managers at management level; 4.Increasingly difficult to find, hire and keep good staff, with special education SPA & Wellness. These factors are essential to the success of destination SPA in an increasingly competitive global economy - in particular SPA & Wellness Tourism. Trends are rooted in broader economic and social changes in today's global society. In Bulgaria there have created more than 2000 specialized SPA & Wellness centers in summer and winter tourist complexes [6]. The results of the research "Budget Time" show an increase in employment of women in the economy [14]. The decline in the supply of managers under 35-45 age affects all tourist destinations and is particularly acute in developed countries, where competition creates an opportunity for seamless mobility of best and highly qualified staff. There is an international trend to increasing incompleteness of the knowledge and skills of young professionals and inadequate practical training while studying. In Bulgaria frame for SPA & Wellness & Thalasso tourism are insufficient training and most of them far from European standards and therefore does not meet the dynamics of the industry. It takes established training programs for professionals in the field of management and services of the SPA & Wellness & Thalasso centers. Furthermore, at the state level is necessary to work for the establishment of regulatory tools and criteria for the development of SPA & Wellness & Thalasso business, but so far the results are partial and do not contribute to a significant improvement of personnel policy in the industry and regulate the activity of the SPA & Wellness & Thalasso facilities. European SPA Association (ESPA) has prepared and submitted to the Parliament of the European Union proposal for harmonization of legislation concerning common European policy for SPA & Wellness & Thalasso therapy resorts and centers. Classifying these relatives, but also various types of services, facilities, and staff is framed in the adopted in 2013 Law on Tourism [17]. Ordinances require higher education for managers and consultants and therapists. The National Classification of Occupations of the Republic by Bulgaria in January 2014 included three new professions - "SPA Centre Manager", "Manager Wellness Center" and "Manager Thalasso center." In our scientific work and the provision of that group travel services, products and competencies are almost on empirical level [17].

Given these problems, **the aim** of the study is to establish the actual quality of the educational programs in the EU Member States and setting out the requirements for staffing in Bulgarian SPA & Wellness & Thalasso tourism. **Object** of the study were 56 Bulgarian and 143 foreign (from a study of the International SPA & Wellness Institute) senior professionals from various SPA & Wellness & Thalasso centers (employers, executives, investors, entrepreneurs, managers, company managers, representatives of professional organizations and the executive power), which conducted expert **survey during the Second Balkan SPA** Summit, held in Cesme in Turkey in 2012. Important it is to create "... educational Wellness modules and levels of education in the teaching and training process ..." in the higher education from "professional bachelor" to "Master" with "... objectifying the pedagogical progress for the students…" [17] and developing "... a new marketing & management strategy…" [12], as part of "... the leisure industry for the whole Balkan region…" [13]. **Table 1** summarized the views for the training of specialized personnel in the SPA & Wellness & Thalasso tourism in two specialized contingent: Employers with leading positions in the industry and SPA & Wellness & Thalasso managers / directors. Surprising findings of an analysis of the results, which show similar opinions, which until 2011 did not happen.

Economic analysts [1] that it was not, both in Europe and in the world of trained specialists with the necessary theoretical knowledge, intellectual and practical skills to provide quality SPA & Wellness services based on scientific innovation. Economic globalization and increased travel opportunities employees and professionals to easily change jobs or businesses in need of their professional competence.

Table 1. Taken views of experts surveyed contingents: employers, industry leaders and SPA & Wellness Managers /Directors

Leaders in business and SPA SPA managers	
Priorities in the workplace	Key gaps in the SPA & Wellness Training
	1. Abilities revenue management
1. Strategic planning skills	2. Strategic planning skills
2. Innovations in technology services	3. IT skills
3. Practical skills for revenue management	4. Vocational Training and experience
4. Effective management structure	5. Investment projects / public relations
5. Application of regulations	6. Quality SPA and Wellness Services
6. Financial Management / Accounting skills	7. Sales / marketing / pricing

Table 2 summarized the existing education and training programs worldwide by 2013. This information is considered to be as accurate as possible, from the International SPA & Wellness Institute / by his research team / but the figures are permissible standard error. Perhaps there are other providers of special education who are not identified and were noted in the study - as is the Bulgarian case. Providers listed in the table are based on data of the research team of SRI, according to information compiled: online, by email, site survey or filed by telephone.

Table 2. Types of educational programs and training for SPA & Wellness worldwide

Summary of SPA & Wellness - Management Education				
	Total number of programs University / College	Total number of programs University / College	Private companies	
			Bachelor / Master	Short courses workshop, seminar Certification
Caribian region	11	3	1	7
Europe	9	3	1	5
Latin America	4	1	-	3
middle East	1	1	-	-
North America	16	7	-	9
In the world	41	15	2	24
Note: Data are the intellectual property of the International SPA & Wellness Institute and published with permission.				

Industry leaders complain that widespread appointments are without specialized skills in SPA & Wellness management. Furthermore, the subjects most closely related to that specific management are relatively new and few in number. Other optional modules available to other disciplines and are not as well connected with SPA & Wellness center / industry / tourism as they ideally should be appointed for the several elective credit, not the professional field of education. Providers of continuing education are also new, fragmented and no "proven" model for effective delivery of training for employees already working in the SPA & Wellness sector. At present special problems in management of SPA & Wellness business concern:

- The challenges associated with current / future SPA & Wellness managers and the requirements for a high level of skills acquired in their careers / path of growth;
- Challenges in taking a management position, which requires interdisciplinary knowledge and skills combined with an understanding of the SPA & Wellness business and intrinsic motivation

[7]. Criteria on educational and professional competencies of staff for SPA & Wellness are not well defined, so most managers / directors / managers / consultants / methodologists have unilateral knowledge: only control or only therapies or finance, or marketing, or movement practices aqueous medium. To analyze the views of experts of the First International Conference on Spa and Wellness / 2011. / And III-rd National Conference of beauty salons and SPA centers (2012). identified 10 indicators for categorization of spa facilities and 10 indicators for certification of SPA staff that they ranked in importance. The results of the psychometric experiment are presented in Table 3. Figure 1 and Table 3 ranged / according to their weights rang / main criteria for assessing the quality and competitiveness of SPA objects on the ground expertise.

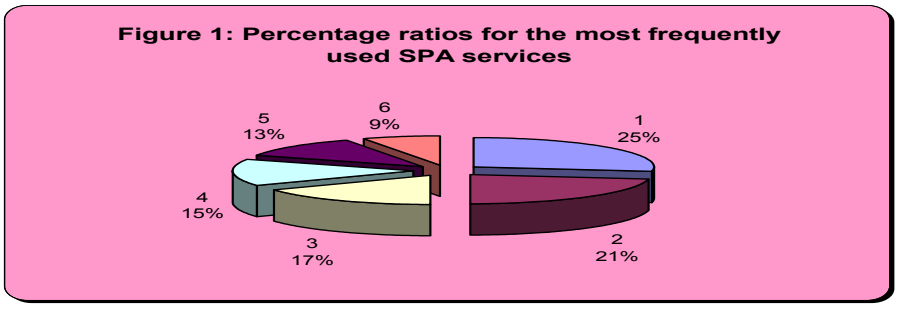

Table 3. Matrix of the opinions of surveyed experts for evaluation of the professional training of staff and the quality of applied SPA and wellness services

Indicators	1 /6 un./	2 /5 un./	3 /4 un./	4 /3 un./	5 /2 un./	6 /1 un./	Sum	Rang
1. Required level of qualification and competence	44 243	7 26	4 17	1 3	–	–	56 people 289 units (R.weigth)	I
2. High quality performance of the proposed SPA and Wellness Services	8 50	33 161	8	6 12	3 5	1 1	56 237	II
3. Contemporary facilities and equipment	5 20	3 35	33 110	3 16	5 8	7 5	56 194	III
4. Investment projects for the development of SPA center	4 15	2 15	3 70	42 51	4 6	3_	56 150	IV
5. Effective structure of governance	4	4 18	6 25	10 20	36 62	_	56 129	V
6. Standardization of services in the SPA center	1 _	5 18	4 14	4 8	12 5	30 34	56 79	VI

The main factors for high quality SPA objects according to most experts have professional qualifications and experience (grades weight 289 units - 25%) and high quality of the SPA and Wellness Services (Ranks weight 237 units - 21%). Third and fourth are classified modern material and technical base (Ranks weight 194 units - 17%) and investment projects for development areas of activity of SPA center (rang. weight 150 units - 15%). Indicators: effective management structure and service standards in the spa received 13% and 9%. The ranking of the other indicators / 7 to 10 place / is as follows: a large assortment of SPA and Wellness services; optimal pricing strategy; flexible marketing policy; favorable conditions of work and promotion of employees. From the data analysis we find that the first and second place are based on the professional qualifications of the personnel and the effectiveness of the implementation of services. Determination by the experts of priority indicators in a survey conducted and their ranking should be considered when introducing uniform standards (in accordance with EU criteria) by public authorities for categorization of spa facilities and certification of staff in the spa and

wellness sector . Future professionals in the spa industry needs a stable knowledge and competencies for effective organizational and methodical management and marketing, with a high level of motivation to offer and perform quality services tailored to the needs of spa customers and promote their interests. In this connection it is necessary activation of professional contacts between academic units - Higher (theory) and the spa and wellness business (practice).

IN CONCLUSION , on the basis of the survey we believe that joint action is needed, in collaboration with the of professional associations and NGOs for the development and adoption of state regulatory tools:

- Setting standards for categorization of SPAs and quality assessment procedures and services;
- Introduction of requirements for qualification of personnel;
- Increasing competitiveness of SPAs in the domestic and international market by expanding the range of activities and services, balanced pricing policy, investment projects, promotional packages and strategic directions of development;
- Provide specialized training of personnel with specialized secondary and higher education (in NSA "Bachelor" and "Master" degree and the "Doctoral degree – PhD");
- Develop regulations harmonized with the European requirements for the activity in the SPA & Wellness & Thalasso facilities and a national strategy for the development of this business in Bulgaria.
- The implementation of these priorities, along with extremely Advantageously natural factors will contribute to making Bulgaria a preferred SPA & Wellness & Thalasso destination.

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VSPORT+ SEVEN STEP MODEL APPROACH TO THE BULGARIAN SPORT SECTOR

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Key words: *sport sector, education and training in sport.*

VSPORT+ is the working title of "A cross-sectoral Valorisation Framework for the Lifelong Learning Strategy in Sport" and is a 29 months project funded by the European Commission through the Lifelong Learning Program. National sports academy is a partner in this project.

Sport and active leisure is a young and dynamic sector which can have a positive impact on individuals and communities across Europe. As the sport and active leisure sector continues to grow and flourish in Europe, sport organisations are increasingly seeking a range of competent and qualified individuals with new skills, who are often dificult to find in the established European labour market. At the same time, volunteers remain a huge part of the sector and are under increasing pressure to display the same skills as professional workers. These developments are adding pressure on the sector to review and modernise its qualifications and training systems.

The Sport and Active Leisure sector has the potential to make a huge impact on the economy, the health of a nation and social cohesion. This potential is being increasingly recognized by government at national and European level. Their expectations challenge the traditional models of delivery of sport and are bringing new business opportunities into a sector that has been dominated by voluntary and public sector led provision.

If the sector is to capitalize on these opportunities and meet these challenges, it has to continue to change and evolve. A key component is the workforce (paid and unpaid). It is a people facing sector and to deliver new and different opportunities for everyone to participate in sport and physical activity then the sector must have a workforce with the right skills to lead and deliver to a new and expanding market.

The Lifelong Learning Strategy for Sport and Active Leisure provides a framework for the development of a strategic approach to ensure that vocational education, training and qualifications (VET system) exist to support the development of this workforce.

The model aims to bring together the education and employment stakeholders in a collaborative approach to ensure that VET provision is fit for purpose and in line with the needs of the workforce.

One of the aims was to identify the potential of the the sport and active leisure sector in terms of : economic ; tourism; health ;physical activity; society; social use of sport; employment; right people with right skills in the right place; sport and active leisure sub sectors; education and training.

The 7 steps model or the lifelong learning strategy for the sport and active leisure sector is effective strategy for developing the sector and for developing an education system linked to the labour market **(Figure 1)**

The 7 Step Model itself is an innovative and flexible approach to developing a high quality vocational education and training system in line with labour market requirements. The Model includes labour market intelligence, occupational standards, a guide to qualifications and a final crucial step of quality assurance **(Figure 2).**

Addressing the sport issues on a large European scale is also due to its cross-cutting nature and its synergies and links with many other EU policies, sport will continue to be strongly influenced by other EU policy areas. At the same time, the sport sector can help the EU achieve its longer-term goals by

contributing to sustainable growth, fighting unemployment, reinforcing social inclusion and advancing people's Europe (EU Sport Programme 2014-2020). The identification of the main problems in the field of sport is based on the results of the Impact Assessment exercise carried out in 2010 in preparation of the 2010. The main challenges identified in this two papers are the following:

Figure 1. A flexible strategy

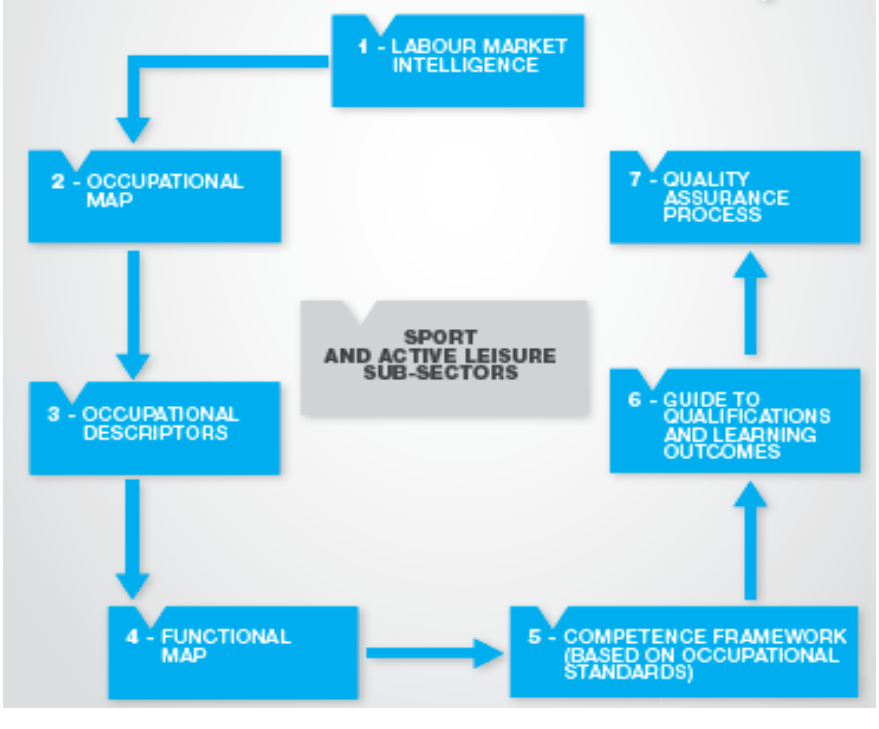

Figure 2. Seven Step Model

a) Challenges related to sport's societal role - Health concerns, in particular weight problems, due to lack of physical activity. According to a 2004 Eurobarometer survey, a large majority of EU citizens (78%) cite the improvement of health as the principal benefit of sport (Cavill et all, 2006). The 2010 Eurobarometer survey shows that 39% of respondents never do physical exercise. The linkage to the school environment is likely to be a critical factor in this context. Studies show that the role of sport and physical activity in education is declining, leading to health-related impacts especially on the younger generation. Unadapted systems to combine sport and education - Governmental and non-governmental sport stakeholders have regularly expressed concern about the fact that the contribution of sport and physical education to educational objectives is often not, or not sufficiently, recognised. The required training intensity for young talented sportspeople today makes it difficult

to ensure their school education. Social exclusion of disadvantaged groups and unused potential of sport. The potential of sport in relation to social inclusion and equal opportunities has not been sufficiently implemented in national and EU policy-making, as confirmed by stakeholders in the public consultation carried out. The rights of people with disabilities need further attention in the field of sport. The popularity of sport and its social value are so far seldom used in specific integration-related programmes.

b) Challenges related to the financing of sport - Insufficient support for voluntary activity in sport. Recent studies and consultations confirm a number of challenges faced by voluntary activity in sport in social terms (e.g. lack of recognition; lack of qualifications to ensure better employability; dominance of male volunteers), political terms (e.g. lack of national strategies), legal terms (e.g. lack of specific legal frameworks; unclear tax regimes) and economic terms (e.g. funding needs for local sport clubs; under-estimated economic value). Discrepancies between developments in gambling markets and the financing of sport - Ongoing developments on gambling markets and the changing national regulatory frameworks for gambling have led to perceived challenges on the side of governmental and non governmental sport stakeholders with regard to sustainable income streams from gambling activities into sport. Also Pedersen (2012) comes to see communication as an essential element in the sport industry, whether viewed from individualistic, organizational, or sport-specific perspectives.

The main aim of VSPORT+ Project was to carry out a range of valorisation activities at all levels and most specifically within 12 EU countries including Bulgaria to reach a maximum of targeted stakeholders. The goal was to raise awareness, communicate, promote, present, encourage and support the transfer and implementation of the EOSE Lifelong Learning Strategy (also known as the 7 Step Model) within current VET systems to encourage changes and modernisation.

METHODOLOGY

Research through analysis of government statistics and/or through primary research e.g. industry questionnaires and focus groups. The main use of this information is to describe the relationship between employers and occupations and to assess how well the labor market is functioning, the existing and emerging skill shortages and training requirements, the appropriateness of the existing VET system, and the prediction of current and future skills priorities.

Collection of comparable data to obtain a precise map of employment for the sport sector through available national statistics, expert cards and interviews, containing the following points: Where people are employed; Who employs them; Numbers and type of contracts, Career pathways, Employment demographics, etc.

All ambassadors provided a national report detailing the activities they had carried out, main stakeholders in their country, the national situation and issues relating to implementation of the 7 Step Model. Across all countries, a pattern emerged showing that sport education is offered through three main types of providers: National Sports Federations, Vocational or technical colleges and providers, Higher Education Institutions. For the purposes of this paper are presented the results of the national survey for Bulgaria.

RESULTS

Economy situation in 2013

According to the data of the Economic and financial affairs DG (web) the real GDP growth remained weak over the first half of 2013, registering an increase of ¼% y-o-y (non-seasonally adjusted data). Growth was driven by net exports and a surge in public expenditure, whereas household consumption contracted. Relative to the pre-crisis peak levels in 2008, export volumes are by now one-fifth higher, while domestic demand and particularly investments are still markedly lower. The rebalancing of the economy towards the export sector is expected to lessen in the second half of 2013, with private con-

sumption projected to strengthen in the coming quarters, as also indicated by the robust increase of retail trade recorded in July-August. The purchasing power of consumers is buoyed by the projected growth in real wages in a low inflation environment. Also, pensions were discretionarily hiked by over 9% in April 2013, after having been frozen over the previous years. The pick-up of economic activity towards the end of the year is expected to be reinforced by the projected economic recovery in the EU. Nevertheless, GDP growth is expected to reach only 0.5% for the year as a whole, which remains well below the estimated potential growth rate of the economy, but the growth momentum towards the end of 2013 is forecast to entail a positive carry-over effect for next year.` Inflation has decelerated sharply over 2013 and is projected to average 0.5% in the year. This is primarily driven by falling energy prices, given the global oil price trends and domestic measures to reduce administratively-set electricity prices. Also, the good agricultural harvest has led to lower unprocessed food prices. Furthermore, core inflation has decelerated over 2013. While inflation is forecast to rebound in 2014 as the base effects from the currently low energy and food prices fade, the overall inflationary pressures are expected to remain low also in that year.

The national sport and active leisure sector

Traditionally, the sport movement in Bulgaria has developed on a voluntary basis – the freedom of association of people who want to practice physical exercise and sport, whose implementation is supported by national and local authorities, is one of the core principles in Bulgarian sport legislation.In international sports competition, Bulgarians have excelled in tennis, wrestling, boxing, and gymnastics, but the country's greatest repute may be in weight lifting. Through the 1980s Bulgaria produced many world and Olympic champions in the sport, to the credit of coach Ivan Abadjiev, who developed innovative training practices. Several Bulgarian athletes have accomplished the rare feat of lifting more than three times their own body weight.

TheMinistry of youth and sport (since May 2014) is the main governmental body charged with sports administration in the country.

The activities of the Ministry are spread over three main areas:

- Sport for High Achievements
- Physical Education and Leisure Time Sport
- Physical Education and Sport at School

The main legislative document in the sector is the LAW FOR THE PHYSICAL EDUCATION AND SPORT.

The national education and training system

Education in Bulgaria is mainly supported by the state through the Ministry of Education and Science. School education is compulsory for children from seven to sixteen years of age.

The Bulgarian educational system falls within the continental European tradition. The main types of secondary schools are: general educational, vocational, language schools and foreign schools. Private schools are also being established and they are beginning to compete successfully with state schools.

There are fifty-one higher educational institutions in Bulgaria offering degrees at undergraduate and graduate levels. In Bulgaria there are public/state schools and private educational institutions at all levels. For state/public schools, parents do not pay fees, however, for state/public crèches and kindergartens a small monthly fee is charged. This fee is fixed by the municipality in which the school is located and is the same for everyone. Both state and private universities charge tuition fees, which will vary depending on the institution.

The national sport education and training system

The national sport education and training system provides Higher and VET education and training in the field of sport (Figure 3)

For example the National Sports Academy "Vassil Levski" Sofia (web) is accredited by the state authority to provide qualifications for sport specialists at various levels.

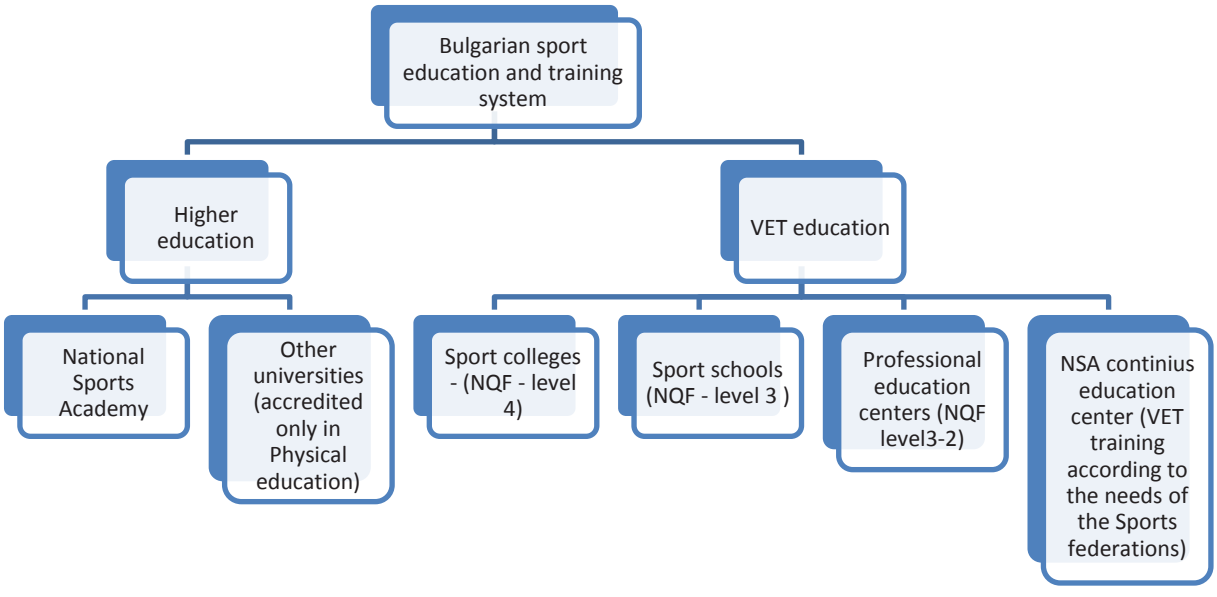

Figure 3. National education and training system in sport

The National Sports Academy (NSA) is the only specialized higher educational establishment in Bulgaria in the field of physical education and sport. Currently the NSA is granted with full state accreditation, offering university degree programs at three educational levels – Bachelor (BSc), Master (MSc) and Doctoral (PhD) and three professional fields – Sport, Physical education and Public health. The NSA is structured in three faculties Faculty of Sports Coaching: Faculty of Physical Education and Faculty of Kinesitherapy, Tourism and Sport Animation. At bachelor level the NSA is conducting education of:

Faculty of Sports Coaching - coaches in 55 different sport disciplines; sports managers; sport commentators; coaches in marshal arts and condition training in the army and the police.

Faculty of Physical Education – teacher in physical education

Faculty of Kinesitherapy, Tourism and Sport Animation – kinesitherapists/physiotherapists; sports animators; Coaches in Adapted physical activity and sport.

On master level the NSA is offering education in thirteen main master programs with possibilities for specialization in different fields.

The NSA is organizing the education of doctoral students in the accredited scientific field “Theory and methodology of physical education and sports training, including methodology of remedial gymnastics in the three professional fields - Sport, Physical education and Public health. The Centre of Post-Graduate Studies at the NSA offers different post-graduate continuing education programs in specialized and interdisciplinary fields. The NSA is well known by its research activities in all directories of sport science which are conducted on field or at the modern Center for Scientific and Applied Research in Sport. It is equipped with advanced diagnostic and research apparatus including mobile as well as stationary devices.

The training system of the sports federations is organised on different standatrs. All sports federations in Bulgaria are following the standards and the requirements of the International sports federations. NSA is educating coaches in 55 different types of sport and every federation is integrating (matching) somehow the national qualifications into the International system. The approach applied by the different federations is different – (examples – coach in football with bachelor level from NSA receive automatically license B. Coach in boxing with bachelor level from NSA should accomplish additional requirements in order to cover the requirements for coach “one star” from the international federation.)

In Bulgaria there are also 22 sport schools which provide secondary education and profesional qualification “assistant coach” at level 3 of NQF. Professional collages are two: Professional collage “Sport and health”and Professional sport collage “BIO FIT”. They provide the following profesional qualifications:

- Instructor on sporting-tourist activities in all kinds and forms of the tourist business and in practicing tourism with recreative, health and cultural purposes.
- Trainer (on given kind of sport) in sport clubs and federations, fitness centers, hotel and sport complexes.
- Instructor on adaptive physical activities and sport for disabled people in sport clubs, regional consultative-informative centers, schools, centers for rehabilitation, the personal assistants' system of disabled people and the social reintegration programs for people of special needs in unequal position.
- Fitness instructor in fitness clubs, fitness centers in hotels and tourist complexes, sport clubs and organizations.
- Sport masseur in health, rehabilitation, resort, fitness and spa-centers, sport clubs and hotels.
- instructor on ergonomics

The national map of stakeholders

The organisational and management structure of the Bulgarian sport sector consists of a number of key actors, including state authorities acting in the field of physical education and sports, specialised public sport organisations, sport organisations with a special statute and private sport formations. (**Figure 4**).

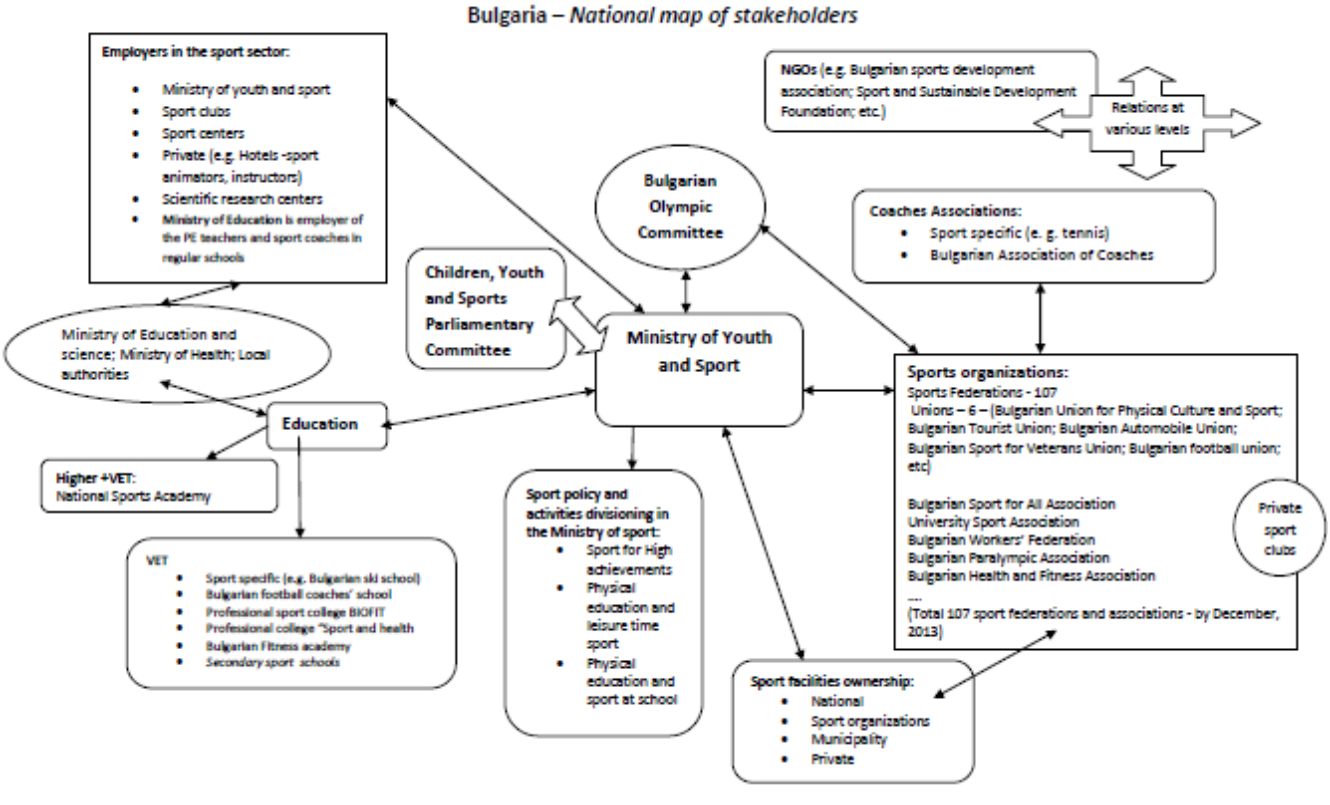

Figure 4. National map of stakeholders

The Bulgarian state authorities relating to physical education and sports are the following: 1. **Children, Youth and Sports Parliamentary Committee (since 19.06.2013)** which undertakes research and discussions of normative and legislative documents on physical education and sports and initiates the National Assembly's decision-making process on these. 2. **Ministry of Physical Education and Sports and since 29 of May 2013 Ministry of Youth and Sport** which defines the national strategy, the normative base, financing, international cooperation and academic research work in this sector. 3. **Ministry of Education, Youth and Science and since 29 of May 2013 Ministry of Education and Science** which is in charge of the mandatory form of physical education in pre-schools and schools through programmes, extracurricular and out-of-school activities, deals with the health condition of pupils and students, and

maintains the school/university sports base etc. 4. **Ministry of Health** which ensures the health condition of those involved in physical education and sport. This is done by the National Centre for Sports Medicine, the cabinets of medical wards, schools which monitor the medical state of pupils and students etc. 5. **Local state authorities** i.e. municipal authorities which maintain the municipal sports base, propagate a healthy way of living, allocate funds to sports activities, organise municipal sports events, festivals etc. 6. **Ministry of Defence** and **Ministry of Interior** which provide the mandatory physical preparation of the Bulgarian army and respectively, the Bulgarian police and other members of the interior system. 7. **Specialised public sport organisations** include the following: **Sport clubs, unified sport clubs** which provide training (from beginners to sport mastership) and competitive activities to their members according to the type of sport chosen voluntarily by them. **Sport federations** which are voluntary, self-governing unions of clubs according to the type of sport. They organise and coordinate the overall activity according to the type of sport and present the national teams in all levels. They prepare the incountry and international sport calendar. Such federations are the Bulgarian Football Union and the Union of Bulgarian Automobilists, for example.**Organisations at national level** which consist of the Bulgarian Association Sport for Students and the Bulgarian Tourist Union. In general, these organisations unify sport clubs, unions, federations etc. on the basis of voluntary membership and equality. The subject of their activity is defined by the statutes adopted at congresses and national conferences.

According to the National register of licensed sport organisations and sport clubs at the Ministry for Physical Education and Sport, to date in Bulgaria there are 105 licensed sport organisations: Sport federations and unions (one sport) – 100; Sport associations – 7; Sport unions -6. Currently 74 sport organisations have been denied a licence permanently or temporarily. The number of registered sport clubs is 3,197 but in reality the figure is higher because the official statistic includes sport organisations who have not pointed out their member clubs. Moreover the current legislation allows registration and functioning of sport clubs under the trading law which makes the data gathering more complicated. This clubs mostly operate in kinder gardens and schools offering after school sport activities.

To the **sport organisations with a special statute** belong the following entities:

- ✓ **Bulgarian Olympic Committee (BOC)** whose work is defined by the Olympic Charter and its own statute. BOC is an independent NGO whose main goal is the development of Olympic sports in the country and participation of athletes at the Olympic Games as well as competitions by the International Olympic Committee.
- ✓ **Bulgarian Sport Foundation** which is a charitable public organisation with ideal purpose registered according to the Family and Persons Law. The work of the foundation consist of raising funds from different national and foreign sources which are used for supporting and developing Bulgarian sport and stimulating high sport achievements. In the last few years a number of other sport foundations were registered but there is no statistics available by now.
- ✓ **Private sport clubs** which are established and financed by private persons and take part on an equal basis with the rest of the sport clubs in the country in state championships and international sport events.

CONCLUSION

This project in terms of disclosure and use of alternatives to optimize the potential for impact of sport leisure on the economy, health and social cohesion of the population in each country is actual and relevant. The 7 step model is an innovative system approach to disclosure of key theoretical (conceptual) and practical aspects of:

- social functions of sport in spare time/active leasure;
- provide vocational education;
- new approach in the interaction of state and non-governmental institutions and organizations (educational , health, economic, local government) which carry an impact on human resources in terms of education , employment protection and labor market;
- introduction of modern social indicators and quality indicators of physical activity (duration, frequency and regularity);

- optimizing the relationship between the producers (workers) to employers, in terms of the specifics of the labor market;
- training and development of recreational sports and their impact on the career development of human resources;
- the need for programming physical activity according to the specificity of the implementation of human resources in the various sectors of the economy and the social sphere , ie need to implement the so-called occupational physical activity (including retail indicators and standards);
- design in nature and key purpose is a new challenge for strategiches8ko managing the development of sports in his spare time and his social role and responsibility in modern society.

The proposed seven steps model (in regard to structural-functional aspect) as content, basic commodities, technology and mechanisms are professionally designed. Their consistent and interconnected realization can elicit the desired dynamic for the long term changes in policy, strategy and programming of the lifelong learning sector and the sport and active leisure. A further work is needed to modify the 7 Step model to the identified national situation.

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OLYMPIC EDUCATION AND ITS PLACE IN BULGARIAN SCHOOL

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Key words: *Education, Olympic Education,Physical Education, Sport*

Education is amongst the core human rights. This idea has been developed by the Czech pedagogue Yan Amos Komenski, according to whom it has to be commonly accessible and organized. In XVII century he made the first attempts to put it in a system.

In the modern social-economic conditions the issues, concerning the education are considered in lots of documents of UNESCO, UNICEF, and the European commission as well as in plenty of laws and strategies of governmental and non-governmental structures. The education is considered also in the economic theory for the human capital “Human Capital”, developed by the Chicago’s school during 60-es and 70-es years of XX century. According to Gary Becker, representative of this school, the education is an investment (1964, 1975, 1993). It is important for the economic progress as well as for the personal progress of the particular individual and the society as a whole (Gary Becker, 1993).

Further to the „classic“education, worldwide the issue for the **Olympic education** becomes more popular in recent years. Term definition is also given on a session of the International Olympic academy (MOA) in 2000: „*Olympic education shares the aims of the Olympic movement and it is a multi-layer training process, which appears part of the common education of various target groups from the population in order to teach Olympic values through sport and culture*” (Georgiadis, K. 2006, 2010). In its grounds lay the Olympic activity and sport together with the whole combination of philosophical, pedagogical and organizational ideas, which are powerful pedagogical instrument. It fully meets the trends of the public development and the needs of the modern civilization. It also may provide an essential input in solving actual social issues, connected with: forming and improvement of the personality, mostly of the children and youths; increasing the interest to the sport and the need of systematic sport activities as an important tool for forming the physical culture and as an element of the healthy way of living.

Nowadays the Olympic education is included in the national educational programs in many countries. In contrast to the world practice, Bulgarian school educational system and educational programs do not cover it. As Desislava Stoyanova[1] has stated in her paper, defended at International Olympic Academy (IOA) „*the moral development of Bulgarian students is not supported by the Olympic pedagogy and they do not become aware of the Olympic values*“. Some sport schools are exception. He author has mentioned a resolution issued by the Bulgarian ministry of education and science dated 1999, according to which the issues related to the history of the Olympic movement became part of the national educational programs for the sports high-schools and high-schools with sport profile. The knowledge about Olympic essence, the Olympic movement, the education in Olympic spirit has its place in the history classes as the topics are related to the general history. The project comprises students from VII to XII class in these schools. For the needs of a high-grade schooling it has been issued a textbook „Olympic essence and Olympic movement: origin and development“[2].

The aim of this report is to represent an acting Bulgarian model of Olympic education, realized in some schools and sports clubs in the country.

The missions, resulting as from the aim we may specify to the following:

- To answer the question „Does the Olympic education has its role in Bulgarian educational system and particularly in the initial stage of the primary educational grade (I-IV class)?“

[1] Desislava Stoyanova. Olympic Education in Bulgaria. – the material was provided with the kind cooperation of the author

[2] See: Бърдарева, Р., Б. Иванов. Олимпизъм и олимпийско движение: произход и развитие. С.,1998

- To clarify the role of the Olympic education, mainly considering the opportunities for ensuring additional motor activity for the students from the above-mentioned age group.

In order to clarify the aim and issues to be solved by our research, we made a theoretical analysis of literary sources. We also made an inquiry by using a specially developed questionnaire. It was given to 57 parents of children, educated under the innovative and unique methodology, which is applied in the clubs „Yunache". The inquiry was made during X anniversary national children's Olympic Convention „Yunache" (Lyaskovets, 1-2 June 2014). In the course of convention we made field observations. We held also an on-line inquiry of former members of the clubs „Yunache" – 34 inquired people.

The Bulgarian model for Olympic education in its essence is related to the national peculiarities (Fig. 1).

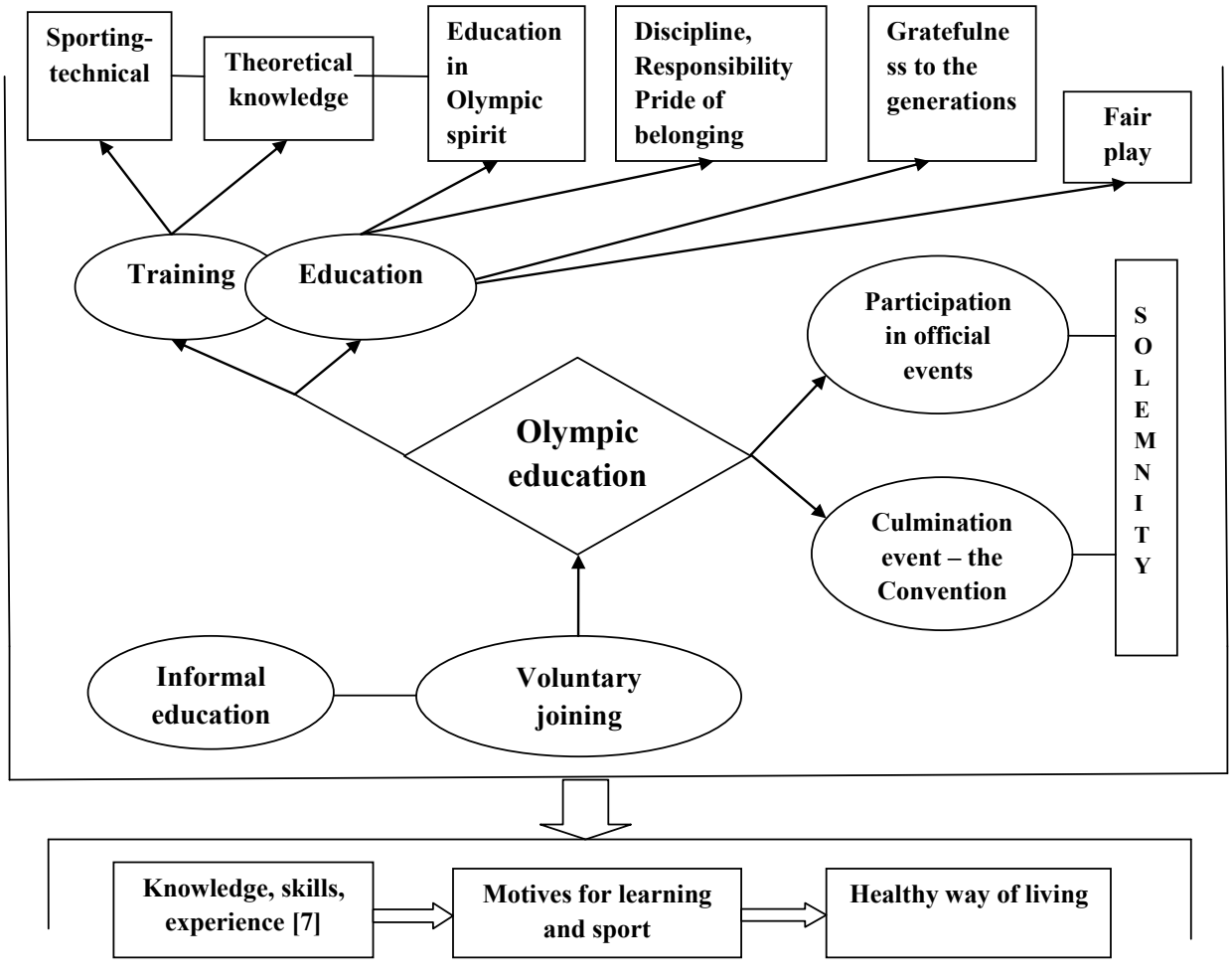

Fig. 1. Model of the Olympic education, applied in „Yunache" clubs

It reflects the Renaissance traditions of the Union of Bulgarian gymnastic associations „Yunak", founded in 1898 as well as the values of the Olympic philosophy. It is realized by the restored association „Yunak", which appears assignee of the union of the same name, founded in XIX century [1,2].

Definitely this is a specific form of Olympic education. Target group appear students from the initial stage of the primary educational grade (I-IV class). In some schools and sports school in the country there are „Yunache" clubs, which belong to the structure of the Union of Bulgarian gymnastic associations „Yunak". Under the direct leadership of the union, the clubs realize Olympic education within the system of the informal education in Bulgaria. The program under which clubs operate – the one-year sporting-pedagogical activity as well as the final closing Convention, which appears the culmination event, combining sport and culture, are a model for realization of Olympic education amongst the youngest students. The form of working in these clubs is out-of-class and out-of-school. The planned material (which comprises learning sporting-technical skills and theoretical knowledge) is adapted to

the modern conditions in Bulgaria and to the age group of the participants; furthermore, it is in conformity with the programs for Physical education and sport and the state educational requirements under this particular discipline. That is one of the reasons for it to be applied also in the regular classes on physical education and sport in school.

Here we have to clarify that the difference between the Bulgarian model of Olympic education and the models, applied worldwide is that in Bulgaria the realization does not belong to the traditional type – from theory to practice. „The direction" is from practice to theory – after many years of applying, just today we consider it from sporting-pedagogical point of view.

The model, applied in „Yunache"clubs, has an interdisciplinary direction. This coincides also with the standpoint of Roland Naul (2008) regarding the Olympic education. Roland Naul considers this issue in the context of the formal school education.

For clarification the role of the Olympic education in relation to provision of additional motor activity amongst Bulgarian students, the negative trends, so typical for our country, were acknowledged - Bulgarian children do not exercise sport actively. However the positive impact of the model for increasing the motor activity was also acknowledged.

According to us, the social-economical processes in our country cause negative impact also on the additional motor activity of the students. This has been taken into account in the National strategy for development of the physical education in Republic of Bulgaria 2012-2020: „*it is disturbing the fact that sports activities for children become an elite occupation and are only accessible for families with good financial status*". This particular disturbing tendency put the opportunities of the Olympic education to the fore. The facts were confirmed statistically by our research. As a result of the made inquiries we ascertained that only 28,1% of the children do extra sport (outside the regular classes on Physical education and sport in school and the activities in „Yunache" clubs). The biggest share is for the students without activities outside regular classes on sport and in the clubs– 42,1% and those students, who do sport very rarely, are 29,8%. (Fig. 2). The positive impact following the Olympic education, which is realized by "Yunak" club, is ascertained as a result of the on-line inquiry held amongst „former Yunache members". We found out that since termination of their membership, 72,7 % of the students have been doing sport actively. Half of the inquired people (54,5 %) had their extra motor activity (outside the regular classes in school) in „Yunache" clubs.

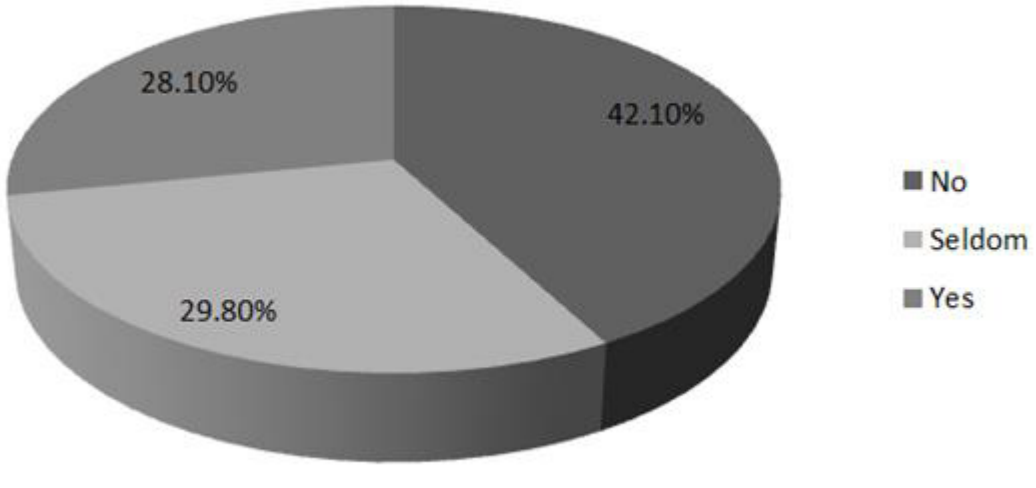

Fig. 2."Is your child doing extra sport outside activities in the club?"

The reasons for these results are various according to us. In order to determine them to a certain extent, we asked the parents to specify why they like/support the participation of their children in„Yunache" clubs. The parents had the chance to point more than one answer amongst some answers, formulated in advance (Fig. 3). Many parents are officially engaged and they suffer difficulties to bring their children

to organized sporting activities outside the school territory. In such relation 54,4 % of them think that it is positive not to have engagement to bring the children to training. The option „it is more advantageous from financial point of view“ was pointed by 43,9% from the inquired people. Despite the difficulties from which suffer some of the parents it occurred that most of them would like their children to do sport – 84,2 % pointed the option „because he/she is doing sport actively and in an organized way”, more than half of them– 54,4 % pointed „because he/she learns new things (obtains theoretical knowledge)” as well as „makes his/her free time efficient“. 66,7 % from the parents pointed as a positive influence that their kid has a chance to join sport events. The fact is that for the students of this age group there are no sporting events envisaged within the framework of the formal education.

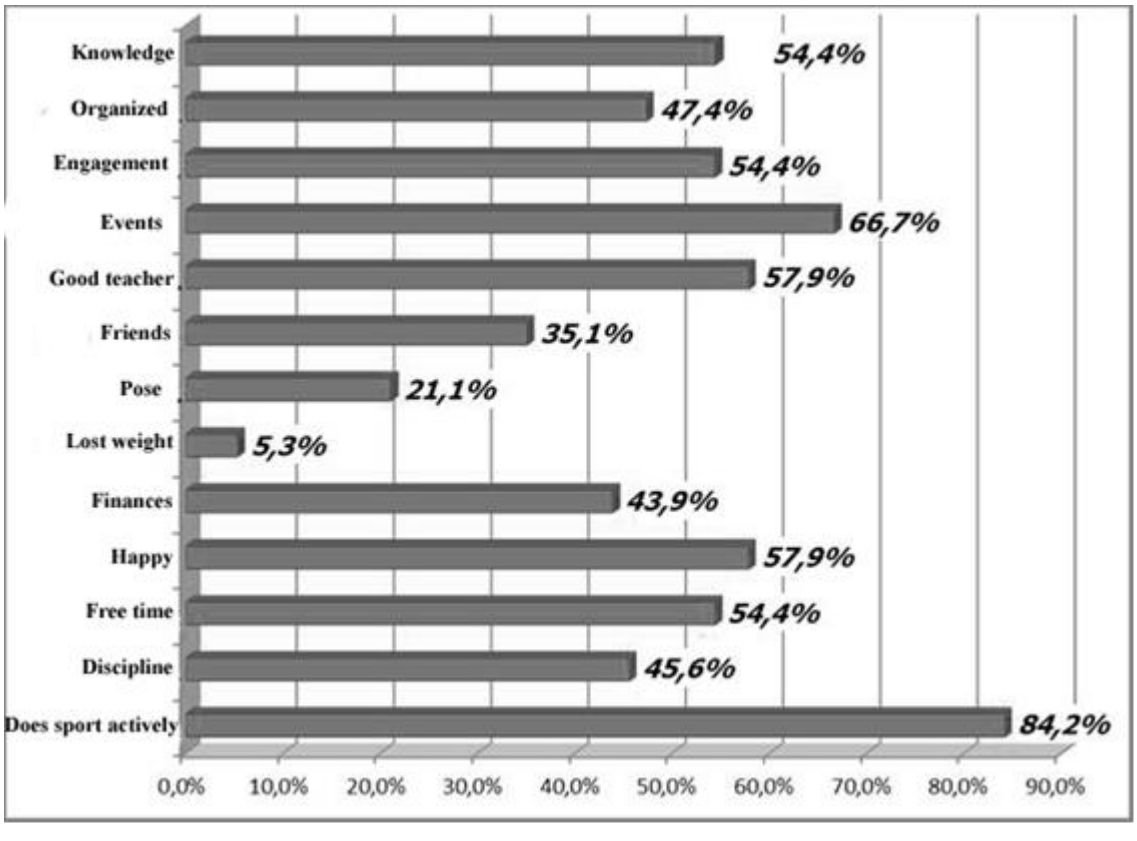

Fig.3. „Why you like/support the participation of your kid in „Yunache“club?

As a result from the field observations and discussion with the children we found out that the Bulgarian traditions and customs, envisaged in the model and observation of the Olympic symbols and rituals, provided for in holding the national children's Olympic conventions „Yunache” cause a big educational impact. The children are proud of their membership in the club and from participating at the Convention. The kids have a feeling of belonging to a specific community– the „Yunache“ club; they feel grateful to the generations, they have national identity, strengthen their competitive spirit and have a stimulus to keep doing sport activities actively and in an organized way; the children develop their creative skills and the knowledge for Bulgarian sport and the Olympic movement.

CONCLUSIONS

The Olympic education in Bulgaria is realized for students only within the system of informal education. The managing committee of the Union of Bulgarian gymnastic associations „Yunak“ has many times made attempts to work together with the state authorities, but in most cases they even do not receive an official answer.

The advantage of the applied model for Olympic education is that the envisaged material appears consistent with the age characteristics of the students, the program for physical education and sport and

the state educational requirements for the relevant classes. There elements, envisaged in accordance with the requirements of the Ministry of education and science and moreover- the model is consistent with the pedagogical methods.

After at least 18 years of usage and as a result of the problem researches we ascertained that the model is really accessible for the students and it may be realized without any obstacles not only in the formal but also in the informal education. The Olympic education may organically "enter' the educational-training process, in the system of the modern school education. As Roland Naul says (2008), the Olympic education has an important mission for the future of all children and youngsters in the schools and sports clubs.

Some positive impacts are seen on the target group: continuous habits are acquired yet at an early school age for: sport for health, physical and creative development; ambition for physical and creative individual and collective contribution; skills are built-up for losing and winning; hygiene and aesthetic habits are learnt; it is worked for discipline, responsibility in the course of implementation of individual and collective tasks; the students are educated to be grateful and respective to the teacher/trainer/school as well as to be proud of their belonging to a certain community. Last, but not least the students learn how to be grateful to the generations and to respect the work of others.

The model in its entirety (the one-year work in the clubs, with usage of the envisaged theoretical material and sports trainings and the final, Closing Convention) complements and enriches the state, institutional and public aims and activities for ensuring worthy and harmonically developed generation of Bulgaria. The social involvement is encouraged: children from all social layers and ethnics are involved as well as underprivileged children. The competitive start in sports is encouraged as well as the creativity, knowledge, public contributions. It supports the endorsement of the health prosperity amongst kids through providing more activity and stimulates the development of children with manifested talents in sports and arts.

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MORAL STANDARDS GOVERNING THE ETHICS OF MODERN SPORT MODEL

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Key words: *morality, ethics, respect, responsibility, caring, honesty, sincerity, humanity*

INTRODUCTION

Morality (from the Latin word Mores) is one of the forms of social consciousness, social institution performing the function of behavior regulation of people without exception. By moral necessity, needs and interest of society or certain social groups are expressed in forming generally recognized requirements (rules of conduct), backed by the power of mass example, habit, custom and public opinion.

Ethics (from the Greek word Ethos) is one of the ancient theoretical disciplines in which object of study it morality. Sport ethics are defined by established rules and norms – generally accepted conventional human valuables, principles and rules of conduct. "Fair play" is concept overlapping and affirming the ideals of sport competition rules and fair play spirit in game, respect between competitors, teammates, lack of tolerance for mocking, arrogant, vulgar and discriminatory behavior, anti – doping banned stimulants, corruption and violence in sport.

Ethics and moral had, have and will have a significant role and place in the global development of sport and all close to it areas. Identification, characterization and observance of moral norms that construct ethical model of modern sport has important role in policy line for development of sport society.

In 1999 in USA (Arizona Sport Summit Accord) are defined six moral categories – valuables and norms of behavior: respect, responsibility, caring, honesty, fairness and humanity/good citizenship. Undoubtedly, the above moral standards form the character and behavior of humans and have a significant role in the development of the value system of personality through sport. Sport practice and law have proven in time moral values and norms, and example of behavior presented as number of pillars of ethical codes (code of conduct) of sport organizations all over the world. International Olympic Committee (IOC) accepted the idea, in the same year prepared, and approved a Code of Conduct with which help the Ethics Commission regulates and supervises compliance with the moral and ethical standards, the Olympic values and sportsmanship adopted by the IOC.

METHODOLOGY

Our aim is to discover and characterize individual moral standards – categories that create the structure of the ethical model of modern time sport, their role, place and importance for building values and personality of the athlete.

For realizing this purpose, we studied the available literature on the problem (1, 2, 3, 4). All the information was systematized, and the results analyzed and discussed. In addition, we defined several important for sport conclusions.

RESULTS

The study of the problem allowed us to build an exemplary model of ethics in sport (see Figure 1) and to objectify and characterize all moral norms (see Table 1).

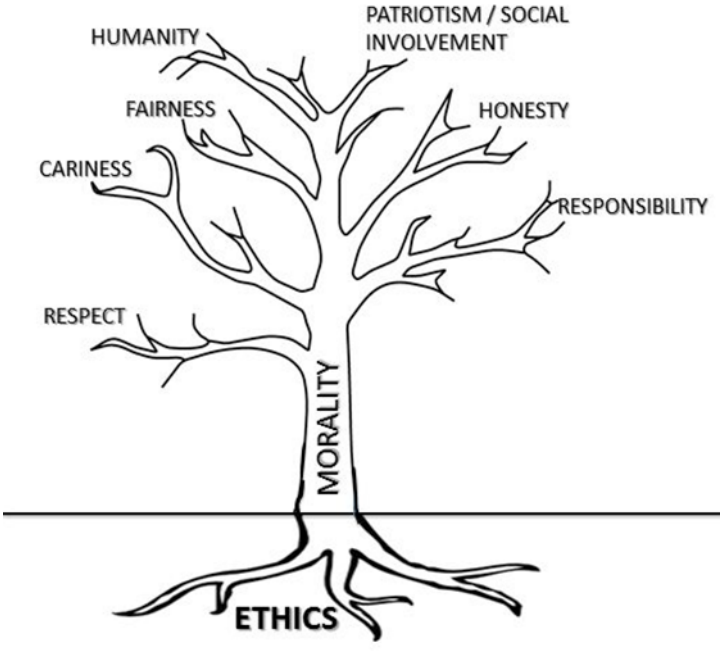

Figure 1. Ethical model – moral norms.

Table 1. Ethical model – moral norms characteristics

Moral norms	Characteristics / moral case in sport
Respect	Respect is set in the golden rule "respect and be respected". Attitude of friends, acquaintances, and all people we have contact with is a reflection of our attitude towards them. Respectful athletes and coaches radiate positivity, accept judges and officials decisions without protest remarks, offensive words, gestures or threads. Communication, whether verbal or non – verbal, should not radiate aggression, sarcasm, contempt or disappointment. Respect is a measure of harmony in relationship between people and is barometer of the mood and atmosphere that define the working environment of sport team.
Responsibility	Responsibility is characterized by permanence, accuracy, consistency and performance of correct actions. Examples of responsible behavior in sport: always try to give best of yourself even against stronger opponent or when the outcome of the match is irrelevant; take responsibility for your actions even if the outcome is negative.
Cariness	Cariness is a moral norm that requires the use of safe and healthy conditions for training and competing, both for yourself and for other competitors. Athlete is caring and compassionate when he has the ability to sympathy and empathy (to experience the feelings and pain of others). Examples of such behavior in sport: taking care of personal equipment and public equipment and facilities; to give your teammate or opponent protective equipment; cheer injured athlete; to help opponent get up after tackle.
Honesty	Honesty require truthfulness and honesties, always telling the truth as it is (do not conceal important information) and be honest and loyal! Examples of fair behavior in sport: to be a team player means to be loyal, honest, honorable and open to teammates and coaches; fair play requires competition in the the rule of the game spirit.
Fairness	Justice is one of the key elements of sportsmanship and requires competing by the rules and the spirit of the fair play – whether you win or lose. Athletes and coaches who play fair will always compete by the rule, regardless of how it affects the outcome of the match. Fairness in sport is a criterion for determining the specific team or individual awards for integrity, honesty and impartiality.
Humanity	Humanism in sport is set of beliefs and actions that express respect for the dignity and rights of athlete, coach, judge and everyone involved in sport as whole. This moral issue is inextricably linked to the previous – respect, responsibility, caring, honesty and fairness. Humanism is a care to create favorable conditions for the comprehensive development of public and social life of athletes, coaches, judges and all participants in sport. Participation of famous athletes, coaches, referees, sport leaders and activists in initiatives against violence, aggression and racism in sport are criteria for demonstrating a high level of humanism.
Social commitment and patriotism	This moral category is an important part of sports ethics and plays essential role in shaping the public image of athletes at local, regional and national level. Decent athletes as a part of the society, by their patriotism helps the creation of positive image and authority of sport in community. Athletes, coaches and sport officials in this category perform national team and international commitments with honor and dignity. As volunteers, they give from their time, money, emotions and everything in the power to be involved in the organization of sport events in a positive and constructive aspect. Placing a higher cause (national team) than lower one (participation in club team) is an indicator for high level of patriotism. Social commitment is a moral norm, which expresses devotion to a particular social group – in sport this is the love for your club. Education in love of your club, responsibility, honor the national team, respect your opponents is a crucial moral and ethical dilemma in construction of patriotism and social commitment of athlete.

DISCUSSION

The study results enable us to objectify moral standards by disclosing the expression level of each characteristic and point out good and bad examples (Tables 2 – 8).

Table 2. Respect

moral norm	manifestation level	examples	negative examples
Respect – positive, friendly attitude. "The respect is the foundation of ethics and fills with content other moral norms."	Self-esteem; Respect for club, teammates and coaches, opponents, officials and volunteers; Respect for the sport, its rules, traditions and spirit of competition;	Greeting teammates, judges, officials, opponents and audience before the start of the game. Maintain clean and tidy equipment. Acceptance of criticism without vulgar words and gestures.	Abusive language or gestures to a teammate, opponent, judge or the public. Failure to salute opponent, judge or the public. Unsightly appearance – to participate with unclea and rumpled equipment. Intrigue. Anthem and disrespect for team symbols. Missing the official ceremonies or bad appearance.

Table 3. Responsibility

moral norm	manifestation level	examples	negative examples
Responsibility – meeting commitments in respect of rules and order. "The responsibility is a reflection to our respect for the work."	Self-discipline and punctuality; Compliance with the targets and guidelines; Compliance with sport regime- food, time schedule; Compliance with principles – educational and sports; Acceptance of the consequences of actions and results.	Arrival at the appointed hour for training and competition; Be always in shape; Compliance and success in completing the tasks; Experience correction after being remarked or indicated.	Be late for traininig or competitions; Night life before competitions or team testing; Accusations after defeat; Lack of experience for corections after being noted.

Table 4. Cariness

moral norm	manifestation level	examples	negative examples
Cariness – to practice sport with prevention and care for athlete's health using sport equipment and facilities.	Usage of the correct equipment and supplies; Sport facilities; Compliance with the individual abilities, sex, age and qualification; Bad weather; Prevent injuries; Adequate measures for illness and injuries; Recovery and prevention; Sympathy for sick or injured athletes or colleagues.	Care for your personal equipment; Taking care for the sport facilities; Considering weather situation; Prevent injured or unequipped athletes to train or compete; Take care for sick or injured players.	Use of worn (damage stick) or equipment; Crating hazardous to health and life situations; Not helping the player in need; Admission to practice or playing of injured, unprepared atheltes or playing with competitiro with significant difference of qualification.

Table 5. Honesty

moral norm	manifestation level	examples	negative examples
Honesty (integrity) – protection of the truth, no matter the consequences. "The highest form of respect is the true as it is, but not as it is beneficial to us."	Honesty to teammates, parents, coaches, etc.; Loyalty to the team; Competing in the game rules spirit; Gambling decisions; Reliability and stability of the behavior.	Always play by the rules; Admit disorder that judge had not seen; Identify the perpetrator of the offence; Keep on the words you say; Talk openly and honestly.	To play by your own rules seeking gap in the official rules; Goal scored by Maradona using his hand during the World Cup in 1986; To conceal the perpetrator of the offence; Constantly change your opinion; To lie or conceal the truth.

Table 6. Fairness

moral norm	manifestation level	examples	negative examples
Fairness – fairness when making decisions. "Without laws there is no justice, no peace!" "Laws give the right of everyone to have opinion, but fairness requires facts, no opinions."	Taking decisions; Compliance with laws, rules and regulations.	Decision on the legality taking in mind reliable evidence and facts; Decision on the belief that there is a violation of rules and taking full responsibility for the consequences.	Disagreement and non – adopatance of accepted rules; Decision in the absece of evidenve; Not taking decision on available facst and evidence.

Table 7. Humanity

moral norm	manifestation level	examples	negative examples
Humanity – high level of moral norm expressing our respect for human dignity and right of every athlete.	Education to respect all human valuables; Respect for established laws, rights and benefits.	Intolerance to corruption and fraud; Intolerance to doping, alcohol, cigarettes drugs in sport; Intolerance to discrimination, aggression, vandalism and vulgar behavior.	Participation in sport gambling; Sale or cooperation in doping and banned stimulatns trade; Alcohol and cigarettes usage; Acts of aggression and vulgar behavior during sport events; Racial, sexual, ethic or other discrimination.

Table 8. Social commitment and patriotism

moral norm	manifestation level	examples	negative examples
Social commitment and patriotism – the ability to love teammates and respect opponents.	Attitude towards the national team of your country; Attitude towards your sport club.	With honor and dignity to accept decision to be or not to be part of your national or club team; To wear with honor and dignity the national or club symbols; Sing the national or club anthem.	To tear or throw on the ground official equipment; Rufuse to participate in the national team because of disagreement with the team selections or club commitments of your own; Refuse to participate in imporatant meetings of your own club without reason.

CONCLUSION

Character specifies the type of personality and morality – behavior, in other words ethics. It is customary to associate in society athletes who exhibit behavior and sport ethics as respectful, polite, honorable, fair, honest and responsible. Even though in sport the primary aim is to seek results the dilemma "good or bad person – a champion is a champion" have great importance. The sportsmanship "obligates" the sport societies to involve people who have good character, behavior and good heart. The great athlete, coach or referee, no matter age, gender, education, race in first place must be a good human.

Sports ethics requires the desire to live and work productively in harmony, peace and prosperity for the image and development of sport – first to educate, second and third to keep and develop the accepted moral norm of behavior in the society. Objectification of moral norms is complex, controversial and difficult to define matter, with important social and public importance, both for elite and mass sport. Public events such as participation in campaigns and initiatives for "Fair play" fight against doping, corruption, violence, aggression and racism in sport of sport superstars are extremely important. The help for the proper direction, education and development of young athletes and criteria for the level of sport ethics, expression of the highest form of humanism and social commitment to moral and ethical behavior model. Emulating to their sport idols, todays' sport talents will determine the boundaries of moral norms and compose the sport ethics in the future.

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PEDAGOGICAL NATURE OF THE COACHING ACTIVITY IN WRESTLING

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Key worlds: *wrestling, pedagogical characteristics of the wrestling coach*

There are tens of thousands of different professions and specialties in the today's globalized and high-tech information society. Many of them, however, come and go, break up and take different modifications. But among all professions there is one that has withstood the most violent twists and turns in the history of humanity and has preserved over the centuries and millennia not only its ancient name, but also its social and educational function - to prepare the younger generation for life and work . This is the teaching profession, the occupation of the teacher, to which since ancient times, coaching has also been assigned. Both jobs belong to the group of the so-called socio-economic professions, i.e. the professions covering the relation "man to man". In other words, these are the professionals who were destined to guide other people, as is the case with sports educators in the field of physical culture and sports, including wrestling coaches. (1,3,6,7,10)

The teacher, as well as the coach, has been entrusted since ancient times with the important social task of building up and forming a physically and spiritually developed personality, fit and ready for a highly productive work and high sports achievements under the conditions of modern technologies and developed information society, including achievements in the field of sport and in particular in the wrestling discipline. The said conditions are constantly changing and modifying and they place before coaches' newer and more complex requirements for their training, qualifications, personal and professional qualities, abilities, attitudes, knowledge, skills, and many more.

The coach occupies a central and leading role in the system of relations within the team and its leadership and management. The features of his personality and his preparation determine the image and performance of the athletes and their attitude towards the set training and competition tasks, as well as the near, intermediate and distant targets in their sporting development. (1,2,4,5,8,9)

In psychological and pedagogical plan, coaching is not only difficult, but also a complex professional activity. It includes the implementation of several socio-pedagogical roles, such as being a coach, a teacher, a pedagogue, an educator, a leader, a psychologist, a doctor, etc. Each of these roles is carried out by a particular trainer with his unique individuality.

To what extent the coach-teacher will be able to combine all these roles and functions in his multifaceted activities, undoubtedly depends on his personal qualities and dispositions. His freedom of choice is also of greater significance.

The functions of the wrestling coach are more strictly defined and closer to his official and professional duties.

In organizational and pedagogical plan his functions are: passing over the social experience of their sport; organization of the independent and critical assimilation of such experience, stimulation and support of the learning process and its utilization in the process of training, practice and competition; monitoring and evaluation for the achievement of the desired goals and others.

This means that along with solid professional knowledge, skills, habits, value orientations and others, coaches should also possess a number of personal and mental qualities and skills that are required by their future profession.

On one side these personal qualities are associated with the values and morals of the person, while on the other side, lies the knowledge acquired through training and education. These qualities are there-

fore mutually connected and intertwined so that they essentially become personal and professional, i.e. they become his second nature. Hence the activity of the wrestling coach is not only school education and training, but also it functions as instructive, formative and developing the personality of the athlete.

The personality of the coach is formed by a continuous process, undergoing the impact of several factors (positive and negative) - the social environment, the educational system, the scientific and methodological training, the ongoing training and sports activities and the results achieved, the hereditary factors and the personal efforts of the individual for his own improvement.

Regardless of what is said here, no direct and explicit definition of the coaching profession is found in any of the various publications and writings. It is even implied that the definition of the nature of coaching is clear by itself and there is no need of interpretation and evidence. This is perhaps most obvious in the simple and unconditional replacement of the term “coach” with the term “teacher” and respectively “coaching work” with “pedagogical work.” However, no one explains or justifies the overlapping of these two concepts.

In fact, the coaching in any kind of sport is quite versatile in its entire range, with all its complexity and contradictions and is subject to and governed by the laws of the complete human development that affects all areas of the athlete’s personality - physical, mental, spiritual, volitional, emotional, intellectual, etc. This fact, as well as the resulting conflict often seems to be “missed” by many authors and coaches in practice.

The nature of the coaching profession, and in general of any pedagogical profession, is determined by the following briefly outlined features and by their significance to coaching.

The goal of coaching is the first major indicator that is determined by the needs and requirements of the modern democratic society. The coach must “provide” the public with a fully developed person that is qualified to cultivate and adapt actively to the constantly changing conditions of life and work, as they are today, requiring “active adaptation”. Thus the goal of coaching is extensive and comprehensive, going beyond the traditional triad - providing only mastering of “sports knowledge, skills and habits.” It refers to the overall personality of the athlete, including all sides and components, which naturally comprise as one of their resultant product the sport skills and sport achievements in wrestling too.

The subject of coaching is the athlete (child, adolescent, young man, adult), who is a complex and dynamic person, with intensive changes in his own characteristics (physical, sports and technical, psychological, emotional, volitional, functional, etc.). That is why it is determined that the subject of the professional and pedagogical activity of the sports teacher is the personality of the athlete. The products of this activity materialize in the psychological image of the students, in their knowledge, skills and habits, in their characters and their will and not least in their sport mastership, acquired in the long-lasting pedagogical process of specific sports training.

The methods of coaching are many. Some of them are common or similar to the methods in other professions. Most of them, however, are specific and unique to the coaching work.

As a whole, the methods are determined by the ultimate goal of the profession, by the dynamic features of the subject –the athlete wrestler, as well as by a number of other conditions and requirements related to the forms of activity, to the specialty of the wrestling coach, to the training and educational level of the students, the trainees and the wrestlers, etc. In broad terms, the following ways and means are common to the profession of coaching: the learning content (technical skills), the personality of the coach and his “engagement” in the formative process (as a model or standard he inspires, engages, persuades, prompts, respects, “infects”, etc.); pedagogical communication is another method in the stock of the coaching profession; the activities of athletes as second active subject are also among the means of successful professional work, etc.

The above-mentioned ways and means become realistic, specific and typical for the profession of the wrestling coach especially when considered in their unique combination.

An important feature of the coaching profession is its creative nature.

A prerequisite for the creativity of the coach is the continuous combination of conclusions, prognoses and transformations in the teaching process, where the conclusions are based on the critical evaluation of work quantity and quality and performance, the prognoses are made on a scientific basis and the transformations are in the direction of developing the overall personality and the best models (standards) in sport. The creative nature of coaching is also determined by the "publicity" and manifestation of the activity, "according to witnesses," which almost always have a critical position towards its implementation, especially in case of failure.

It is obvious that the job of the coach is not limited only to working with athletes, although this coactivity is the primary one.

Under all these conditions, the coach takes into consideration the work for the development of the personality of the athlete and it is actually his strategy to accomplish all-round development of the athlete's personality and to achieve the best possible sports results (better ranking).

The second important area where the coach unfolds his various activities is the area of motivation and value orientation and the athletes' attitude towards the various phenomena in nature, life and social reality (educational function).

This field of coaching is too delicate and the relationship between the effects and the results is hard to reveal, but its existence is undeniable. Unlike in training and practice, the measure of uncertainty here is extremely high and therefore this part in the preparation of the coach is often overlooked. However, this function of the coach integrates and brings together all other functions, i.e. everything in his work represents education. The point of education is precisely this - to be able to develop a set creativity in the wrestler by helping him to come in contact with the social and natural environment, providing him with a wide variety of perceptions, arousing his creative imagination and thinking. This implies a focus on the difference between perception, imagination, thinking, behavior of the wrestlers, stimulation of dreaming, the emergence of new ideas and solutions, the divergence between thinking and behavior. In summary, the pedagogical communication needs to create an atmosphere for creativity of the athletes by supporting their ideas, their creative work, their interests, the originality in their competitive actions and behavior.

The socio-pedagogical control over the athletes is represented by the so-called institutional pedagogical power that the coach exercises in different situations. This area of his activity in which he performs some of the functions is no less significant in influencing the behavior of the athletes and the implications for their overall development.

First in the range scale stands the communicativeness (sociability) of the coach with the necessary ability to establish empathy or rapport with the athletes. Communicativeness is a key quality for the implementation of the entire integrated system of the coaching profession.

Second in the range scale stands the creative thinking and activity of the coach with allits elements and aspects of content and manifestations: originality, initiative, resourcefulness, flexibility, tact, particular variation, selection and measured communication, creative flair, etc.

There are rarely such professions that require both concentrated and distributed attention in order to monitor both individual athletes and entire groups (teams).

Like in other areas of creative work, the activity of the coach may include intuition, too. It is expressed in quick orientation in a complex situation, immediate and almost instantaneous taking of right decisions.

Since the right professional approach is not to solve problems by himself but rather to try and involve the students in the process, the coach contributes to the development of positive qualities in the athletes' way of thinking.

Another important feature of the creative personality is the necessary component of the individual and of the coach's job – the imagination, also called pedagogical imagination. The coach works with this part of the population that not only lives in the present, but dreams and prepares for the future. It is known that each athlete is both a present reality and a projected into the future person –an athlete.

Therefore, the coach should be able to see his student not only in his current dimensions and achievements, but also in the projection of his nearest and farthest life experience, including his sports career.

CONCLUSION

It is difficult and it is not necessary to enumerate all the individual qualities of the coach. But we can still mention only the most important of his positive qualities, without which it is impossible to practice this profession.

It is precisely why the coaching profession, as well as all other educational professions, involves professional training and qualifications of the coach, required by the standards of the sports and pedagogical activities, where the subject of pedagogical influence and interaction is the sports person. In contrast, however, the task of coaching (and of the profession) is to provide not only the intellectual but also the physical and sporting and technical training and education of the young people involved in sport. This means that the coaching pedagogue must not only be prepared as a professional expert in the respective sport (theoretically and practically), but also to be competent in many other scientific areas related to the human body. The latter is subjected to influence by different in force, structure and content physical exercises, to which the student reacts, thus changing and perfecting him, becoming fit to join the competition and fight for peak athletic performance. This means that the training carried out by the coach is much more difficult and much more sizeable than the analogous training of all other educators.

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STUDY THE STATUS OF WOMEN AND GIRL'S FOOTBALL IN THE REPUBLIC OF BULGARIA

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Keywords: *football , women, education, research.*

More than 20 years is tangible presence of women's football world and Olympic arena. During this period, FIFA create conditions similar to the organization of conducting male fora such programs in the Olympic Games women's football enjoys a great interest and attendances. During the past 2013. in Europe the number of female football clubs reaching number 70 000 and 21 285 girls formations. Registered football players are 1, 162, 314 as 719.098 of them are girls, and the total cost of female national football associations in 2012/13 was 80,679,700 euros.

European Football Association (UEFA) a program for the development of women's football in all 54 member states of the organization. The strategy of this program (The UEFA Women's Football Development Programme) is oriented in three directions:

- ✓ Effective management
- ✓ Increase the prestige of women's football
- ✓ Mass involvement of children, girls and women in sports system.

More women at the football pitch and off and in management and senior management functions is a policy that should be followed and an example of this is Karen Espelund, a member of the Executive Committee and Chairman of the Committee on Women's soccer, which says: "Football has come a long way over the last few years, but there is still a clear lack of women in positions of the highest level."

Equality between women and men is a fundamental principle in legislation and practice of the European Union. In 2007 the European Commission adopted the White Paper on Sport. This is the first strategic document that outlines strategic directions of the sports policy of the European Union. Highlighting the societal role of sport is taken to respect his contribution to promoting equal gender relations. The opinion expressed in it. 17 „Within the Roadmap for equality between women and men 2006-2010, the Commission will encourage the mainstreaming of gender equality in all its activities related to sports, paying particular attention to access to sport for immigrant women and women from ethnic minorities, women's access to positions with the right decision-making in sport and media coverage of women in sport. „(see. White Paper on Sport).

In 2011 Bulgaria has 30 years from the beginning of women's football. Now in the country are competing nine representative teams, eight teams of girls up to 19 years and eight teams to 17 years. Developed „Long-term strategy for the development of women's football" between 2012-2016.
Undoubtedly a huge boost in the promotion of girls' and women's football set up the organization of European Championships for girls up to 19 years in 2001., European Championships for girls to 17 years in 2007, as well as the most prestigious club tournament -Buy UEFA women, 2001 that the ninth edition 2009/2010 season already is named Champions EHL women.

This huge step for the organization of numerous international meetings on different levels a positive effect in our women's football. In 2000 it was rebuilt our women's national team. Created new club teams in the National Championship 9 -10 participated composition. In 2001 was selected first girls' national team to 19 years, and in 2007 and selection to 17 years. In this period after 2005, As undisputed leader in the National Championship for women established team FC NSA, which is 10 times champion and eight-time winner of the Cup „Bulgaria".

Regardless of the major programs of FIFA and UEFA for the development of women‘s football in recent years Bulgarian female football lags far behind internationally. This article is part of a major research and development project „the football female gender equality“

The aim of this study is to explore, identify and analyze the situation of girls‘ and women‘s football in Bulgaria.

Tasks of the study:

1 To prepare and develop a questionnaire.
2 To implement the survey.
3 To process and analyze the data from the survey.

METHODOLOGY

Survey conducted by anonymous questionnaire comprising 23 questions.

Object of the study were 113 players, coaches and specialists in the field of girls› and women›s soccer, divided by gender, age and years in Table. 1.

Table 1.

Researched people			
Gender	Number of researched people	To 18	After 18
MALE	9	-	9
FEMALE	104	71	33
COMMON:	113	71	2

ANALYSIS OF RESULTS

From the data analysis we present some of the results of questions and received answers that provide important initial information about the state of the system for sports training, motivation, experience, age, social status, etc.

The question „In 2011 the European Parliament adopted a resolution according to which in 2015 women should occupy 30% of senior management positions, and in 2020 - to 40%. You personally do you agree with this resolution? „Figure 1 introduces a result, a large proportion of respondents 82% gave a positive response, respectively 9% remains for those who disagree and 9% had no opinion.

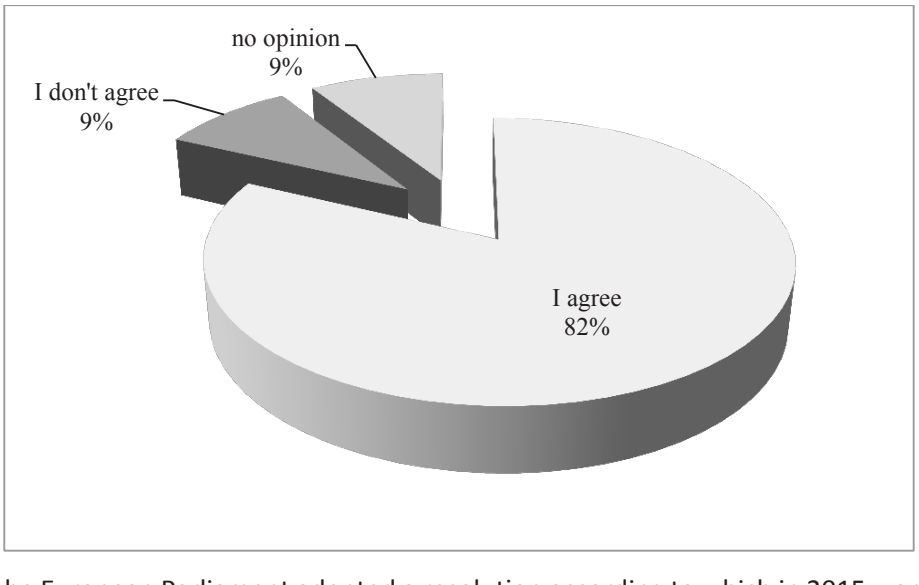

Fig. 1. „In 2011 the European Parliament adopted a resolution according to which in 2015 women should occupy 30% of senior management positions, and in 2020 g.- to 40%. You personally do you agree with this resolution? „

What was the attitude of your loved ones to your choice? “Undeniable positive support - 80% indicates that the family is an important factor, 11% indicate indifference and 9% had a negative close relation. In particular importance is the support of friends / girlfriends

they - 87%, 10% showed a disinterest and only 3% have a negative attitude.

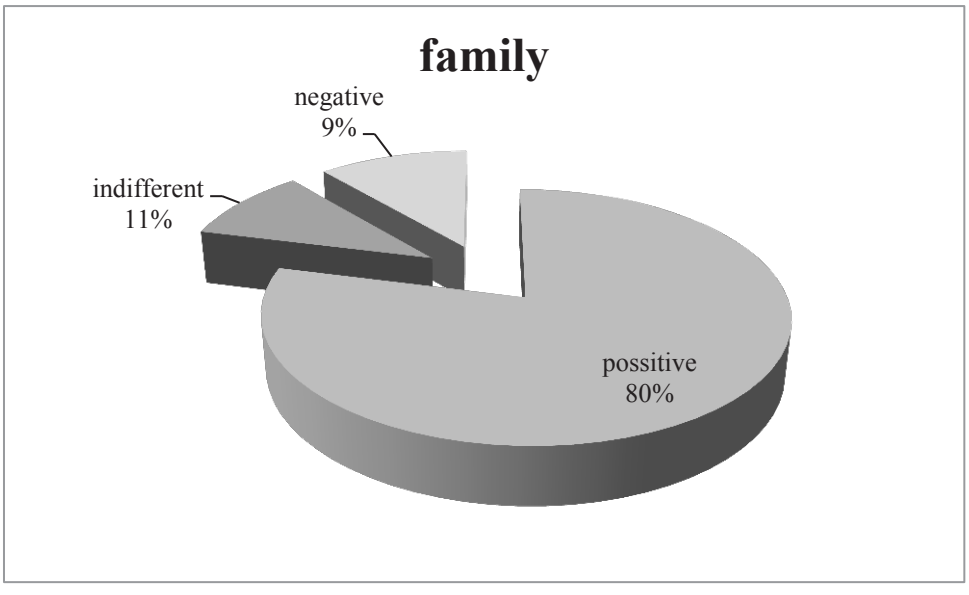

Fig. 2. „What was the attitude of your close people to your choice?“

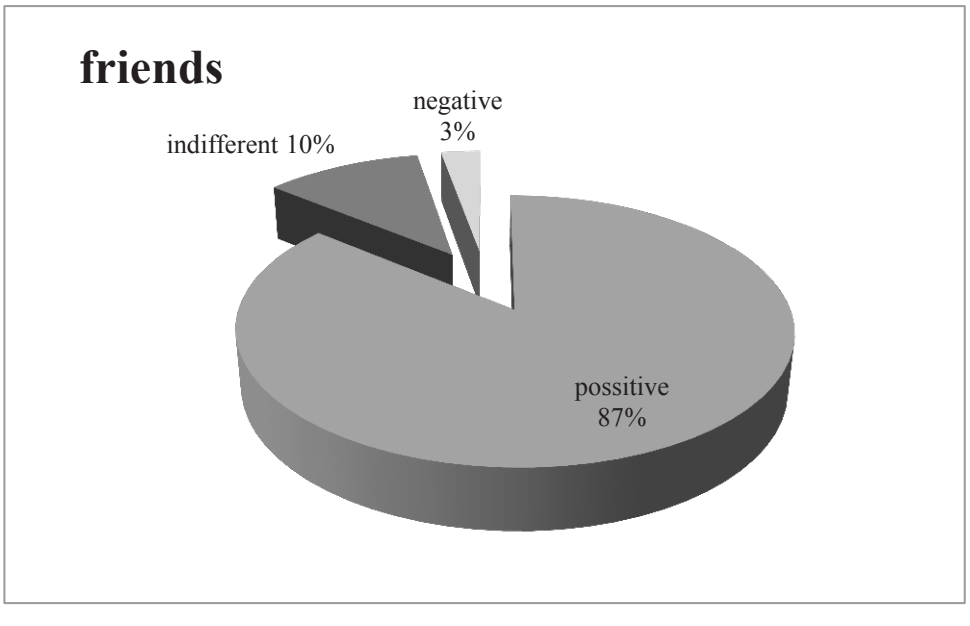

Fig. 3. „What was the attitude of your close people to your choice?“

The question “number of weekly practices in the weekly cycle”?

The answers are presented in Figure 4 and are distributed as follows:

√ 1-2 workouts per week - 13%

√ 3-4 workouts per week - 45%

√ 5-7 workouts per week - 34%

Vast majority of respondents (total 79%) responded that train a week between 3 and 7 times.

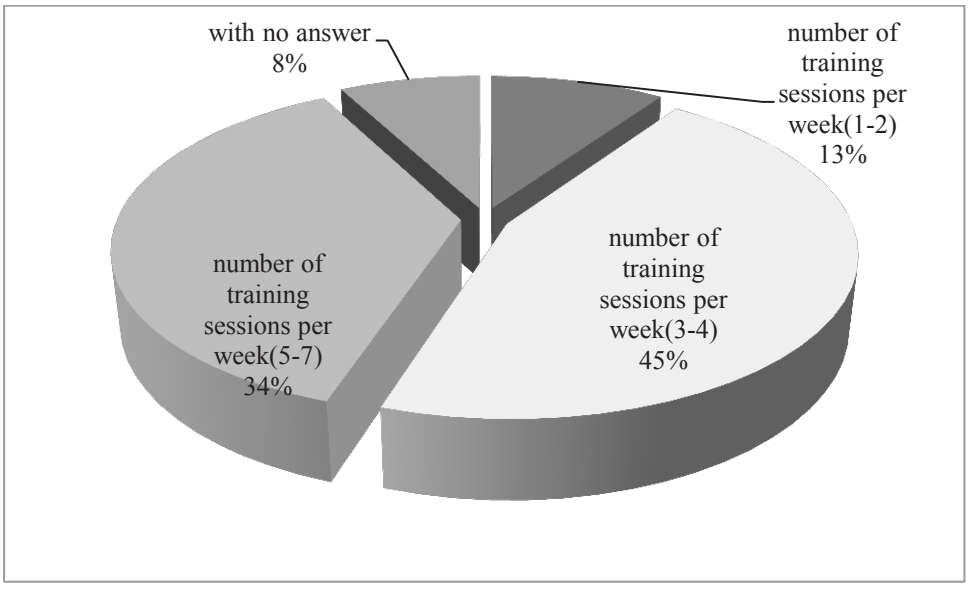

Fig. 4. „The number of weekly practices in the weekly cycle“?

In 2012 BFU participated and won the FIFA project, which main goal is to improve the state of women's football in Bulgaria based on long-term development strategy. Of particular importance in education is the inclusion of over 30 coaches in free training to BSC acquisition of "C" license. In the system of women's football are less qualified coaches, but the question "How do you evaluate the performance of your coach training Team"? 66% of respondents gave a good assessment of the work of the coach. Good assessment and give 22% satisfactory and generally give no opinion 12%. High estimates that put the majority of participants and raises some doubt about the criteria and general competence of the younger respondents.

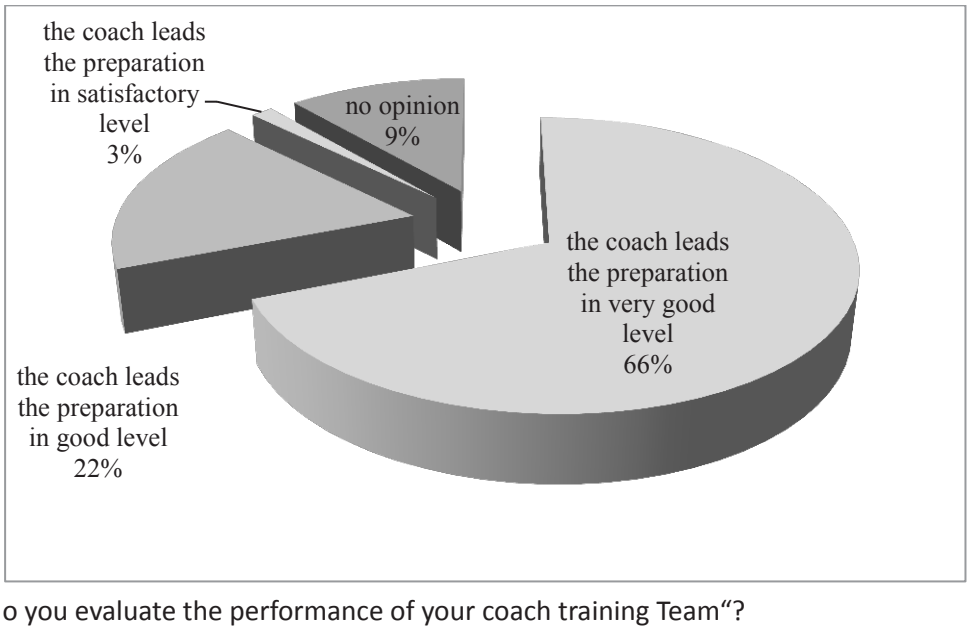

Fig. 5. „How do you evaluate the performance of your coach training Team“?

It is common knowledge that women have short sports-racing career, in this respect, football is no exception. Figure 6 present the results to the question "How many years participate in organized sports football"?

1 to 5 years responded that they have little experience in football 65%. From 6 to 10 years. participants 24%. Racing experience of 11 years and above are generally 11%. This is evidence that because of some reasons women footballer much earlier than men finishing their racing career.

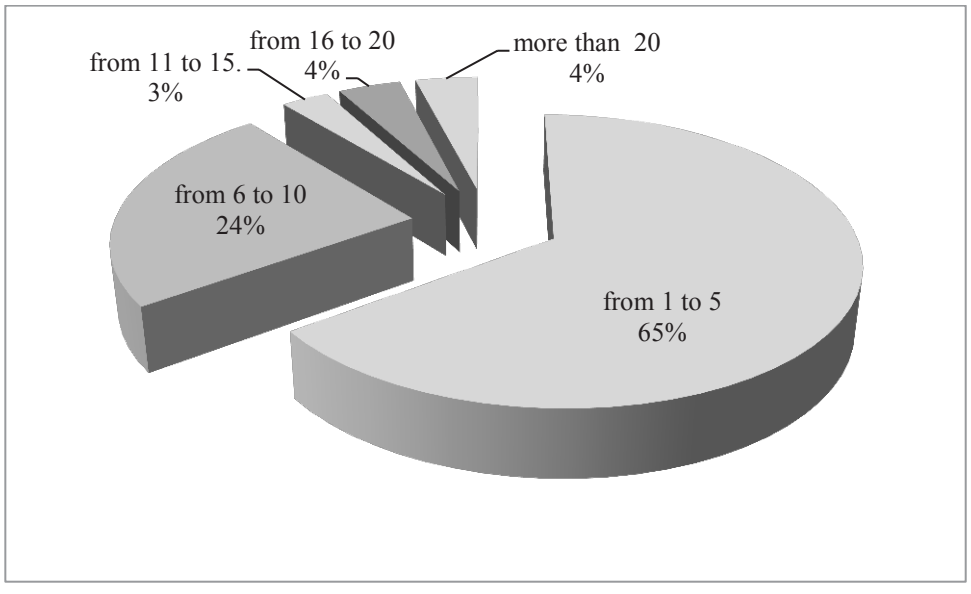

Fig. 6. „How many years do you participate in organized sports football"?

Bulgaria still not practice inclusion of organized football activities for girls in kindergarten and school at physical education and sport program in primary school age. This question is, as a problem in the system of women's football because girls' education should begin in early childhood (5-6 years) Fig. 7 are shown the results of the question "How old did you involve in organized sports football"?

The main part of football players - 68% have started to train between 9 and 15 years., 13% between 5 and 8 years, 15% between 16 and 20 years and 4% did not respond. Notwithstanding the above limitations can be concluded that a significant part over 80% starting at the age that still gives prospects for development .not small share of respondents - 15% starting between 16 and 20 years. It should be noted that it is typical for women and girls' football to attract players from other sports disciplines on later age.

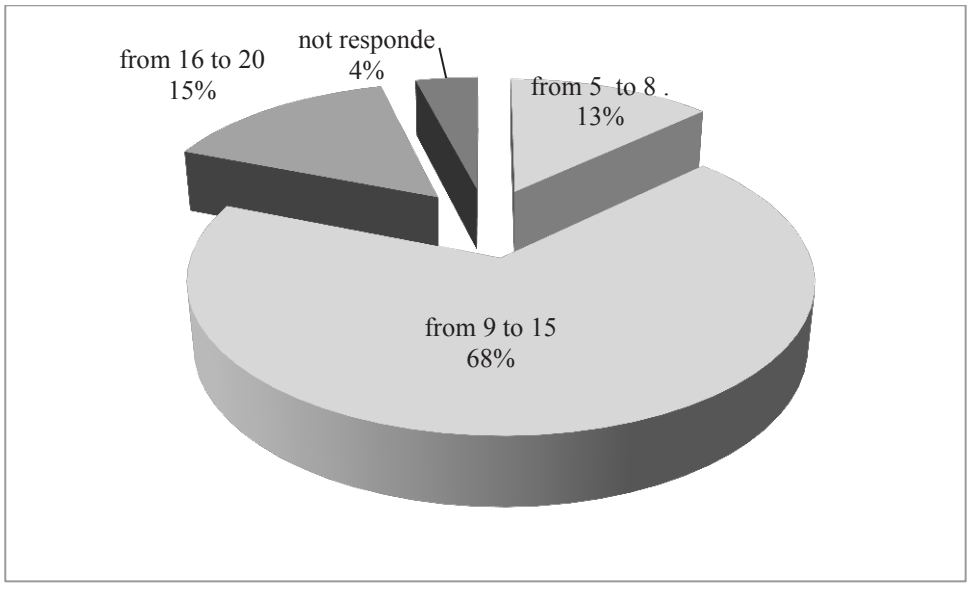

Fig. 7. „At what age did you get involved in organized sports football"?

Next question confirms our assertion that the majority of respondents were involved in other sports. This probably is the reason that women's football is not very popular in Bulgaria. In Figure 8 we present the results to the question " Before football activities I was involved in another sport? "

Responses indicate:

Track and field – 10% ;
Basketball – 9% ;
Tennis– 5% ;
Handball – 6% ;
Swimming – 5% ;
Volleyball – 6%;
Other sports – 21%

The remaining 38% did not indicate sports probably are those that football is the first sport discipline.

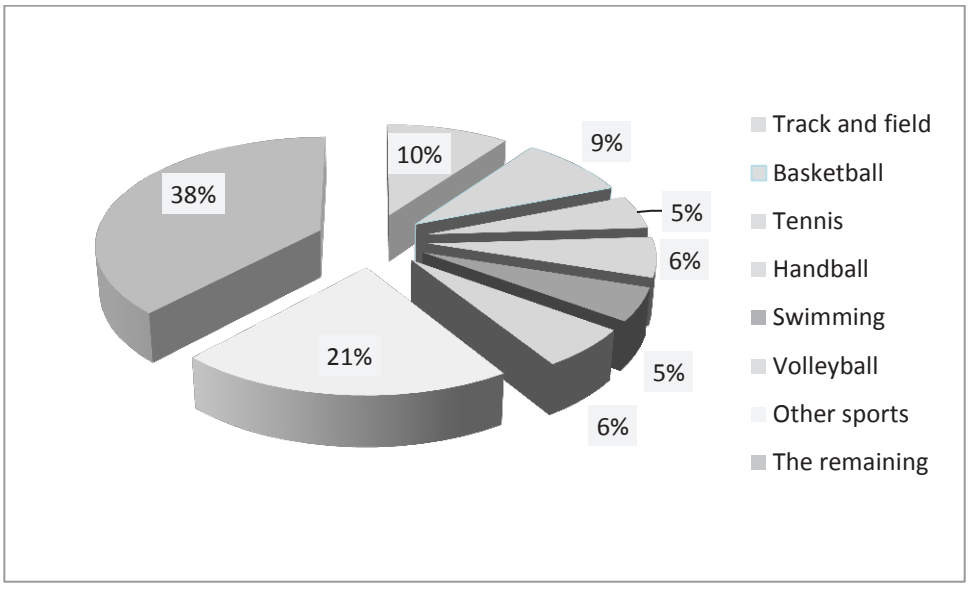

Fig.8. „ Before football activities I was involved in another sport? „

CONCLUSIONS

1. Strongly supported are the documents and recommendations of the European Union gender equality in point. Hrs., And sport;
2. For participation in football activities major factor is indisputable family support. Much of actively dealing with football, participate in between 3 and 7 training sessions in the weekly cycle, for amateur female soccer in our country this is a good standard.
3. Concerning entire coaching career has been determined largely good score and racing experience over time is an important factor in the process of sports training.

RECOMMENDATIONS

1. Preliminary and initial screening should take place between 5-8 years, teaching girls to be 3-5 days per week in mixed groups of boys.
2. To create interest in the organized football activities to take into account the positive role of the family, teachers in physical education and sport, coaches and friends.
3. In order to improve the quality of the training process is necessary to introduce qualification requirements for trainers.

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SURVEY OF THE EFFICIENCY OF VOLLEYBALL CLUB "MINYOR" – PERNIK IN PREPARATION OF PERSPECTIVE VOLLEYBALL PLAYERS

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Key words: pupils, volleyball, club, physical development, specific workability

In our days, as a result from the increasing deficit of motive activity, particularly in school age, it appears to be the reason for the growth of the problems related to the extra body weight, spinal distortions, heart diseases, lower functional fitness, etc. [2,3,4,5,6]. It is really a pity that one of the reasons for the worsen health status of the growing up young people is the lack of efficiency of the compulsory school preparation in physical education within the educational system (**1**). That is the reason why the contemporary experts are compelled to look for out of class activities to compensate the above mentioned problems.

The present study is aimed at uncovering the cumulative impact of the out of school preparation at "Minyor" - Pernik volleyball club of 10-13 years old pupils. Subject of the study is the level of the physical development and the specific workability. The contingent of the study covers 60 pupils all, divided into two age groups of 15 boys and girls each. The first group covers pupils from the IV-V grade and the second – from VI-VII grade.[1]

The complex methodology covers analysis of literature, implementation of certifying and developing experiment, tests and evaluation of criteria [as per R.Tsarova and coll., 2002, [**7**]. Data have been processes statistically by the application of the variation analysis and the "Method of Student"[2] to prove the statistic reliability of the registered differences. The study is made during the period 2011-2014.

ANALYSIS OF THE RESULTS

The general review of the transversal study results of the components of the pupils' specific physical workability shows the following regularities. The pupils from the second age group from both sexes have registered higher achievements according to certain indicators in comparison with those of the first group while the growth for nearly all variables is supported by maximal quantities of confidential probability (see **Fig. 1**).

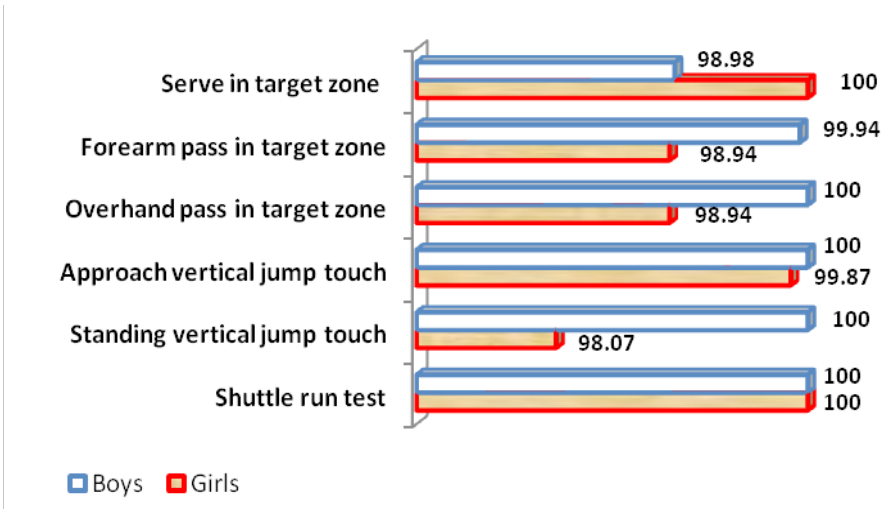

Fig. 1. Coefficients of confidential probability of the growth in the development of the specific workability of the girls and boys (IV-V and VI-VII grade)

[1]For shortness in the analysis, V grade shall be used for the first group and VII grade – for the second
[2]We have used this method after establishing that the form of distribution of the symptoms studied is "normal"

The highest growth in the development of the specific workability is established in relation to the explosive strength of the lower limbs symptom measured.by the following tests – "standing vertical jump touch" (cm) and "approach vertical jump touch" (cm). As a result of the purposeful training activity, the boys from the VI-VII grade have improved their achievements for the first test by (d = 31.31 cm), and for the second one by (d = 35,37 cm). The differences pointed out are supported by maximal confidential coefficient (Pt = 100%). The same tendency is established in the dynamics of both tests for the girls of the second age group with the difference that the growth here is of smaller quantities (respectively 14.54 and 20.00 cm) supported again by considerable coefficient of statistic reliability. (Pt > 98%).

Growth is established in the development of the specific endurance as well, measured by the "shuttle run" test. The boys and the girls from the second age group realize improvement (respectively d = -1.76 and d = -2.45) supported again by considerable confidential coefficient. At the same time, by growing up, the pupils naturally improve the components of the specific workability as well, registered by the following tests – "overhand pass in target zone", "forearm pass in target zone" and "serve in target zone". Obviously all components of the physical workability for the pupils from both sexes are considerably improved resulting from the purposeful training at "Minyor" Pernik volleyball club.

The effectiveness of the cumulative impact of the preparation of perspective volleyball players on the indicators of the specific workability is of particular interest for us. For the purpose we have compared the data of our own studies about the girls made in 2013 with those made in 2011. In order to avoid doubling information, we have placed the calculated quantities of statistic reliability in the following figure (**see Fig. 2**).

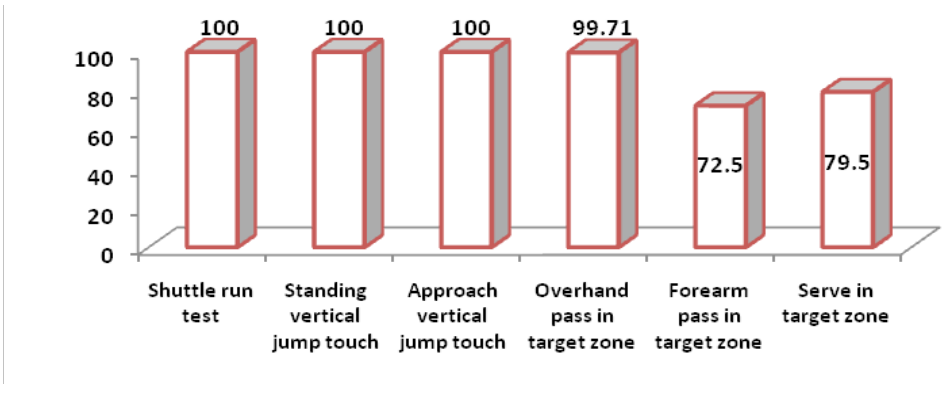

Fig. 2. Coefficients of confidential probability of the growth in the development of the specific workability of the girls from the first and second age group

We have established that the girls from the second age group improve statistically reliably their achievements in four indicators. Highest growth is registered in the "shuttle run" test [d = -4,08 s], followed by the improvements of the results in the „standing vertical jump touch" and „approach vertical jump touch" respectively (d = 3,75 and 3,67 cm). The differences in the achievements for the three tests are supported by maximal confidential coefficient (Pt = 100%). The improvement of the technique of the „overhand pass in target zone" (n) - (d = 1,25) is also of high statistic coefficient.

Minimal improvements are registered for the „forearm pass in target zone" and „serve in target zone" tests but they are not supported statistically. Consequently the growth of these indicators is due rather to occasional reasons than to the impact of the purposeful training activity.

Maximal effect in the work of each coach is achieved on the base of objective evaluation of the results of his competitors' specific workability. The data from the evaluation appear to be a powerful stimulus for planning the next coming means, methods and forms supporting the educational and training process.

Figure 3 shows the results from the evaluation of the indicators analyzed by us for the pupils from V and VII grade by which information can be received about the efficiency of the volleyball training process. (see **fig. 3**).

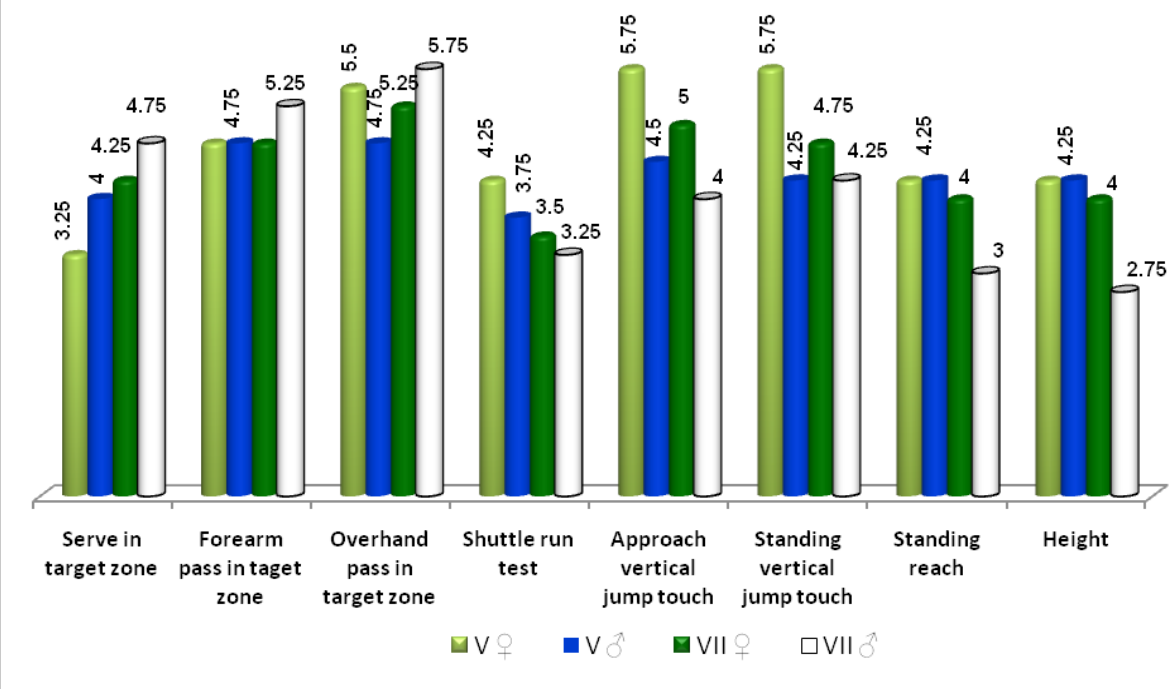

Fig. 3. Evaluation of the physical development and the specific workability of pupils from V to VII grade (acc. to R.Tsarova and coll., 2012)

Figure 3 states interesting regularities. The evaluations of the pupils from both sexes from the first age group - for nearly all specific workability indicators - are above the average with the exception of the V grade girls' evaluation for the ""serve in target zone" test -(Average 3,25) and the one for the boys from the same age group in the "shuttle run" test - (Good 3,75). At the same time the girls' results for most of the indicators are better than those of the boys. The girls got the highest evaluations for both tests related to the explosive strength of the lower limbs (Excellent 5.75), followed by the evaluation for the "overhand pass in target zone" test (Excellent 5.50) and the one for the "shuttle run" test - (Good 4,25).

It is necessary to be noted that the evaluation for the physical development of the pupils from both sexes is as well higher than the one for this age group (Good 4,25). Based on the analysis, it can be underlined that the results for the physical development and the specific workability of the pupils from both age groups, taking additional volleyball lessons, are at a stable level satisfying the approved requirements.

It is curious that with the increasing of the age, some modifications in the dynamics of the variables under study are registered. In general, a decrease for both sexes of the VII grade pupils' evaluations is noted for the tests related to the development of the explosive strength of the lower limbs although the impact of the purposeful educational and training activities. It is only the girls from the VII grade who retain their evaluation for the "approach vertical jump touch" test. Probably this fact might due to the considerably higher initial results of the analyzed tests from the V grade.

A decrease of the evaluations for the development of the special endurance of the pupils of both sexes is registered too. At the same time differences in the dynamics of the tests related to the specific endurance in volleyball are noted. It is established that the VII grade boys increase their results in the "overhand pass in target zone" and "forearm pass in the target zone" tests while the girls from the same age group slightly decrease their evaluation for the first indicator and retain the evaluation for the second one. It is good that the VII grade pupils from both sexes increase their evaluation for the technique in the "serve in target zone" test.

Along with that rather troublesome is the tendency of worsened physical development indicators of the VII grade boys and girls. The probable reason about that is a strictly genetic predetermination of the anthropometric indicators for the respective age.

Based on the analysis, we can say in general that although a decrease of the results for nearly all indicators, the average evaluation for the special workability components for both sexes during the transition from the first into the second age group is above the average level. This circumstance is a guarantee that the methodology of the preparation of the growing up pupils at the volleyball club of "Minyor" Pernik answers the needs of the society for the development of this sport. The only exceptions are the unsatisfactory development of the specific endurance and the physical development indicators of the VII grade pupils.

As a result from our studies, the following ***conclusions*** are imposed:

1. The purposeful educational and training activity in the "Minyor" Pernik volleyball club improves the statistically reliable development of the explosive strength of the lower limbs and the specific volleyball technique for the contingent of pupils under study in transversal and cumulative aspect. These data provide the reason for us to consider that the activity in the club is a solid base for the future development of this sport both in the region and in the country.
2. The system of evaluation of the preparation of the sports schools' pupils and students developed by an authors' team (R.Tsarova and coll., 2012) allows detailed evaluation of the specific workability of the pupils at the "Minyor" Pernik volleyball club.

We allow ourselves to formulate the following ***recommendations*** as well:

1. In order to improve the physical fitness status of the growing up generation and the discovery of new talents, it is necessary ***to restore the good practice*** of the functioning of specialized sports schools, pupil's and students' sports centers and sports clubs.
2. The evaluation system of the special workability of the pupils and students at the sports schools to be introduced at the sports clubs too. It is expedient that an innovative computer program ***be created*** allowing the conservation of the results achieved about the specific workability components of the sportsmen. Such an approach would help the perfection of the educational and training process.

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MAPPING THE SPORTS VOCABULARY OF THE SECOND LANGUAGE

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OBJECTIVE

The present research explores the kinetic lexicon in the second language (English) aiming to mark and map its functional status for educational efficiency.

METHODS

Testing, comparing, discussing, chartering

KEY WORDS: universal grammar, unified field, deep structure, manner-salient

PHILOSOPHY

The study is based upon two main postulates: that "the brain stores linguistic information by category" (Gadamer, 1989); and that "all representations are related to a possible empirical consciousness" (Kant, 1993), hence, conducting the test as an 'encounter' between the category and its professional exponents – athletes.

The linguistic rationale behind derives from Chomsky's signature principle of *universal grammar* which views innate mechanisms as a "thoroughly empirical procedure and integral part of modern scientific inquiry" (Chomsky, 1980).

The practical foundation of the research is prompted by the marked priority in foreign language acquisition of "the productive skills", as attested by 90% of students' answers to the pre-training questionnaire of the best-selling author and English language teacher David Riddell. (Riddell, 2010).

TEST PROCEDURE

The experiment was conducted in a class environment as an un-prompted exercise in two stages with 26 students from the Coaches Faculty - 13 from year 1, and 13 - from year 3, at the end of their last term. (As by the NSA program these two years are consecutive in regard to students' Foreign Language training)

1. The first stage was aiming to establish the inductive modus of the students' sports-related linguistic knowledge by identifying their free production in English. The students were asked to write down all kinetic verbs that occur in their mind at the moment of the experiment and were given a reasonable amount of time to work realistically.
2. The second stage was aiming to establish the deductive modus of the students' knowledge by identifying their targeted production in English. The students were shown a picture of the karate "flying kick" position and were asked to identify the actions involved in the performance. The students were asked also to designate the preceding and the succeeding actions related to the pictured state from/until normal position, thus an imaginative targeted production was also expected to take place.

The students demonstrated a positive attitude and responded to the given tasks with serious performance.

RESULTS AND DISCUSSION

The test revealed the following results:

1. The inductive testing measured by the standard manner markers with three levels of intensity - neutral: medium: high, was attested as 39%:17%:43%, thus indicating an effective inductive performance.

The year 1 students performance ratio is: n;m:h = 50:36:100

The year 3 students performance ratio is: n:m:h = 31:22:64

In general the two ratios are similar, while the number of entries differs significantly. The lexical aspect of the production is measured by Slobin's general semantic typology of archetypal, wide-plan and manner-salient/marked or high intensity semantic groups, pointing to the students' actual activity profile. The 10 top marked kinetic verbs are – *run, jump, swim, hit, kick, lift, catch, throw, climb, jog, and dive*. The 5 most frequented wide-plan kinetic entries include: *play, train, practice, fight, and dance*. The principle archetypal semantic group includes: *move, walk, go, get*.

The performances of year 1 and year 3 students differ significantly in import. The distinctive feature appears to be the marked move of year 3 students from general to specific lexicon, accompanied with a decrease in number and an increase in affective degree. While the year 1 students' best performance reaches 36 entries, and the average is 15 entries, the year 3 students' maximum production appears as 18 entries with the average of 8 entries.

The move from general to specific import of year 3 students, which has determined the reduced number of entries, is rather informative on the point of typology. While disregarding the general lexicon, the year 3 students have instead selected wide-plan kinetic lexemes such as: *fight, train, live, become, grow.* Specific semantic feature is the selection of extreme manner-salient verbs such as: *unleash, destroy lose, sneak*.

The organization and sequence of the listed items are indicative for an empirically determined mindset pointing to relational paths that are peculiar to this research contingency. The relevant structuring assumed the following format:

*auditory clusters - *"dive, drive"*

*semantic clusters - *"jump, play"*

*mixed auditory/semantic clusters - *"sit, stand, send"*

*cause/effect clusters: *"hit, smash", "punch, shout"*

The lexical nature of the established format reveals some overdoing of the task by crossing the line of the researched domain and creating its own sub-context. However, it is interesting as a memory pattern, informed with an affective insight and some pragmatic meaning-retrieval pathways. To transform Slobin's metaphor – here are displayed several ways to find a gist.

The inductive mapping thus appears as a diverse construction, informed with variety of semantic and empirical relations and interdependence that are significant and important for the enhancement of specialized teaching. It also confirms the philosophy embraced ahead of the test.

2. The deductive testing: n:m:h= 8%:14%:78%, reveals a restricted deductive performance, determined by the closed nature of the task and a high percentage of marked entries determined by the active nature of the given reality.

Year 1 students' performance ratio is: n:m:h =11:18:46

Year 3 students' performance ratio is: n:m:h = 4:10:36

The ratios of the results between the two groups are again analogous, and again - with a similar number difference. From semantic point of view it is the affective aspect that has drawn most references. The task has been completed in a limited manner, while the additional imaginative task was attended sporadically. These results present a gap and a field for improvement of the deductive production.

THE SEMANTIC EVENT OF THE EXPERIMENT

The inductive production presents a group of items, which are difficult to fit within the standard typology and deserve special attention - *become, grow, breathe, smile and live*. Students-philologists would have been very careful listing these notions but the exponents of the kinetic reality did not hesitate to grant them a kinetic status. Practice has versed theory in an intriguing manner. Being familiar with the nature of the discussed notions to their maximum empirical degree from direct and constant experi-

ence, the exponents might have acquired a deeper cognitive capacity, which goes beyond the ordinary state of affairs and touches upon a different kind of kinetic nature – the minute quantum kinetics, which indeed can emerge only in extreme conditions. The standard wide-plan significance has been dissected down to its minute kinetic foundation and reported here with a style - surely - a breathtaking one!

CONCLUSIONS:

* The established mapping clearly manifests the athletes' actual empirical profile and confirms the adopted philosophical principles of the research.
* The established database comes as a viable source for furnishing a patterned teaching platform for enhancement of production in second language.
* The better achievements in the inductive production compared to the restricted one in deductive production can be used as an informative reference for the improvement of teaching targets, aims and planning.
* The semantic events are a clear indication for the functional status of the representational-empirical interdependence and for the operation of the innate linguistic mechanism.
* The semantic event raises the question for a review of the formal lexical typology system in regard to the quantum kinetics, similar to the review it determined in the classical physics. The quantum kinetics lexicon needs to find its formal place in the scholarly domain of linguistics, as it has done so in the empirical realm. Most importantly, the evidences obtained here are not by observation, neither by experimental premeditated setting, nor in a calculated laboratory environment, but entirely naturally, in reality activism, and in conditions quite similar to the one that is inciting quantum momentum. Such introspective data are as relevant as any other. Thus the universal grammar will meet its physical counterpart - the unified quantum field and the intrinsic form will be given a corresponding representational form.
* In perspective, this diverse map is instructive for the next stage of the experimental work, which will include the constitution of the central experimental platform of the doctoral theses, namely: to identify the cross-linguistic capacity's deep structure by using sonar navigation incited by a common linguistic denominator (Sanskrit), believed in the universal grammar to be a functional mechanism.

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MANAGEMENT OF A SPORT EVENT FOR ADAPTED SKIING

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***Key words**: Adapted skiing, event, management, sport, leisure*

Bulgaria is a European country with a great diversity of natural resources allowing the implementation of many outdoor activities. Its mountains and existing winter resorts provide good conditions for developing winter sports. Alpine skiing is wonderful opportunity for a pleasant and meaningful leisure time in the nature. As an outdoor activity it provides all of the psychological, physiological and social benefits for the individual.

Disability affects hundreds of millions of families in developing countries. Currently around 10 per cent of the total world's population, or roughly 650 million people, live with a disability. According to a report of the NSI from 2011 in Bulgaria the number of people with disabilities is 474 267, which is approximately 7 per cent of its population. [1]

"The EU aims to ensure that all the people with disabilities can use their basic human right to active inclusion and full participation in society… The UN Convention on the Rights for Persons with Disabilities is in the core of the European Disability Strategy 2010-2020." According to the last one, people with disabilities and their families should be able to participate on equal basis with others in all aspects of social and economic life. "They need to be able to exercise their human rights … and to full access to cultural, leisure and sport activities." [2]

Our interest in adapted skiing originates from the vision for a future development of this sector in Bulgaria. The sport activity is designed for people with disabilities and corresponds to their needs. Our motivation is to find more information about organizing and realizing adapted skiing events for sport, recreation and leisure. The Scandinavian countries have leading expertise and traditions in the area of winter sports, which was the reason to learn about their best practices.

We present the observational study of an event for adapted skiing - "Try to ski" - held in Ski center Himos, Finland.

The event was organized by Malike (service provided by Inclusion Finland KVTL), Finnish Sports Association of Persons with Disabilities, The Finnish association of spinal cord injured AKSON and Sokeain lasten tuki ry. *The collaboration between the four organizations is an example of a good practice and networking.*

The sport event lasted for three days and was intended for people with various kinds of disabilities and different level of skills. 10 experts and 8 volunteers were involved for its realization. Adapted skiing was attended by 25 clients - people with disabilities and their families.

Different resources provided the funding needed to realize of the adapted ski event "Try to ski". The four organizers arranged the experts salary and other expenses and there were entry fees for the clients. On the other hand there was a scholarship for accommodation of the volunteers, the ski center also provided ticket discounts, food and equipment for the instructors. The specialized ski equipment was provided by Malike.

The idea of the event was to provide professional education for the clients and their families in order to develop their skiing skills. This would allow practicing adapted skiing in future as a hobby or even in competitive sport.

There were participants with different level of skills (from beginners to advanced) their families and Paralympic athletes. This is a very good example of how the families of such people can be involved and so to promote the activity as leisure, recreation and sport.

The sport event started with an opening ceremony by establishing the daily schedule, meeting the clients with the instructors, introduction of the safety issues and information about the accessible places in the ski center. The specialized equipment was set on the slopes beforehand and the first activities started right after the opening ceremony.

On the second day there were two sessions of skiing scheduled with a lunch break between them, of course, there were also additional breaks according to the special needs of the clients.

On the third day there was only one skiing session ending with a slalom competition. After lunch closing ceremony was held. Short movie filmed during the skiing sessions was played. Not only did the movie get uploaded on Youtube, but the whole event was covered by an article in a local big newspaper. At the very end of the closing ceremony everybody participated in an open feedback session.

These good practices could very well be adapted to socio-economical and geo-political reality in Bulgaria, thus new sports-recreational activity for people with disabilities can be made available.

METHODOLOGY

For the purpose of the observational study were held in-depth interviews with experts (Finnish and Bulgarian) and we did a SWOT analysis (Table 1).

Table 1

STRENGHTS	WEAKNESSES
• A new service • More clients • Socio-economic benefits • Social inclusion • Development of the winter sports sector • Better quality of citizens lives	• Absence of specialized ski equipment • Lack of experts and volunteers
OPPORTUNITIES	**THREATS**
• Long-term development • Training of elite athletes • Held of competitions	• Insufficient snow conditions • Environmental accessibility • High prices of the service

RESULTS

Based on the collected data we can say that there are four key elements for successful adapted skiing event.

The first one is the Stages of organizing the event for adapted skiing In the process of the organization and implementation, we distinguished 3 steps: preparation, accomplishment and feedback.

The second one is the Participants. We believe that a successful and meaningful sport event depends on the participants. The participants in “Try to ski” were beginners, advanced and athletes with different kind of disabilities. This is a good practice and it gives people the opportunity to learn adapted skiing, which is offered both as leisure and at a competitive level.

The third one is the Human resources. The presence of a good working team is a key factor to a quality sports event. Within the process of implementation, various experts, ski instructors, volunteers, assistants and other personnel were involved, and an important part was played by volunteers that were especially trained. Given the prior-preparation and education of the latter that should correspond to the aims and the specifics of the event as well as the required further upgrade of volunteers’ skills, we strongly recommend taking further actions for proper preparation such as creating a training program for volunteers.

Last but not least is the media coverage. Media coverage is important in order to promote and spread the adapted skiing - a prerequisite for any long-term development of the activity. It is crucial to provide

information in order to introduce people with such opportunities for leisure and sport.

Adapted ski bring socio-economic benefits. It can provide better quality of life to the citizens. As a new type of service it will be prerequisite for social inclusion and development of the winter sports sector in Bulgaria. There can be more clients in the winter resorts such as people with disabilities and their families.

One of the obstacles is the absence of specialized equipment, which on its own is a serious investment. On the other hand is the lack of experts. There is a risk of insufficient snow conditions or too high prices of the service. Also the accessibility of the environment has to be improved. Other difficulty could be the attitude of the people with disabilities or their families regarding to the safeness of the service.

On the other hand though, there are so many opportunities for long-term development of the adapted skiing in Bulgaria. As a country with excellent skiing conditions, we see a great potential for developing this sport and a good base for training Paralympic athletes as well as holding international adapted skiing competitions.

CONCLUSION

We believe that the expertise and the know-how of adapted skiing in Finland is a good example for Bulgaria to follow in the future. The activity is a precondition for different socio-economic aspects, providing a better quality of life for all people, with or without disabilities.

With a hard work and positive attitude it can be developed a quality service in the Bulgarian winter resorts. The sky is the limit!

ACKNOWLEDGMENT

I would like to express my special thanks to Susanna Tero (Malike), Katja Saarinen (Development Manager of Finnish Paralympic Committee), Anni Täckman (The Finnish association of spinal cord injured AKSON), Lauri Louhivirta (Member of Finnish Alpine skiing teacher's teacher & Demo team) and everybody else who helped me.

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ANALYSIS OF MATCH RESULTS IN TURKISH SPOR TOTO SUPER LEAGUE IN 2012-2013 SEASON ACCORDING TO SOME VARIABLES

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Key Words: Match Analysis, Football, Spor Toto Super League

INTRODUCTION

Football is a branch of sport which is increasingly loved by people with an international effect. When the dimensions of sport marketing such as spectators, sports facilities, original product consumers, media organizations, stadium services are considered, it is clearly seen how closely-related is football with people [2]. Due to its significance, football has always been in the center of interest in the researches. In the studies conducted, football is tried to be increased to a better level by the help of current technological developments.

There are many variables both in the match and out of the match affecting match scores. Analyzing these variables and presenting data helps footballers, trainers and the executives of the clubs. The goal of match analysis and observation in football is to record data during matches and training, and obtain exact statistical and numerical results to determine the structure of performance parameters [3]. Performance of the players and the trainer team, and technical-tactical analysis results throughout the season are indicative factors.

Statistics is a branch of science which enables planning, data gathering, evaluation and decision-making in order to analyze a subject [1]. Match analysis systems provides data for statistical processes as loud observation, paper-and-pencil and computer-assisted systems [4]. It is observed that considering statistical approaches in branches of sports creates positive outcomes both for team-level and individual performance evaluation [5].

The aim of the study is to investigate how the factors of; national or foreign coaches, first or second half of the league, and playing a home or an away match affect match scores in Turkish Spor Toto Super League in 2012-2013 Season. Another aim is to evaluate the whole season in the light of some variables such as ball possession percentage in the first half, second half and full time, positioning distance of the team, ball possession percentage in the midfield, number of positive-negative passes and total number, ball possession ratio in the offensive field, positive-negative balls crossed into the penalty area, number of positive-negative shots and total number of shots at goal.

MATERIAL, METHOD

This study comprises of the evaluation of 612 official league matches throughout 34 weeks played by 18 professional football teams in Turkish Spor Toto Super League in 2012-2013 Season. Spor Toto Super League is the top league level in which professional football is played in Turkey.

Data has been obtained from website address called tr.matchstudy.com which uses MathBall match analysis and gives match analysis service with %1,5 error margin rate. MathBall is a software system developed to provide statistical analyses of football matches for coaches, footballers, executives, referees, media, and fans [6]. It uses many variables for the analyses. Offensive field mentioned in the study is transversely one third area of playing field near the opponent goal. Team positioning distance is the average of the team's all ball possession distances near its own goal.

Data of all matches played throughout the season has been examined statistically through Spss 21.0 program. Level of statistical significance has been determined as $p<0.05$. In the analysis of data, aver-

age, standard deviation, minimum and maximum values have been calculated, and Ki- Kare test has been used in order to determine the relationship between variables.

FINDINGS

Number of lose, win and draw of national and foreign coaches and their relationship between each other is shown in table 1.

Table 1. Number of lose, win and draw of national and foreign coaches.

		Match Score				
		Lose	Draw	Win	Total	p
Coaches	National	177	139	183	499	,644
	Foreign	44	31	38	113	
Total		221	170	221	612	

Number of lose, win and draw of first or second half of the season and their relationship between each other is shown in table 2.

Table 2. Number of lose, win and draw of first or second half of the season.

		Match Score				
		Lose	Draw	Win	Total	p
Season	First season	102	102	102	306	,007
	Second season	119	68	119	306	
Total		221	170	221	612	

Number of lose, win and draw of playing a home or an away match and their relationship between each other is shown in table 3.

Tablo 3. Number of lose, win and draw of playing a home or an away match.

		Match Score				
		Lose	Draw	Win	Total	p
Home-Away	Home	82	85	139	306	,000
	Away	139	85	82	306	
Total		221	170	221	612	

Ball possession percentage in the match, number of passes, balls crossed into the penalty area, shots at goal and team positioning distance is shown in table 4.

DISCUSSION AND RESULT

It has been seen that having a national or a foreign coach in a team is not statistically significant for success (p>,05). National coaches have won 183 matches out of 499 while foreign coaches have won 38 matches out of 113. The situation can be examined more comprehensively through a more detailed study using different variables such as fans, team structures trained by coaches, etc.

When match results in the first and second half of the league are compared, statistically no significant difference has been seen (p<,05). While 102 matches are win and 102 matches are draw out of 306 matches played in the first half of the league, 119 matches are win and 68 matches are draw in the second half of the league. It can be stated that this situation has been created because the teams which

do not have any pressure for championship or relegation in the first half of the season have played more easier and similar quality game. As rivalry between the teams increases in the second half of the season, need for winning arises prominently and this can be regarded as the reason of the decrease in the number of draws.

Tablo 4. General data.

		N	Mean	Std. Dev.	Min.	Max.
Ball Possession Percentage	Midfield	612	50,00	10,49	0,00	96,00
	Offensive Field	612	23,98	5,77	10,67	46,03
	First Half	612	50,00	7,41	31,09	68,91
	Second Half	612	49,98	6,92	32,90	67,10
	Total	612	50,03	6,39	33,07	66,93
Number Of Passes	Successful	612	298,59	82,14	100,00	549,00
	Unsuccessful	612	49,24	10,28	20,00	83,00
	Total	612	347,89	85,50	137,00	605,00
Balls Crossed Into The Penalty Area	Successful	612	13,17	5,26	2,00	37,00
	Unsuccessful	612	26,69	8,31	9,00	57,00
	Total	612	39,85	11,62	13,00	84,00
Shots At Goal	Successful	612	5,23	2,58	0,00	14,00
	Unsuccessful	612	7,39	3,38	0,00	28,00
	Total	612	12,62	4,73	2,00	36,00
Team Positioning Distance (m)	Total	612	54,33	3,89	42,54	67,55

When match scores of the teams at home and away are viewed, it has been found out that there is significant difference statistically (p<,05). It has been proved that the teams are clearly superior at home with 139 wins, 85 draws and 82 losses out of 306 matches at home. It can be said that the teams with fan support have increased their success. Advantages of home teams are based on crowd, familiarity, travelling, rules and sectionalism factors [9].

In a study done for Turkish Super League 2004-2005 season, it has been indicated that home teams have got 151 wins, 67 draws and 88 losses [8]. These figures are consistent with current study.

In Spanish professional men's football league in 2008-2009 season, win rate of home teams is 61.95% while that of visiting teams is 38.05% in 380 matches [7]. Superiority of home teams emerging in a study done in the Spanish league supports the results of this study.

When matches throughout the season are analyzed, it is seen that the average of ball possession percentage is 23% in the offensive field, and around 50% in the midfield in the first half, second half and total time. When ball possession percentages are analyzed, it can be stated that midfield-weighted football was adopted in Turkish Spor Toto Super League in 2012-2013 Season. Total number of passes on average is 347.89, 298.59 of which are successful and 49.24 are unsuccessful. The highest number of passes in a match is 605 while the lowest number of passes is 137. Balls crossed into the penalty area on average is totally 39.85, 13.17 of which are positive and 26.69 are negative. The average of shots at goal is totally 12.62, 5.23 of which are positive and 7.39 are negative. Team positioning distance is 54 m on average. In the study by Bakır in 2007, 14 home and 14 away matches of a team in Turkish Super League were analyzed and average number of passes was found as 229.25. In the study, average number of shots at goal was found as 4.57, 1.14 of which are positive and 3.42 are negative [10].

As a result of the evaluation of match data in Turkish Spor Toto Super League in 2012-2013 Season, it will be helpful for the teams to determine their criteria for next seasons in the light of this information. The studies related to match analyses should also focus on the general evaluation of the whole season as well as the data of the playing team and footballers. Similarly, match analysis studies can also be conducted for women's football.

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EDUCATION IN SPORTS SPECIALTY THROUGH ELECTRONIC FORMS OF DISTANCE EDUCATION

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INTRODUCTION

With the development of the E-learning and the technology, the web-based education has become an attractive option to expand the educational opportunities available to students. National Sports Academy (NSA), like other universities, is working actively on the issue of changing the status quo and for the extension of the range for the new students and the implementation of quality and efficiency in the educational programs. During the 2013/14 academic year, students from the NSA had the opportunity to be included in a course in electronic form of education.

A systematic review of the various technologies available is a good starting point for institutions seeking to enhance their effectiveness in the practice of distance and online instruction.

Distance learning is characterized by features such as flexibility, modularity, economic efficiency, the new role of the teacher of training and dedicated to quality control, the use of technology and specialized learning facilities, relying on current communication tools of educational information.It is believed that distance learning can be as effective and of high quality as well as the education that traditional education provides. In this case refers to the experience of some famous universities, in particular Open University in the UK, where the standard of education at all levels (professional diploma programs, bachelor, master and doctoral study programs) is not inferior to the training standards best British universities that offer training with traditional methods(Rumble G., Harry K., 1982). The successful implementation of distance learning requires the following conditions: a supply of educational information to the student; performance feedback to the teacher; provision of a separate group work where necessary. Essentially, quality distance learning is done under a good feedback. This assumes the use of good telecommunications. Therefore, we can accept that telecommunications are the main function in the application of distance learning (DA Bogdanov, AA Fedoseyev, 1996).

There are two methods of interaction between teacher and student in distance learning. First - asynchronous learning in which students are absent from educational institutions, they are involved with individual education plan with educational materials developed by the educational institution. Second - synchronous education or teamwork when distance when the educational institution gives instructions to a group of students at the same time involved (total virtual study group, students in this case is not necessarily in the same class room and even in the same city).

Interaction between teacher and students are in real time. However, both methods are interrelated and complementary (AN Romanov, BC Toroptsev, D. Grigorovich, 2000).

When conducting distance learning using various IT training methods, it is necessary to provide students with a basic volume of the studied material, to assure interactivity between students and teachers in the learning process, to provide opportunities for students to work on themselves to understand the material being studied, and an assessment of their knowledge and skills acquired by them in the

learning process (ANRomanov, BC Toroptsev, D. Grigorovich, 2000; ESPolatetal, 1998; IvannikovAD, JIzhvanov, 1998; Tikhonov, ADIvannikov, 1994).

Conventional, face-to-face universities are increasingly moving into the delivery of online learning programs. Many conventional universities have been unable to adopt or adapt the strategies developed by distance teaching organizations fast enough to ensure increased access, quality, and sustainability through the use of teaching technology. Carol Twigg's research has provided evidence that completion rates improve when blended learning is used at low performing post-secondary institutions.

Meanwhile, experts say that the content of higher education in the field of physical culture and sport is not completely in accordance with the new requirements of the European social education. For this reason, the National Sports Academy "Vassil Levski" (NSA) applied and won a project under OP HRD procedure № BG051PO001-4.3.04-0001 entitled "Introduction of new educational quality systems of distance learning in sports and sports-related programs ". The web based system, which was created for the needs of the NSA is in full compliance with the requirements of the education in the online environment and administration of learning, allowing students to have access to electronic books, electronic self-tests, exams and additional information of their student status.

METHODOLOGY

Our research is a web-based survey of several websites (databases) that provide information about university programs offering training in a particular scientific area. We have examined the educational programs for bachelor and master in the field of sport, and the forms of education.

In this study we aimed to examine the universities offering online learning in the field of sport as well as the curricula of the NSA in bachelor and master degree in Coaches faculty.

The information gathered is sorted through and evaluated in relation to the concept identified in the conceptual framework (Figure 1). Data was coded and cross-referenced using indexing and cross-referencing procedures following Veal and Darcy Protocol (2014).

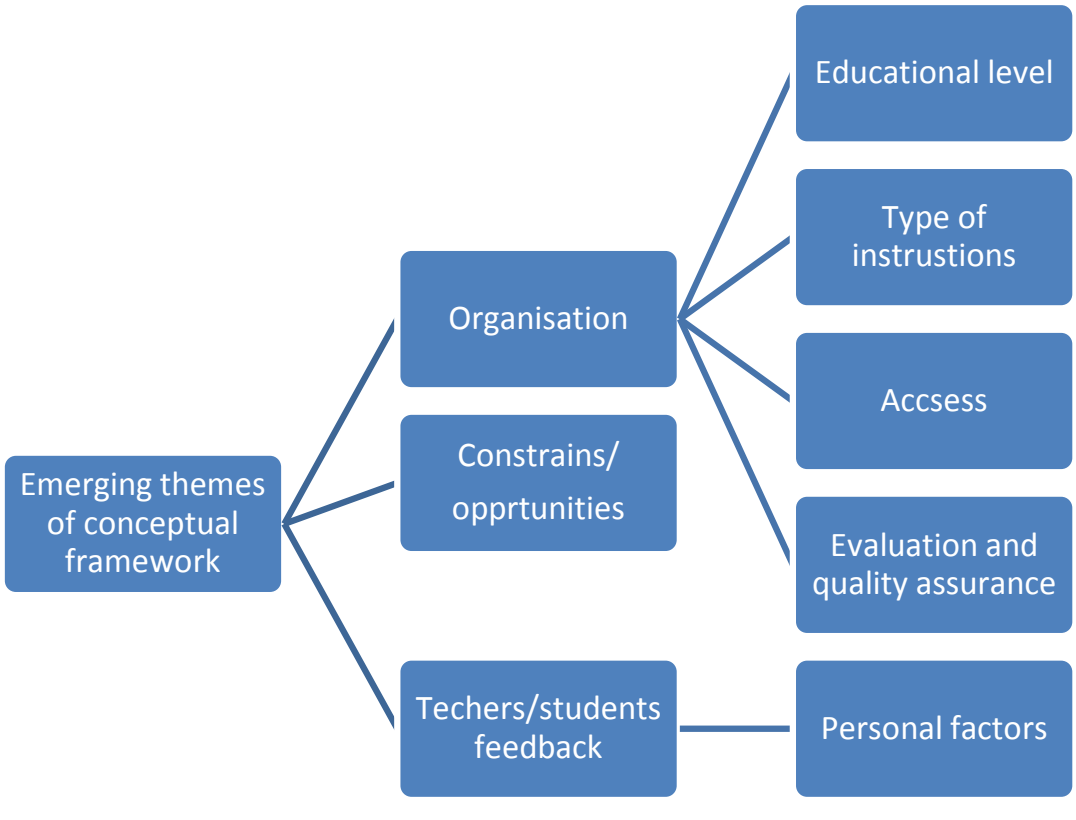

Figure 1. Emerging themes of conceptual framework

RESULTS AND CONCLUSIONS:

According to the research we did of universities that offer online education in sports, the following results became clear:

We did a survey of 7 bachelor programs and 14 master programs. Universities, which are offering online undergraduate education in the sports specialty are 5 and only 3 of them offers an entirely online form of education. In all other universities, on which we did our survey, are using blended learning (on-ground and online courses). In the master's programs, the situation is slightly different. From 14 studied programs, online learning is available only in 5 of them. For all other programs in the sports specialty the universities requires attending hours during the education.

According to the analysis of curricula for graduate and postgraduate programs of the NSA, it is clear that a Master's degree programs are similar to programs at other universities. This leads us to conclude that the Master's program as "Sports Excellence" is entirely appropriate for electronic form of distance learning, and also that this program has the potential to be developed in English.

The Regulation on the state requirements for the organization of distance learning in higher education institutions of the Republic of Bulgaria, the attendance hours of distance learning can be no more than 30%, which also means that attendance hours are not required. Each university determines the percentage of attendance hours of distance learning in the regulations of the university.

One of the main reasons for dropping out of education in electronic form is the lack of attendance contact with the teacher. Because the online environment does not provide the "body language" feedback to the teacher, course designs should concentrate on "over-explaining" (versus under-explaining) the policies, expectations, learning goals, and methods by which a student will be assessed. Students who are confident can skim materials, while students who might be confused will have detailed explanations to which he/she can refer. This can include specific grading rubrics, samples of past assignments, and practice quizzes - to ensure that students understand their obligations in the course.

One difficulty in the online environment is determining if students are staying on-task, and another difficulty is trying to avoid academic misconduct (primarily plagiarism and "hired guns" to take tests for students). These issues are best addressed by providing students a with multiple homework and quiz activities, each carrying relatively low amounts of course points. Having materials to submit each week helps the teacher determine that the student is tracking properly and provides the teacher with a way to give individualized corrective feedback and advice to students who might not be performing as expected. This also lowers the anxiety of students, because they are getting regular feedback (boosting confidence) and the failure of any one assignment will have relatively little effect on the overall course grade.

Because each student will be available online according to their preference (scheduling around work and home responsibilities), we recommend that teachers set up group projects based upon the times that students can commit to being available to work on projects (rather than by topic of interest). This allows members of a team to phone each other or use an Internet chat tool for periods of brainstorming, project planning, and evaluation of work product.

DISCUSSION

The key issues related to the organization of learning. The use of ICT allows each person to overcome age, time and spatial barriers. The modern education must meet the needs of society and to generate future needs. Therefore, the education and social economic policy are a priority of the modern country, of the modern society.

Further research is needed on the methods of the different distance learning programs to restrain the dropouts, to keep the motivation for learning and individual forms of communication and consultancy with the online teachers. Another challenging issue is the time management in the distance learning programs combined with contact hours as well as evaluating the ration between them.

Higher education has expanded remarkably in recent decades. Growth is, by all measures, faster than anticipated. Projections gave 120 million students worldwide by 2020, but that number has already been achieved.

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CYBERSECURITY POLICY IN THE CHESS ACTIVITY AND ELECTRONIC DOPING

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INTRODUCTION

The launching of the IT innovations and the connected with them software chess products in the system nexus the coaching of the chess-players lead not only to scientific interest but at the same time they treat in a new way the question of the strategy of the chess-players' coaching and the future of the chess play and of the sport itself. Cyberspace puts on the agenda the many new questions connected with the influence of its elements over the chess play and over its subjects. This requests the studying and the implementing of the modern tools that meet the criteria of the new time the same as the methodics within the sphere of both the training-coaching and the sport-competitive activity. The studying and the analyses of the literature sources do lead us to the scientific researches and to the modern condition of the problems that interest us and which problems lead to the influence of the innovation technologies and processes and to the further development of the chess play and to the connected with it processes of the training-coaching and of the sport-competitive activity. The scholars are being organized around the thesis that the cyberspace as a unique sphere in the history of the human species is a bearer of the non-existant until that moment combination of characteristics which is a prerequisite for the formation of a fundamentally new pschycological and communicative experience of the individuals and of the different correlations between them. They define it as some sphere which changes to one or another degree the notion of the development of the chess sport in the 21-st century. The data of all of the researched specialized literature lead us to the unavoidable influence of the total computerization of the sports and of the chess play in particular. We come to realize that there are almost no separate and thorough scientific researches in Bulgaria as regards the influence of the cyberspace, the internet and the new innovation technologies over the chess play and over the perspectives of the chess play. The international theoretical and the practice-applied experiences in this respect are only but too scarce. The analysis of the literature shows that the historians who are studying the chess play and the scholars who are researching the cyberspace are still looking for the answers of the too many unsolved questions connected with the chess sport and with the emergence of the 'chess doping'. This gives us the basis to think that the 'chess doping' problem from a scientific point of view and from a practical point of view is extremely pressing and important and it does need a further research.

Keywords: cybercrime, cyberspace, 'electronic doping', cybersecurity in the chess play. Work hypotheses of the research: We do have the correlation and the interrelation of the chess sport with the internet space. The computer innovations and the effectiveness of the training-coaching processes are in a direct correlation with them while the cybersecurity of the chess activity is a real necessity must. The target of the research is to define the cybercrime and the cybersecurity in the chess play as the phenomenon and as the product of the new forms of communication in the rapidly developing cyberspace. Fof the realization of the target set by us we are hereby defining the following research tasks:

1. Theoretical analyses of the literature nexus the researched problem.
2. The defining of the taxonomy of the 'electronic doping', its influence over the chess play and over its subjects and the consequences of the 'electronic doping' reflecting upon the chess sport.
3. To verify that the 'electronic doping' is a new crime phenomenon in the cyberspace which is used by the chess sport activity for the benefit and for the enrichment of certain chess players of different ranks.
4. To be discovered and classified the basic preventative measures, principles and policy of the cybersecurity in the chess activity.

The sphere of the research focuses on the influence of the cybercrime and of the 'electronic doping' upon the chess play. The object of the research is the chess play as an intellectual type of sport in the cyberspace. In connection with the target and the tasks of the research we are going to use the theoretical-practical approaches and the methods of research and the analizing of the scientific and of the real facts and data.

Literature research of finding, systematizing and studying of the current materials (monographs, specialized literature, scientific articles, dissertations works and reports) which have a direct relationship to the cyberspace and its influence upon the chess play.

Retrospective analyses and discovering of the prerequisites for the detection of the 'eletronic doping'.

Inquiry investigation of the researches of the other countries of the sport chess practice nexus the digital sphere within whose frames the chess play is developed and perfected. We have worked out an inquiry map which consists of 21 questions via which we had tested 50 leading Bulgarian chess players.

ANALYSIS OF THE RESULTS

Through the inquiry method we do hope to receive very detailed and profound information and through analyzing it to see how the interviewed ones look upon, grasp and use the correlations between the chess play, the internet and the digital sphere. For the realization of the set task we invented a wide-scope and multi-profiled inquiry map which consists of 21 questions. 35 people or 70% of the inquired people approve of the computerization of the chess play, 11 people (22%) don't approve the computerization of the chess play while 4 people (8%) of the inquired people have no opinion on the topic. Diagram 1

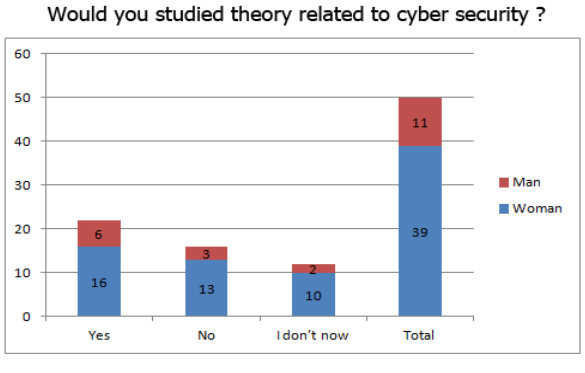

Diagram 1

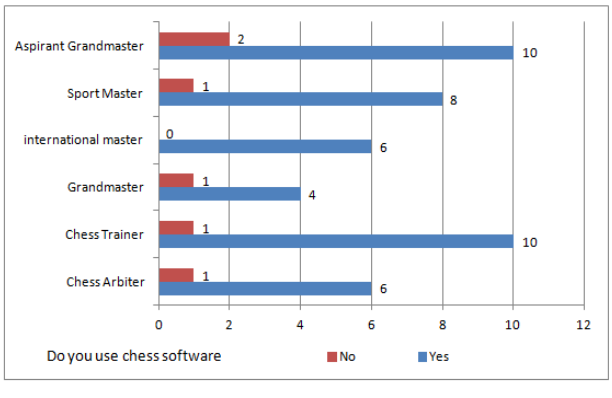

Diagram 2

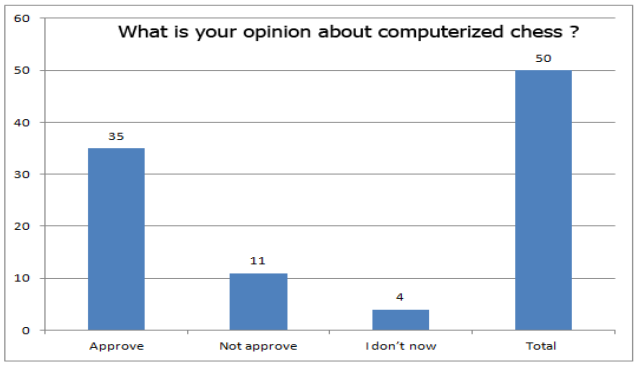

Diagram 3

Characteristics and evaluation of the correlations got from the carried out inquiry: From the next graphic (Diagram 2) the correlation between reasonings 1 and 7 is seen: "What is your business status?" and "Do you use the basic chess software products?" Many of the inquired people answered they use the basic chess software products. After analizing the given correlation between reasonings 2 and 12:

"What is your gender?" and "Would you study theory connected with the cyberspace and the cybersecurity" we saw that a big part of both genders would study such theory. Diagram 3

The chess play like any other sphere of the social life has a direct touch with the internetspace like the specific training-coaching and the sport-competitive activity which can fall into the field of the cyberattacks of different nuances thus subjecting themselves to some ill-intended targets. One can imagine what would happen if the information data about the rating of the competitors, the filing of the clubs, the filing of the competitors, the information about the judges, the providing of the software for the carrying out of a given international, state or world tournament were destroyed or substituted as the result of hackers' attacks, attacking the yeb-sites of the federation and of the clubs. Special attention should be paid to the computers through which the staff of the judges achieves the performing of the states chess competition tournaments the same as the international chess competition tournaments. For especially important chess competition tournaments as regards the world chess competition tournament title the same as the Olympiad chess competition tournament title it has to be very carefully thought about the applying of all the special tools in connexion with the muting of all the kinds of electronic signals and the barring of all the possibilities of using of computer help. After one of the sets of the chess match of the world chess title in Elista between the super gross-masters Veselin Topalov and Vladimir Kramnik the latter had been asked a question which he thus answered: *"… the chess has strongly changed since the emergence of the computers … I think that the time has come when FIDE should accept a unique system of rules in connexion with the anti-computer security in the chess play".*[1] The lots of the scandals during the last few years did show that the non-fair play in the chess play boundering on the sportscrime is entirely possible due to the mighty computer programmes and due to the contemporary communication technologies. This turned the attempts of the cheating in the chess play into one of the biggest problems of the world chess play. Nowadays there are many incidents of cheating in the chess sport or the so called 'eletronic doping' by using the possibilities of the technological innovations in the internetspace. This in itself is a new tendency of the cyberspace cheating which tendency is being used in the sport space for the benefit and for the enrichment of certain chess-players of different ranks. The international chess gross-master of Ukraine – Vladimir Baklan participating in the press-conference of the 'Обозреватель' (the Observor) points out to the fact that with the emergence of the computer technologies and with the using of the computer technologies in the chess play, into existence came a phenomenon which he called 'eletronic doping'. This same chess gross-master says that sometimes during the chess competition tournaments special hearing aids and other electronic devices are being used leading to the victory in a given chess-play set. From this point of view he recommends to be introduced in the chess tournaments 'eletronic anti-doping' (muting of the signals) so that chess-players could play fairly.[2] For the eventual usage of the 'electronic doping' one could judge by the example of the match between Topalov – Kramnik in Elista in 2006.[3] Veselin Topalov lost the world chess title to Vladimir Kramnik but his staff suspected the Russian chess grossmaster of non-fair chess play. In Silvio Danailov's letter it's been pointed out that *"after each of his moves Vladimir Kramnik immediately goes to the rest room and from there he goes directly into the toilet room. On the average after each set he had visited the rest room for 25 times and the toilet for 50 times – the only place where there are no surveilance cameras."*[4] In the web-site of the "Фокус спорт" (Sport Focus) the information of yet another scandal arose of the using of cheating by the Bulgarian chess player Borislav Ivanov. Several months ago on the basis of the collected proofs and on the basis of the live incidents the international chess federation FIDE expelled Borislav Ivanov from its ranks. Which are the conditions and the prerequisites of the emergence of the 'electronic doping'? The development and the possibilities of the technological innovations (computers, chess software, different electronic devices which can fulfill the functions of the electronic prompting); the internet; the commercial targets; the other targets of the creators of the devices for the usage of the 'electronic doping'; the specifics of the qualities, the morale, the abilities and the targets of the subjective factor (the chess-player); the lack of the internationally accepted rules of combatting the electronic means of prompting; the not enough strict control during the different chess tournaments on behalf of the organizers and on behalf of the judges' staff. In a simplified variant the scheme of the electronic prompting could be shown as

given at Figure 2. A possible variant of the mechanism of the usage of the 'electronic doping' can be seen at Figure 3.

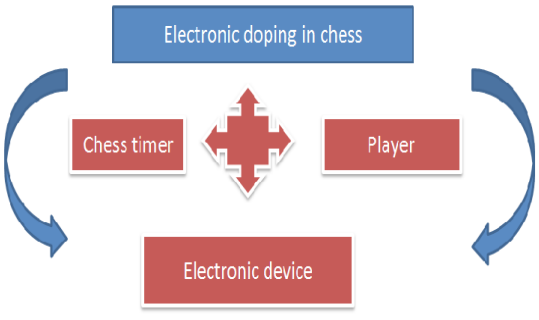

Figure 2

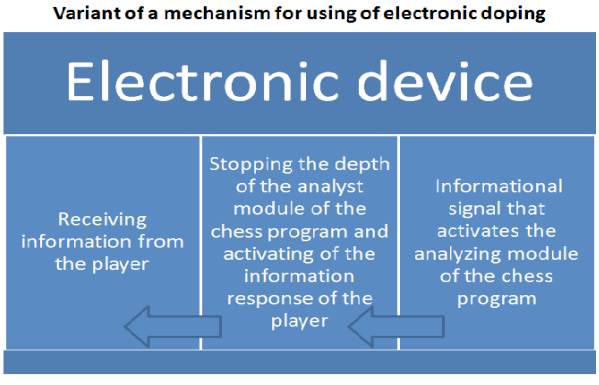

Figure 3

The playing chess player is emitting an information signal which is activating the analizing module of the chess programme: The playing chess player or (the second chess player) is emitting a signal for stopping the deapth of the analizing module of the chess programme and for the activating of the information answer sent to the playing chess player; the receiving of the information by the playing chess player. What is the length of time during which time those very same actions could be realized? On one side a certain technological time is necessary for the receiving and for the remitting of the signals and on the other side a certain technological amount of time is necessary for the analizing module of the chess programme itself so that it could give an answer about the chess move. After the programme had fulfilled the move it is expecting an eventual answer. If the answer does coincide with the answer expected by the programme the programme immediately gives the answer. Figure 4

Figure 4

The expected answer is move Ke7. The deapth of the analysis gives the answer to the question how many moves in advance should be analized for the given move. The module works with a very high speed and always shows the move. For instance: 835kN/s means that the programme generates and evaluates 835000 positions per the given move. Of course the options of the hardware on which the chess programme has been mounted should also be taken into consideration.

The question of the cybersecurity in the chess activity is one of those questions which are directly connected to the cyberspace. That's why the cybersecurity should be treated as a priority must because the cybersecurity presents a real necessity must. The American politolog and researcher of the international relationships Joseph S. Nay wrote about the security problem stressing upon the fact that: *"The security is like the oxigene – you never ever notice it unless you lose it. And then you can think about nothing else but security".*[5]

The policy of the cybersecurity in the sport activity has its own specifics which are being defined by the specifics of the sport activity, the system of the sport activity and the specifics of the sport itself. As a whole the cybersecurity should be based upon objective criteria and analyses. The cyber influences to a very great extent will influence the chess clubs in the future where the training-coaching activity is concentrated. Those cyber influences will be affecting the subjects of the chess activity and the multi-sided activities of the chess federation. This is so because the chess sport in much bigger extent than any other sport uses the means of the internet, performs the on-line activities of the chess parties and of the chess tournaments, receives and emits on-line the chess information, constantly uses the most

advanced chess software, etc. That is why it is objectively necessary to toil hard in this sphere to work out the contents and the principles of the policy of the cybersecurity in the chess activity. Figure 5

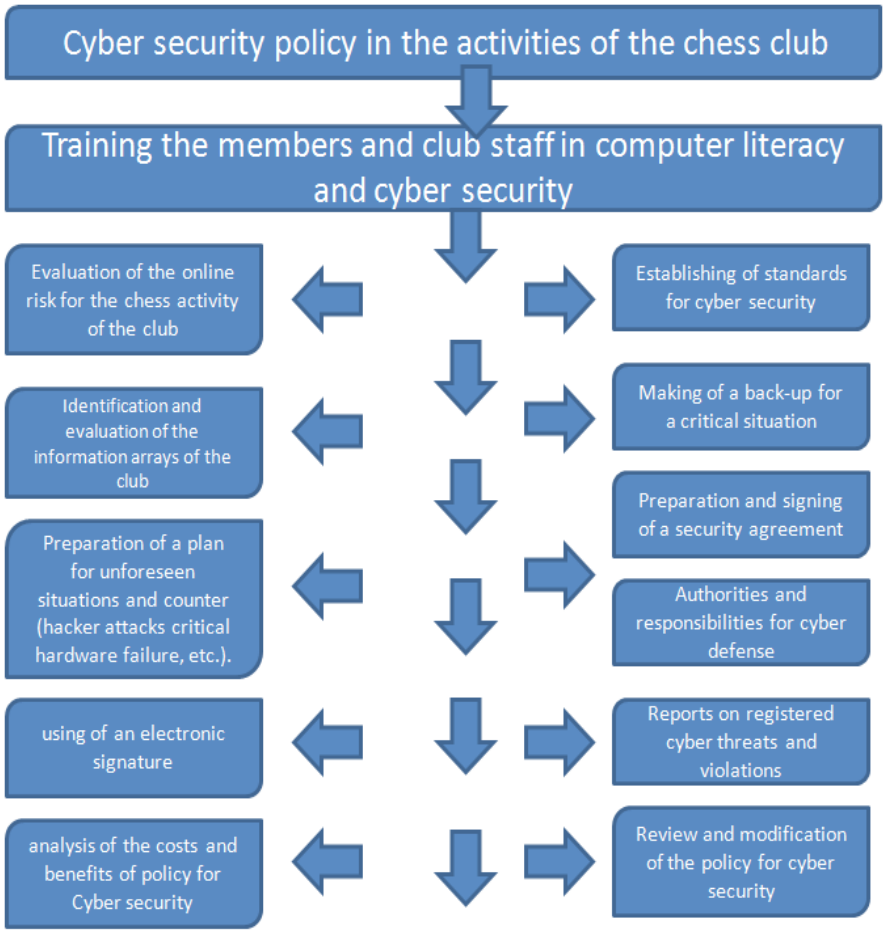

Figure 5

The data and the analysis of the correlations as regards the enquiry research do permit to be drawn the following conclusions:

1. Some of the interviewed chess players do show interest and do wish to learn the specialized chess software, they do use the internet but they hadn't thought about the question of the online cybersecurity.
2. A big part of the coaches don't see a possibility at the present moment to develop the chess computerization and its applying into the coaching process and into the drilling process of the chess play due to one basic reason – the financial difficulties in the chess clubs.
3. The data of the inquiry has proved that it has not been thought enough on behalf of the chess players and on behalf of the chess coaches of all the questions nexus the importance of the innovation possibilities which the new computerized time presents to the chess sport. The question of the cyberthreats emerging in the cyberspace is not well-known and to a certain extent the cybersecurity is underestimated at a personal level and at a chess club activity level.

CONTRIBUTIONS

1. An attempt has been made to discover the specifics of the cybercrime in the chess activity. An attempt has been made to define the characteristics and the necessity for the combatting of the 'electronic doping' in the chess activity.
2. The basic principles and the contents of the policy of the chess clubs has been defined nexus the preventative measures of the chess clubs cybersecurity.

The chess play like any other sphere of the social life does have a direct touch with the internet space and due to the specifics of the chess training-coaching and due to the chess sport competitive activity could very easily come under the influence of all kinds of cyberattacks and thus could be subjected to the ill-intended economics and sport spying targets. This process can be stopped or restricted by the working out of a long-term chess cybersecurity strategy.

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THE RESOURSE AVAILABILITY AND ATTITUDE OF THE NATIONAL SPORTS ACADEMY MASTER'S DEGREE STUDENTS TOWARDS IMPLEMENTATION OF DISTANCE EDUCATION

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Key words: *distance education, resource availability, communication*

INTRODUCTION

The rapid technological development in the last decade has motivated changes in higher education. Traditional lecture and seminar forms are largely replaced by more active teaching methods in which the student becomes an active participant in the learning process.

The higher education experiences particularly significant changes due to the achievements of modern information and communication technologies. Regardless of space and time, communication technologies, with their ability to transmit sound, image and text, change forever teaching and learning [4, 8].

E-learning, which is defined as "learning supported by electronic and communication technologies" appeared (H.Beetham, 2009, qtd in V. Slavova, 2014). The development of Internet and related devices (smart phones, tablets, etc.) enables the delivery of well-programmed learning content and receiving assistance from the teacher at a convenient time and place [7]. New and better high-tech environment and e-learning platforms are created. Interactivity helps to implement more complex materials in distance learning [3], allows easy switching and quickly searching the needed information regardless of location, dialogue with other participants and the teacher [5], as well as discussions, which in turn makes learning interesting and fascinating.

The main factors that determine the effectiveness of distance learning are the motivation of the students and the teacher, the good interaction between them, the good preparation, organization and understanding of the material and technology used in the course [1, 2, 6]. Important conditions for success are also the support by the school administration and the assistance by developers, designers and technical staff that provide the studying platform as well as the availability of the necessary resources. However, adequate development of the students' skills and resources is needed for the successive implementation of contemporary distance education.

The aim of this study is to modernize the learning process in the master's degree program by implementing teaching materials and methods according to the students' characteristics and their desire to be included in distance learning.

The tasks of the study are:

1. To describe the characteristics of students from the master's degree programs of the NSA and their influence on the desire to participate in distance learning;
2 . To characterize the availability of the resources which master's degree students need in order to take part in Internet-based studying technologies;
3 . To define the time, space and type of e-learning parameters that are most convenient for students who are to involve in distance education classes.

Object of the study are the opportunities to modernize the education of students in the professional field "Sport". The paper studies the characteristics of the students who have interest in receiving effective education. The Study includes 104 students from the master's degree program (59 men and 45 women). They are representatives of six graduate programs of professional field "Sport" (48 regular and 52 from part-time education).

METHODOLOGY

For the realization of the research tasks have been used a survey and mathematical-statistical methods (frequency analysis).

RESULTS AND ANALYSIS

The National Sports Academy (NSA) is a unique school where the theoretical knowledge and the practical skills of the students are equally important. Reaching their master's degree, students are often high-qualified athletes involved in demanding training process, people highly contributing to the development of sports, or just ordinary people working to earn a living. Therefore it is interesting to see whether these students would like to study their master's degree program in distance learning courses. The results of the survey show that 21.57% of the students would definitely participate in such a learning form, 69.61% answered "yes, if conditions are favorable", and only 8.8% do not want to involve in distance learning courses (Fig. 1). Usually the number of students in traditional forms of education is larger than those enrolled in the distance education and considering the distribution of the answers to this question there is observed an increased interest by students in NSA towards distance learning.

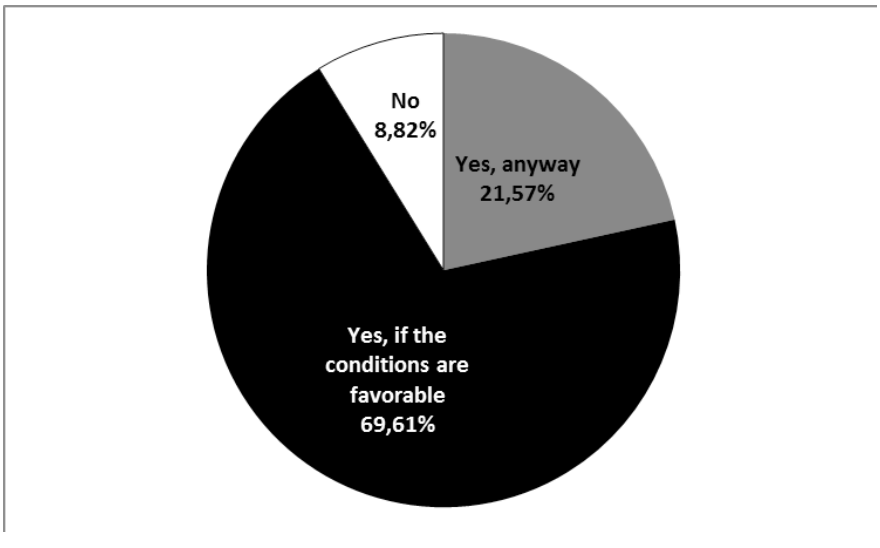

Fig. 1. Do you want to enroll in distance learning education?

The next question that arises is when and where students could learn the material or make examination requirements. As a rule, the Internet-based technology enables both the distribution of studying materials and the use of synchronized or non- synchronized communication. Institutions for higher education are obliged to create distance learning centers where in addition to the administration of the educational process students can use specially equipped rooms in which to learn and to be tested. Only 7.92% of the respondents are willing to use such a center while 15.8% think that they can study at their workplace, which is not a good condition for the quality or performance of their working duties, nor an effective learning process. 87.13% of respondents wish to study in their domestic environment. This, of course, does not mean to create classrooms for similar purposes, but they can serve as a web-based testing of students in the presence of a teacher, to prevent the risk of fraud or improper valuation of knowledge.

One of the factors determining the effectiveness of distance learning, according to M. Coomey, J. Stephenson (2008), are the dialogue and support of the students by the teacher. It is therefore important to clarify what time of the day is convenient for the students to communicate with the teacher and how this can be combined with teachers' work duties. Fig. 5 shows the distribution of answers to the question "What time of day do you prefer for Internet communication with teacher?". Five time intervals are offered and the students were able to give more than one answer (the sum of the percentage is

more than 100%). It turned out that the most preferred time for direct Internet communication with a teacher is the time between 18-20 o'clock (54.08%), followed by the time interval 13-16 o'clock (24.49%) and 8-11 o'clock (23.47%). Unfortunately the questionnaire was not specified for time interval after 20 o'clock, which could change the distribution of the commented responses. Beside their duties in distance learning courses teachers have a normal working and learning process in NSA and it is appropriate as a rule to have a schedule of Internet-based consultations between 19 and 21 o'clock, which would be convenient for most students and would be outside the work schedule for teachers in the NSA.

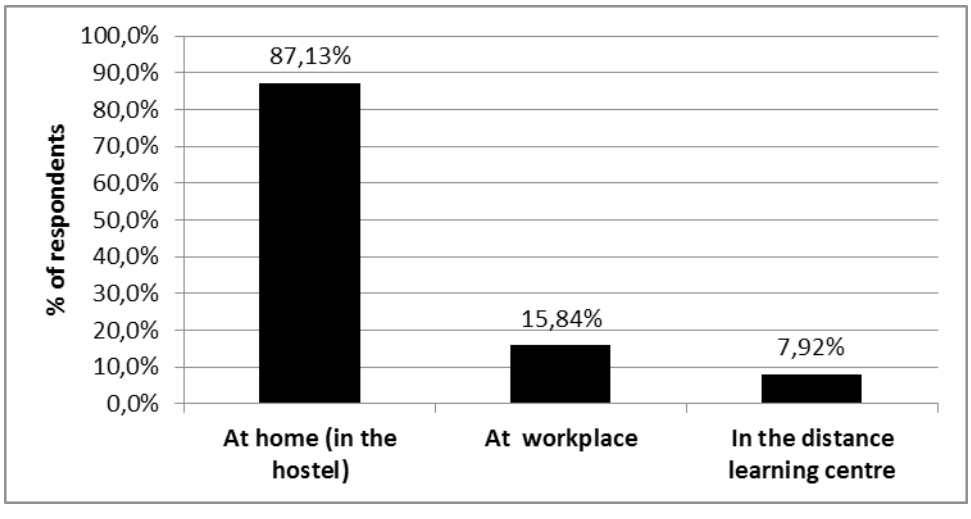

Fig. 2. If you get involved in distance learning, where would you like to study?

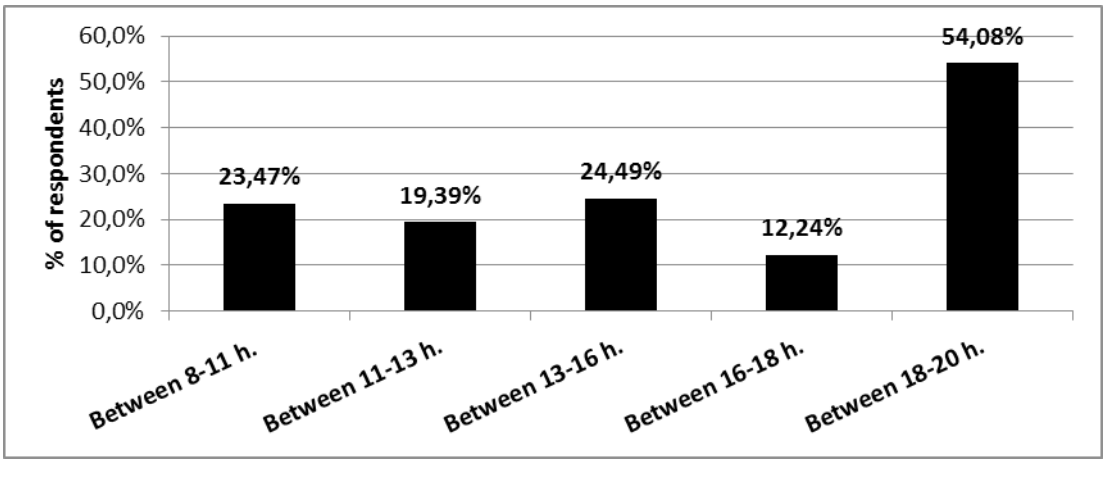

Fig. 3. What time of day do you prefer for Internet communication with teacher?

High technology is the essence of the distance education. Without a high-speed Internet, computers, telecommunication equipment and related software applications it is not possible to deliver the educational material to be to its user - the student. The more qualitative from a technological point of view the content is, the more modern and functional equipment (hardware and software) must be provided to the students.

It turned out that as young people living in the 21st century, 98.1% of the surveyed students have their own computer, 77.9% - a tablet or smart phone, and that all have access to the Internet.

The most used browsers (Fig. 4) are Google Chrome (55.79% of responses) and Mozilla Firefox (55.79% of responses), which can be assessed as a favorable circumstance because these browsers are suitable for playing interactive learning materials, video lectures or educational films. Internet Explorer is used by 32.63% of the respondents.

NSA students actively use the Internet for information and communication (Fig. 5). The most commonly used are the social networks (Facebook, Twitter, MySpace and others) - 80% of respondents use them every day. This shows that the social networks can be used actively to contact teachers, complete assignments and participate in group discussions on topics raised by the teacher. They could overtake one of the disadvantages of distance learning - that young people feel isolated from the learning environment and their colleagues and can not compare their own performance with that of others, and thus can not be encouraged for active learning.

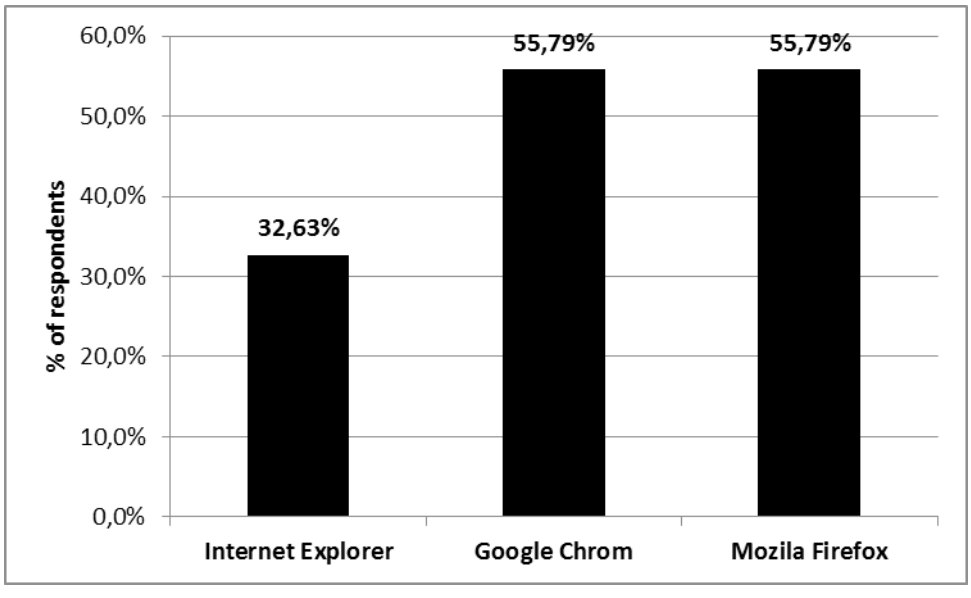

Fig. 4. What is your browser of choice?

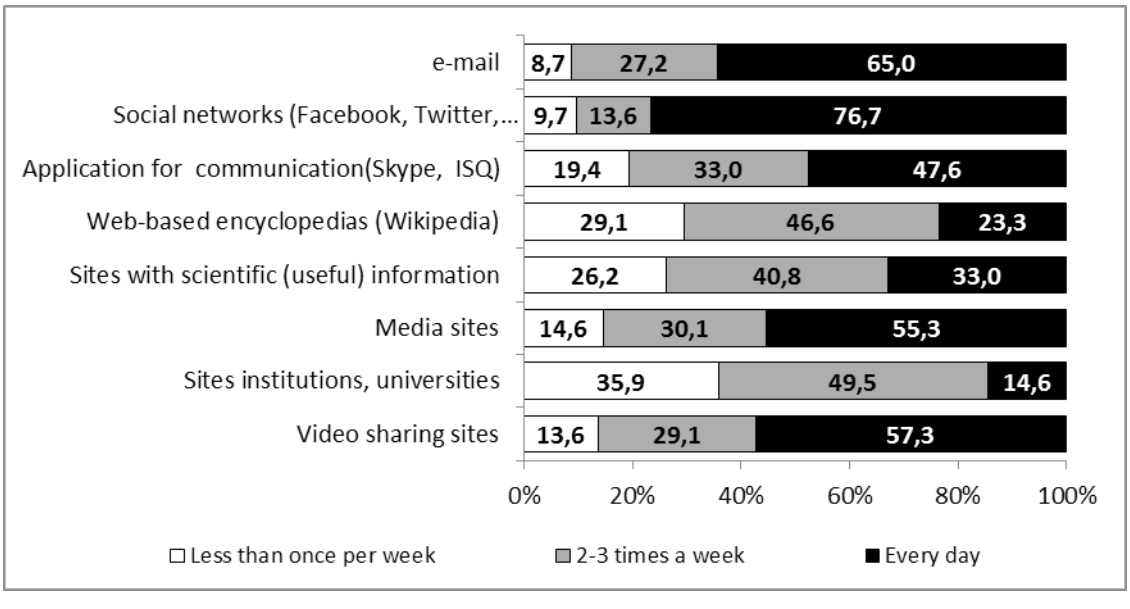

Fig. 5. How many times a week do you use these search/information exchange tools?

Skills for working with e-mail as means of obtaining individual assignments or presentation of completed tasks can not be doubted - 65% use it every day and 28% of respondents use it 2-3 times a week. More than half of the respondents use everyday applications for synchronized communication (Skype, ICQ) and media sites. The fact that particularly popular are video sharing sites (YouTube, VBox) – 57.3% of respondents use them every day, and 29.1% - 2-3 times a week – is also positive for distance learning. The students can find educational films and public lectures by leading professors in the world which, after a careful selection by the teacher, could improve the quality of education and improve the language skills of the students.

Web-based encyclopedias can also be used as additional information to the students, because most of them search for information in such sources.

An important factor which must be considered when developing the distance courses is not only the current trend in technology development, but also the resource availability of the students. The survey results show that 96% of students use operating system Windows, 4% - Linux and 7% - Mac (more than one answer is possible).

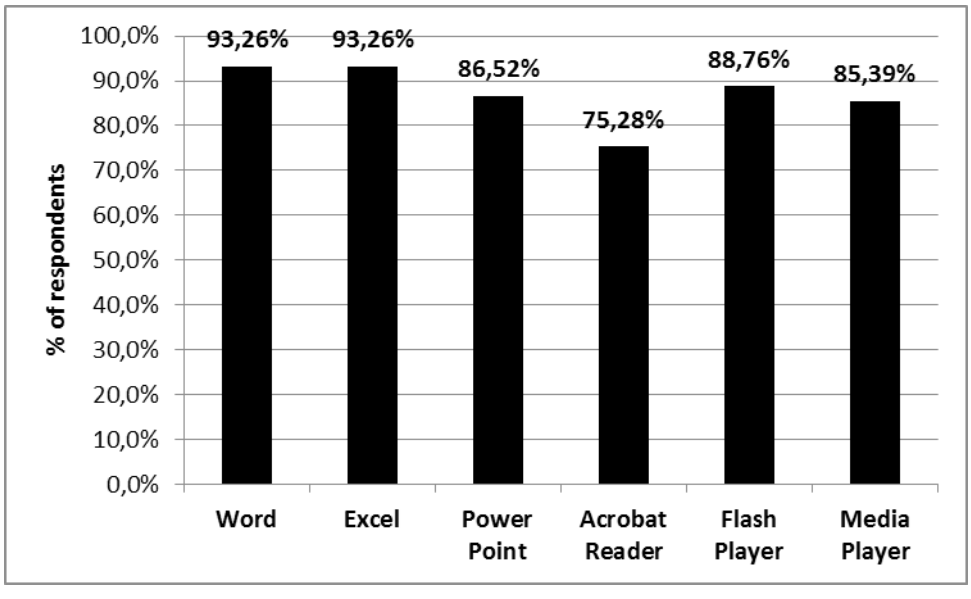

Fig. 6. Which of the following computer applications do you have installed on your computer

The educational content is usually created in the form of text, video and audio using applications of MS Office. The availability of these software applications is a necessity. Using Cyrillic fonts worldwide is not hard. Updating the MS Office products in 2007 helped to overcome the previously caused problems in opening documents from computers with outdated software. Update of MS Excel also creates some problems as functions created with modern versions of the product may not be running on its older versions. Therefore, it is important to know which of the needed resources the students actually possess. It turned out that only four students answered that they have older versions of MS Office. Out of 104 surveyed, only 89 have specified particular software applications . 93.6% of the respondents have MS Word and MS Excel, 86.52% - MS Power Point. Surprisingly, the most commonly used software to open text files - Acrobat Reader - have relatively few students - 75.28% of respondents. This application is free of charge and could be included as link for downloading when needed. Software for video playback (Media player) and interactive products (Flash player) have over 85% of respondents.

In conclusion it should be noted that the study took place in two successive classes of students of the NSA. Considering the rapid pace of development of computer technology it can be reasonably expected that the condition of the studied indicators is currently better than the discussed in this report.

CONCLUSIONS

1. The analysis of the survey results shows that students in master's degree program at the National Sports Academy have the necessary motivation to participate in distance learning education.
2. Students have the necessary availability of resources to use Internet-based training technologies
3. The development and widespread use of mobile devices and technologies creates a good condition for affordable, flexible and high quality mobile distance learning.
4. Students of the master's degree program have enough computer skills but not enough established habits to use global network for educational purposes.

5. Most used channels for information exchange are social networks, email, and applications for synchronized communication.

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THE STUDY OF PHYSICAL ACTIVITY MEASUREMENT SCALE THROUGH RASCH MODEL: BY CROSS-SECTIONAL AGE AMONG KOREAN WOMEN[1]

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***Key words**: Physical activity, female, measurement scale, Rasch model, validity*

INTRODUCTION

To live longer and more healthily requires physical activity(PA) in six pocket. Routine PA gives elementary health to us and acts as a positive various in mental health as well as a chronic illnesses[6, 13, 18, 25, 27, 28]. However PA in deed is one step behind the developed nations for the extend interest in health[1]. PA is a vital factor in health and welfare so that there is a growing interest and need for the study in PA by total age group, by class[20].

Past research in domestic and foreign papers has consistently reported what develop the measurement scale for PA. A variety of direct and indirect measurement such as Selfreported questions, observation method, a pedometer, an accelerometer and double hydrogen were developed. Many researchers preferred questionnaire for financial reasons on a large scale in short time[2, 4, 6, 7, 10, 13, 18].

IPAQ, Beacke, Stanford 7-day recall questions, Minnesota Leisure-time PA questions are being used. However validity of them is low and the subject limited adult, young men. For the elderly, youth, undergraduate, middle aged women is developed questionnaire. They also have low validity[7].

In Korea, the quest for PA measurement is an important part of advancing health science, which primarily adapt foreign scales to Korean circumstances[2, 6, 13, 18].

Major preceding researches related with PA focused on PA levels and fitness factors, which lacked diverse contributing factors clearly. Also the validating method reflects female PA character by age related factor was untested[5; 26]. The questions were not compared with on a developmental stage which one study measured specific targets. Selection tools based on test contents will be verified statistically. The purpose of this study is to develop the optimal PA scales for Korean females by age, which are considered some limitation of measurement tools for PA requirement index psychologically, physically and environmentally. In comparison with classical test theory, the Rasch model provides a means of assessing a range of additional measurement properties, increasing the information available about a scale's performance. Recognized for its value of evaluations, it assesses response category and item difficulty so that duplicate or inaccurate items on developed scales are selected[20]. Also the optimal item category on Rasch model can be evaluated to determine the fitness of response category(5 or 4 points). It make up for the weakness depended only on researcher's experiment and judgement on category[21].

Therefore in this study rasch model applies to developing the scale with factor analysis so that it analyze the optimal female PA scale by age and examinate the validity.

METHODS

1. Participants

A convenience sample of 520 females(youth 11~18=250, adult 19~64=200, elderly over 65=70) were used to the pilot test. The 642 females(youth=280, adult=200, elderly=70) absent from the previous participated in real test. Respectively sample in each test can help to develop the higher validity and reliability of Physical Activity Measurement Scale(PAMS).

1This article forms part of a research programme financed by Korea Council of Sport for All(2013 guest research 03). Corresponding Author: Eun-jeong Kang, Postgraduate student in PhD, Department of Measurement and Evaluation for Physical Education, Korea national Univ, 88-15, Oryundong, Songpagu, Seoul. Email: ejkang@knsu.ac.kr

2. PAMS development

1) items selection and pilot test

One measurement and evaluation specialist and a PA expert determined common and individual questions based on test contents after collected items to measure PA from existing research. Measurement scale was decided to 4- point likert scale. The following 1, 2, 3 tables are item contents and scale.

The exploratory factor analysis(EFA) identified statistically common components by SPSS 19.0 program. Maximum Likelihood Estimate(MLE) was set up as the elements extraction and Promax method as oblique Rotation was used for analyzed.

2)Real test

The real test to new participants was conducted after eliminated and modified inaccurate questions in the pilot test. Next principal component analysis(PCA) was used to verify unidimensional assumption to apply Rasch model for each age PA scale. Unidimensional assumption includes local independence assumption. Therefore it meets both requirements which are an essential condition of Rasch model.

In the case that the first eigen value of principal component analysis(PCA) is over 1, or the highest value of PCA accounts for one-fifth in whole, the Unidimensional assumption was satisfied[16]. Facets 3.67.1 program was used in that order to goodness of fit test by components valid Unidimensional assumption. Fit value;infit and outfit is set up between 0.80-1.2 [8,17]. And the accuracy of response category was verified to optimal 4 point scale by youth, adult and elderly.

It make a decision to fit the response category if stepcalibration is higher, which crossed with each other in category probability curve[3, 8, 21].

RESULTS

1. Exploratory factor analysis(EFA)

Exploratory factor analysis is to explore items configured conceptually and uncertainly information in model for the proper[23]. Each question youth 35, adult 34, elderly 24 based on test content was conducted through EFA to judge construct validity. Below Factor loading 4 on each factor were eliminated and then EFA was conducted again. The rest of items by age were arranged in factor loading order. On youth, items over .4 factor loading are q.1~7 which mean sports participation situation measurement. 2nd factor are q.8~11 which mean current health related to exercise. 3rd factor are q.12~16 which mean sports participation intent, measurement physical. On adult, 1st factor is exercise intensity, q.1~4. 2nd factor is current health related to adult PA, q.5~8.

3rd factor is PA participation, q.9~12. 4th factor is measured to PA preference, q.13~16. On elderly showed 7 items in order after eliminated 17 of 24 in adult. 1st is q.1~3, exercise intensity, 2nd is q.4~7, enjoyable sports type.

After EFA, youth has 3 factors; 7 PA intensity, 4 current health and 5 participation intent. Adult has 4 factors and 16 items; exercise intensity, current health, participation situation, preference. Elderly has 2 factors, 7 items, which examined low-moderate exercise and preference type.

Total 3 factors of youth accounts for 76.83%, eigenvalue of PA is 22.96, means 65.62% explanation power. Determinants as Current health and Participation intent has each eigenvalue 2.81(8.1%) and 1.1(3.16%). Adult has total 4 factors, accounts for 63.8%. Exercise intensity is 4.84(26.9%), Current health is 3.24(18.1%), Sports participation is 1.89(10.1%) and exercise preference is 1.57(8.8%). Total 2 factors of the elderly account for 59.5% in whole variance, exercise intensity is 3.20(40.1%), preference type is 1.55(19.4%).

2. Unidimentionality

On table 4 PCA was conducted for each item unidimentionality test before Rasch model application.

1st eigenvalue was higher than 1 in each age. Total explanatory in age showed over 20%. All were satisfied with unidimentionality

Table 1. 35 questions based on test content(Youth)

No. items	Strongly disagree	disa-gree	agree	Strong-ly agree
1. I hate walking.	□	□	□	□
2. I enjoy climbing or swimming.	□	□	□	□
3. I enjoy exercising alone.	□	□	□	□
4. I like aerobic exercise(jogging, long distance race etc).	□	□	□	□
5. I'm on the plump side.	□	□	□	□
6. I like running.	□	□	□	□
7. I'm good at jump rope.	□	□	□	□
8. I love dancing.	□	□	□	□
9. I like cycling or swimming.	□	□	□	□
10. I don't actively participate in workout.	□	□	□	□
11. Now I work out regularly.	□	□	□	□
12. I'm exercising in sports club.	□	□	□	□
13. I don't have a favorite exercise.	□	□	□	□
14. I work out to relieve stress.	□	□	□	□
15. I feel a disorder of the heart when exercising.	□	□	□	□
16. I'm often trouble with a pain in my chest when exercis-ing.	□	□	□	□
17. I ever heard not to work out too hard from a doctor.	□	□	□	□
18. I ever felt that a exercise is beyond my physical capacity.	□	□	□	□
19. There are many overweight people to family(relatives, cousins).	□	□	□	□
20. There are many anyone fond of sports to family(relatives, cousins).	□	□	□	□
21. I feel better whenever trying some workout new.	□	□	□	□
22. I ever felt stiff in night-study.	□	□	□	□
23. I worked high intensity physical activity at school in the past seven days.	□	□	□	□
24. I worked moderate physical activity at school in the past seven days.	□	□	□	□
25. I worked high intensity physical activity after school in the past seven days	□	□	□	□
26. I worked moderate physical activity after school in the past seven days.	□	□	□	□
27. I played jumping, jump rope, running, stretch, basketball, volleyball, or tennis in the past seven days.	□	□	□	□
28. Over 60 min physical activity a day is done almost every day.	□	□	□	□
29. I avoid doing physical activity in a menstrual period.	□	□	□	□
30. I should workout to relieve stress.	□	□	□	□
31. I can't exercise for another subject.	□	□	□	□
32. I'll participate in new sports program after school.	□	□	□	□
33. I'll be willing to take part in weekend sport program.	□	□	□	□
34. I'll join the sports program 1 hour each twice a week.	□	□	□	□
35. 3 hours workout a week is suitable for me.	□	□	□	□

Table 2. 34 questions based on test content(adult)

No. items	Strongly disagree	disa-gree	agree	Strong-ly agree
1. I enjoy climbing or swimming.	□	□	□	□
2. I enjoy exercising alone.	□	□	□	□
3. I like aerobic exercise(jogging, long distance race etc).	□	□	□	□

4. I'm on the plump side.	□	□	□	□
5. I am well able to overcome anger and depression.	□	□	□	□
6. I like running.	□	□	□	□
7. I enjoy dancing.	□	□	□	□
8. I'm good at jump rope.	□	□	□	□
9. I'm not passive but active.	□	□	□	□
10. I do not like to exercise personally.	□	□	□	□
11. Now I work out regularly.	□	□	□	□
12. I'm exercising in sports club.	□	□	□	□
13. I work out to relieve stress.	□	□	□	□
14. I like anaerobic exercise(weight training).	□	□	□	□
15. I feel a disorder of the heart when exercising.	□	□	□	□
16. I ever felt severe dizziness during exercise.	□	□	□	□
17. I ever heard not to work out too hard from a doctor.	□	□	□	□
18. I'm often trouble with a pain in my chest when exercising.	□	□	□	□
19. I ever felt the frustration during trying to lose weight.	□	□	□	□
20. I have a lot of housework.	□	□	□	□
21. I feel better whenever trying some workout new.	□	□	□	□
22. I ever felt stiff in households or company.	□	□	□	□
23. I usually tend to stretch.	□	□	□	□
24. I worked high intensity physical activity at work in the past seven days.	□	□	□	□
25. I worked moderate physical activity at work in the past seven days.	□	□	□	□
26. I worked high intensity physical activity at home in the past seven days	□	□	□	□
27. I worked moderate physical activity at home in the past seven days.	□	□	□	□
28. I did muscle exercise(push-ups, sit-ups, dumbbell, etc.) in the past 7 days.	□	□	□	□
29. I played jumping, jump rope, running, stretch, or tennis in the past seven days.	□	□	□	□
30. Over 60 min physical activity a day is done almost every day.	□	□	□	□
31. I avoid doing physical activity in a menstrual period.	□	□	□	□
32. I should workout for health.	□	□	□	□
33. I should workout to manage my figure.	□	□	□	□
34. It is hard for me to exercise as childcare and housework.	□	□	□	□

Table 3. 24 questions based on test content(elderly)

No. items	Strongly disagree	disagree	agree	Strongly agree
1. I enjoy exercising alone.	□	□	□	□
2. I like to walk.	□	□	□	□
3. I enjoy the leisure activities outside.	□	□	□	□
4. I like cycling or swimming.	□	□	□	□
5. I prefer sports with friends to alone.	□	□	□	□
6. I'm exercising in sports club.	□	□	□	□
7. I usually work sitting or standing, sometimes walking.	□	□	□	□
8. I work out to relieve stress.	□	□	□	□
9. I like anaerobic exercise(weight training).	□	□	□	□
10. I ever heard not to work out too hard from a doctor.	□	□	□	□
11. I ever felt the frustration during trying to lose weight.	□	□	□	□
12. There are many anyone fond of sports to family(relatives, cousins).	□	□	□	□

Table 4. PCA by age

age	1 eigen value	2 eigen value	1st eigen value explanatory(%)
youth	4.085	2.643	25.5
adult	5.317	2.950	33.3
elderly	2.510	1.291	35.9

13. I think that the exercise helps brain health and to prevent dementia.	□	□	□	□
14. I worked high intensity physical activity in the past seven days.	□	□	□	□
15. I worked moderate physical activity in the past seven days.	□	□	□	□
16. I worked low intensity physical activity in the past seven days.	□	□	□	□
17. I did fast walking, bicycling, ballroom dancing, tennis in the past seven days.	□	□	□	□
18. I was sedentary for more than four hours a day in the past 7 days.	□	□	□	□

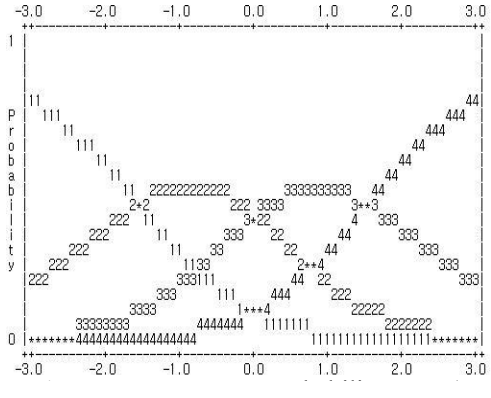

Figure 1. Response category probability curve(youth)

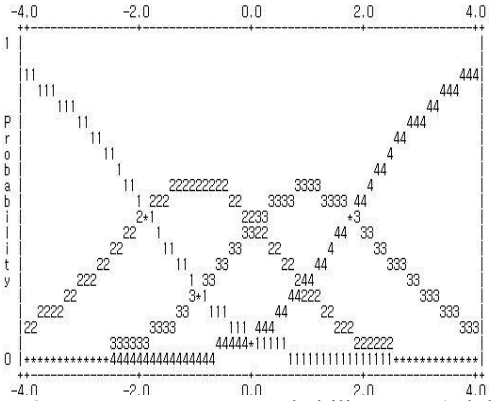

Figure 2. Response category probability curve(adult)

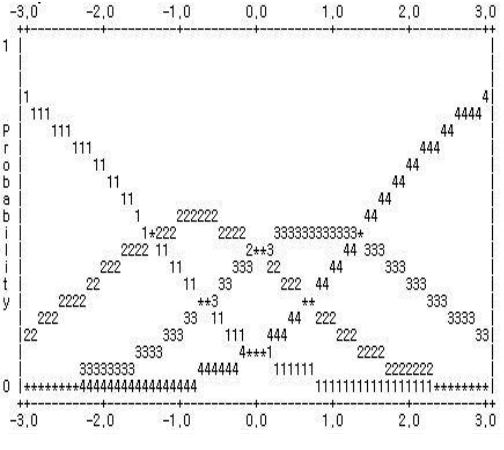

Figure 3. Response category probability curve(elderly)

Table 5. Response Category Stepcalibration(youth)

scale	response rate(%)	average	step calibration
1	10	-.55	
2	33	-.18	-1.55
3	40	.53	.02
4	17	.91	1.53

Table 6. Response Category Stepcalibration(adult)

scale	response rate(%)	average	step calibration
1	8	-.52	
2	35	-.15	-1.86
3	42	.54	.08
4	15	1.06	1.78

19. I walked for more than four hours a day in the past 7 days.	□	□	□	□
20. I do the outdoor gardening(including weekends farm).	□	□	□	□
21. I think that exercise is costing too much.	□	□	□	□
22. It's hard to work out for child care or households.	□	□	□	□
23. I'll be willing to participate in state sports program.	□	□	□	□
24. 3 hours workout a week is suitable for me.	□	□	□	□

3. Goodness of fit in response category

4-point likert scale was made up in response category. "not at all, not much, somewhat, very much" mean the more physical activity has a high score. Facets 3.67.1 program was used to verify the suitability of the item response categories. It is category probability curve and stepcalibration to figure out the optimal number of response category. Xaxis is individual PA and measure relative to item difficulty, Y axis is $P_{jk}(\theta)$: category probability in category probability curve.

As following figure 1, 2, 3 & table 5, 6, 7, category 1-4 had increasing average -.55 up to .91(youth), -.52 to 1.06(adult), -.39 to .71(elderly). step calibration, see fig. 1, 2, 3 mean the 4 scale intersections in category probability curve. Youth was -1.55(1-2 scale crossing point), 0.02(2-3 scale crossing point), 1.53(3-4 scale crossing point), Adult was -1.86, 0.08 and 1.78, Elderly was -1.34, 0.03 and 1.31 which optimally showed as increasing forms.

4. Goodness of fit

Estimated infit and outfit value of items was as following. Question 1 and 3 in youth's PA was over 1.2 outfit. Q 7, joined in sports club was over 1.25. Q 11, 12 and 13 a combination of exercising and others were below 0.76. While Adult 4 factors and elderly 2 factors, values were satisfied with infit/outfit .8 to 1.2. Separation index of Model and reliability were 8.77 and .99 in youth, 7.57 and .98 in adult, 5.17 and .96 in elderly.

DISCUSSION

The purpose of this study is to develop and validate the physical activity measurement scale (PAMS) for Korean females by age through goodness-of-fit in Rasch model.

The test questions were already used in public health, medical field. PA scales in foreign were translated

and modified through experts[2, 3, 6, 14, 18]. Identical items by ages appeared optimal for youth not for adult or elderly. Or versus did. As the result, it is considered that the scales should be subdivided into the subjects by age. Comprehensive Understanding of subject characters is more important in developing scales.

Facets 3.67.1 program was used in that order to goodness of fit test. Fit value;infit and outfit is set up between 0.80-1.2[17].

General standard index is.7 to 1.3. There is no absolute standard for the purpose of the study. To develop the scales which then applied strict standards for selection.

As a result of facets program, over 1.2 outfit mean no having homogeneity questions, vague and great confusion response. Below 0.8 infit mean duplicate contents questions. There has extreme value to eliminate in youth. Thus, a person with high PA have high all score except that extreme question. Or a person with low PA were evaluated in that question as high.

Both infit/outift were over 1.2 mean it is hard to answer YES in this Q 7 even if a teenager do high PA. The standard as below 0.80 infit/outfit can be simplified after deleted Q 12 due to duplicate item for youth. It is relevant to what this 6 items in youth were statistic figure in Rasch, which could not figure out in classical test theory. PA requirement index with optimal items can be estimated for female by age.

Also this PAMS can utilize applied item response theory(IRT) in further study. Next participants can have numerate PA requirement(%) through IRT. After set for criterion referenced assessment, it is based to judge goal achievement of necessary fitness activity. Based on test contents and figures from ROC, it can properly be set the standards for the lowest PA of Korean female by age. A demand considerations customized exercise can be provided not typical sports prescription after factor result in each individual.

It is need for variety of programs, PA facilities support, administrative policy and excellent trainers[5, 11, 12]. PA contributes eventually female's health improvement, high life satisfaction. And in each age group, it is effective at preventing delinquency, disease, life depression. It might be fiscally responsible to national health burden which is continuous deficit in aging society($16 trillion surge in 2020, Commerce and industry, 2013). In real survey, Many of the females are favorable to sports benefit in maternity aid. If facility use and exercise cure add to present childbirth voucher system, the birth rate might increase and successful result for the pregnancy.

The higher the voluntary physical activity will, the higher health and happiness index of all ages women[2, 9, 12, 14, 15, 19, 24]. To recognize her own physical activity as measured by this scale (necessary exercise index) is a feedback significant in increasing the participation healthy PA.

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29. for health. Retrieved July 20, 2013 from http://www.who.int/dietphysicalactivity/en Table 1. 35 questions based on test content(Youth).

IMPROVING THE EFFICIENCY OF THE EDUCATIONAL PROCESS WITHIN THE DISCIPLINE "PHYSICAL CULTURE» BY MULTIMEDIA

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Key words: *physical education, multimedia, learning films, UrFU*

Currently, multimedia technology is one of the fastest growing areas of new information technologies in the educational process. The emergence of new and improvement of existing education requires a higher level of literacy and the general preparation of the expert in any area of competence and mobility in the knowledge acquired. Successful achievement of this goal depends not only on the content of training , but the shape of the material . And if any one of the course , its duration is determined by standards and its extremely difficult to subject changes , the choice of a technique teacher is given sufficient freedom .

In today's society is becoming more relevant to increase the effectiveness of training discipline "Physical Education ." This is due to a general decline in the health of students , decreasing base of motor skills associated with a sedentary lifestyle , and progressive total ignorance in matters of health and physical development.

Currently, most universities use of visual aids within the discipline "Physical Culture" limited. That there are many reasons , but the main (in a survey of colleagues with relevant university departments Ekaterinburg) - specifics of the discipline , which hinders the use of such benefits, and the lack of effective visual aids, allowing concisely and quickly convey to students the basic information regarding the running exercise.

The novelty of the research:

Within UrFU first used multimedia visual support for practical training within the discipline "Physical Education ."

Objective: To determine the effectiveness of multimedia visual aids and their possible specificity within the discipline "Physical Education "

Tasks was:

1. Define visual aid from the standpoint of classical pedagogy within the specifics of physical culture.
2 . Suggest technology use multimedia presentation in the framework of discipline "Physical Education."
3 . Determine the effectiveness of the proposed technology .

Testing and implementation of the results of research carried out in the form of workshops with streaming groups of discipline " Physical Education" at the Department of Physical Education of the Ural Federal University.

Principle of visual learning - one of the most famous and intuitive learning principles , used since ancient times. Classical didactics established the principle of visibility based on the obvious fact that the training is successful , beginning with consideration of objects and processes of reality .

In the early stages of human development , when training was directly related to employment , students have not experienced any major difficulty to imagine and understand what they are taught.

With the advent of writing books and learning becomes more abstract and therefore more difficult. There is a contradiction between personal experience and social learning experiences recorded in the studied material .

John Amos Comenius (XVII century.) Pedagogy first gave a theoretical justification of the principle of visual learning . He gave a clear statement of the scope of visibility , " all that is possible to provide for the perception of the senses : visible - for the perception of vision ; audible - hearing ; smell - smell ; subject to taste - taste ; allowable haptic - by touch. If any objects or phenomena can immediately perceive multiple senses - give multiple senses "

Thus, the visibility in understanding Comenius becomes a decisive factor of learning.

Pestalozzi sees clarity only basis of all development . Perceptual knowledge is reduced to visual learning, respectively visibility turns into an end in itself.

Rousseau delivered directly into the nature of learning . Therefore, the visibility of learning does not acquire an independent and significant. Learner is in nature and directly sees what needs to learn and explore. Therefore there is no need to invent , you need to take in nature and ready to show.

Ushinsky gave profound psychological justification visibility of primary education . Visual aids are a means for forming a sensual image . That sensual image formed on the basis of visual aids is important in learning and not the visual aid. Developing learning theory , he formulated an important position regarding the acquisition by students of true knowledge : " Faithfulness of our findings and all our thinking is correct depends , first, on the faithfulness of the data from which we make inferences , and , secondly, on the fidelity of the output . No matter how logically true our conclusions , but if the data is perceived by us from the outside world , are incorrect, and the conclusions will be false ".

Zankov explored various forms of combining words and clarity in teaching. He singled out a number of rules, some worth quoting here:

1) by the word teacher based on observation of visual objects and on the basis of their existing theoretical knowledge leads students to understanding these relationships in the phenomena that can not be obtained in the process of visual perception (ie visibility helps a deeper understanding of the subject , and not detracts from the learning process);
2) by means of the word teacher directs supervision , which is carried out by trained and knowledge of the shape of the object, its properties and perceived directly trained relations extracted from the object of the visual observations (independent study under the guidance of a teacher);
3) information on the shape of the object , its directly perceived properties and relations of the students with the teacher's verbal messages and visual aids are confirming or concretization of verbal messages ;

Thus, there are various forms of communication and clarity of speech . Give some of them a complete preference would be misleading , since, depending on the characteristics of learning objectives , content, themes , nature of the available visual aids , as well as the level of preparedness of students is necessary in each case to choose the most efficient combination.

Visibility in the modern theory and practice of teaching is divided into :

- The process of sensory reflection in learning ;
- Study material on the basis of visual aids .

Thus, we come to the need to define " visual aid" .

Visual aids - this training material models of subjects , events or their properties to create a student in cognitive activity trends representation of real objects , events or parties in the natural conditions of existence.

Visual aids feature a number of essential features:

1. Any visual aid is a model of real processes.
2 . Visual aids is a learning model .
3 . Visual aids is a means of knowledge .

4 . Visual aids based on sensations and perceptions form a sensual image , representation , of which the basis of the relevant conclusions concludes .

As mentioned above, the principle of visual learning - one of the most famous and intuitive learning principles , used since ancient times. Regular support of this principle in terms of physiology obtained relatively recently. It is based on strictly following fixed patterns : the human senses have different sensitivity to external stimuli , the vast majority of people have the most sensitive organs of sight ; bandwidth communication channels from the receptors to the central nervous system different :

optical communication channel - 1.6 x 106 bits / sec,

acoustic - 0.32 x 106 bits / sec

haptic - 0.13 x 106 bits / sec

Also found that the information coming into the brain via an optical link , does not require significant recoding , it is embodied in the human memory is easy, fast and durable.

From the above, it turns out that comprehensive engagement of the maximum possible number of information channels in the consciousness of the student gives a much stronger effect than using them separately. Indeed, mastery learning material begins with his sensations and perceptions . Perceived through the senses signals are subjected to logical processing , fall within the scope of abstract thinking

As a result, sensual images included in the judgments and conclusions . At the stage of the process of knowledge - comprehension application visibility affects the formation and assimilation of concepts, evidence and validity of judgments and conclusions , establishing causal relationships , etc. When memorizing the use of visual aids helps to perpetuate the knowledge gained - bright reference points to help capture the logical thread of the material , organize the material under study . The assimilation, synthesis and consolidation of the material helps students visual aid “package” the information received into a single image that is easy to play and which may easily “fix” the theoretical knowledge - in other words , is much easier to remember what you can imagine externally.

The place and role of visual material in the learning process is determined by the ratio of student activities with a clear material to the activity that constitutes the essence of the learning process - it should take into account when applying the teacher visual aids .

This attitude may be threefold :

- and other activities that may overlap each other, which provides direct visualization effectiveness;
- The first activity can prepare a second , and then only required to correctly and clearly identify the appropriate stages of the pedagogical process ;
- and other activities that may not be linked, in this case visual material is useless, and sometimes can even play the role of distraction .

Thus , in our opinion it is necessary to use such clarity that will most effectively performed by students form a line of motion of the basic links technology required exercises. We hypothesized that to achieve this result is as follows:

- To create an image in the mind of the student movement that constitutes the central link of the art physical exercise , demonstrating atlas of human anatomy ;
- Help shift the image motion on himself, explaining the location of relevant bones and muscles in performing the movement , taking into account the features of the existing constitution and physical development ;
- Create a motivational effect , demonstrating by example and technique videos athletes exercise in dynamics.

The study was conducted on a group of students who are engaged in the gym in “ Athletic Gymnastics .” Group was divided into control and experimental , with 10 people in each . As the object of the investigation were the following basic movements - squat neck , fretboard deadlift , bench press , pull the dumbbells to his belt , breeding dumbbell .

Students in the control group received a single direction from the teacher on technology performance .

Teacher showed the technique to perform himself, have a central link of each art movement called the working muscles for each movement . After that, the students were asked to engage in the gym during the semester, with the specified exercise. As a visual aid in this group were only photocopies of sports magazines , traditionally placed on the walls of gyms .

Students of the experimental group were able to view a series of commercials with the participation of professional athletes, commenting technique execution of each of these movements , as well as get acquainted with the images of the skeleton and muscles in the atlas of human anatomy . In addition, students in this group received an explanation as to the location of bones and muscles in their body , taking into account the features of each body . Then also engaged in during the semester using these exercises , with the ability to view videos in addition to the extent of any questions .

We do not present the measurement results of growth in the investigated physical exercise, because originally this problem was not put. Different levels of physical development of students makes questionable statistical value calculation of these data. Therefore, in this study it is only about the art exercise.

Technology assessment exercise was carried out twice. First time - at the beginning of the semester , a week after classes , which have been applied in a way to illustrate each of the groups . Second time technology assessment made at the end of the semester , after 12 weeks . Accordingly, the table shows two figures - the first and second estimates for each alternative technology errors .

Overall results were as follows .

Group	Rough mistakes of performance, significantly distorting the meaning of physical exercise	Mistakes in the initial position and trajectory that do not violate the central link of physical exercise, but significantly reduce its effectiveness	Small mistakes of performance which reduces the effectiveness of physical exercise,	Mistakes of performance which caused by uncounted individual anatomical and morphological features
Control	60% / 50%	10% / 30%	20% / 10%	10% / 10%
Experimental	10% / 0	30%/ 0	30%/ 20%	30% / 0

On the basis of these data we can draw the following conclusions :

1. Visual aids for discipline “Physical culture” is a training model that encourages the creation of the movement image by students that constitutes the central link of exercise equipment that allows to move it to your own body , taking into account its features .
2 . We have used the following visual aids: atlas of human anatomy in conjunction with the display of the necessary body structures on each of the students ; showing movements by coach; showing videos of professional athletes .
3 . We found that the combination of the applied visual aids gives significantly greater effect than their separate application . However, for more specific conclusions we are going to continue this line of research, including at the same time different visual aids in material and technical equipment of the discipline “Physical Education”

RESULTS OF A STUDY ON CERTAIN INDICATORS OF PHYSICAL FITNESS OF STUDENTS FROM SOFIA UNIVERSITY « ST. KLIMENT OHRIDSKI», ATTENDING TRAINING ON TENNIS ON COURT

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Key words: *physical fitness, motor abilities, tennis on court*

INTRODUCTION

SU is the oldest and most prestigious university in Bulgaria. Currently, its structure comprises 15 faculties and 75 domains of study, where 30 000 students are taught in different specialties.

The physical education and the sports activities at the University have their crucial role in the overall educational process of the students from the time of the establishment of the institution till today. The practice of the sport tennis on court at SU has its traditions and accomplishments. It has been characterized by a high interest from the students in the past as well as at the present stage of its development.

The main component of physical fitness is the level of development of physical skills and habits. The characteristics of the practice of tennis on court is such that it brings great demands on the motor skills of the students in the form of a system of rationalized, targeted, simple and complex movements. They are evaluated based on the specific actions that are reflected in feelings, emotions, stress, etc. According Jelyazkov Tz. (2001), this transfer of the entire physical activity of the individual is possible only thanks to the realization of the motor skills - strength, speed, endurance, agility and flexibility. They have their external manifestation in the form of many different combinations of time, space and effort, which are materialized in specific skills and habits [3].

Purpose of the study

The purpose of the study is to establish the level of development of the basic motor skills, which are essential for the learning and the use of various technical elements of the game tennis on court.

Tasks of study

1. To determine the level of development of some basic physical skills.
2. Preparation of normative assessment tables

Object of the study is the physical fitness of students from Sofia University „St. Kliment Ohridski“, attending classes in tennis on court.

Subject of the study is a group of 94 students from Sofia University “St. Kliment Ohridski”, attending classes in tennis on court.

METHODOLOGY

1. Literature and internet research
2. Experimental study using a test battery, which includes: grip strength of strong and weak hand (hand dynamometer calibrated from 0 to 90 kg); depth of inclination from standing position (specialized rig with a graduated scale from 50 to 150 cm, 100 cm assuming meets the 0 cm); long jump from place with two feet without the involvement of the hands; running 30m; specialized test “Fan”; maximum number of squats for 20 seconds. (number of cycles); maximum lifting of the corpse from occipital position to seating position for 30 seconds; folding and unfolding of hands in support for 30 sec; adapted test of endurance EUROPHYT (Biptest).

3. Theoretical analysis and synthesis
4. Mathematical and statistical methods
   - Variation analysis
   - Method of Martin .

RESULTS

The results of the test are summarized in (Tables 1 and 2).

Table 1. Results of a test on the physical fitness of students (males) from SU (2012)

Indicatiors	n	R	min	max	X	S	V	As	Ex
Strenght of a strong hand grip	50	48,00	18,00	66,00	44,06	11,098	25,19	-,096	-,619
Strenght of a weak hand grip	50	48,00	16,00	64,00	38,98	11,210	28,76	,078	-,727
Depth of inclination	50	31,00	87,00	118,0	103,58	7,746	7,48	,048	-,524
Long jump	50	105,0	115,0	220,0	174,00	20,315	11,68	-,806	1,219
Running 30 m	49	5,52	4,27	9,79	5,20	,832	16	3,987	19,916
Fan test	49	7,46	18,30	25,76	20,75	1,667	8,03	1,010	1,083
Squats for 20 s	50	9,00	16,00	25,00	20,50	1,705	8,32	-,424	1,368
Beeptest	50	6,70	2,80	9,50	6,13	1,660	27,1	,162	-,158
Crunches for 30 s	50	23,00	15,00	38,00	25,22	4,933	19,56	,451	,354
Pushups for 30 s	50	42,00	7,00	49,00	27,80	9,666	34,77	-,046	-,036

Table 2. Results of a test on the physical fitness of students (females) from SU (2012)

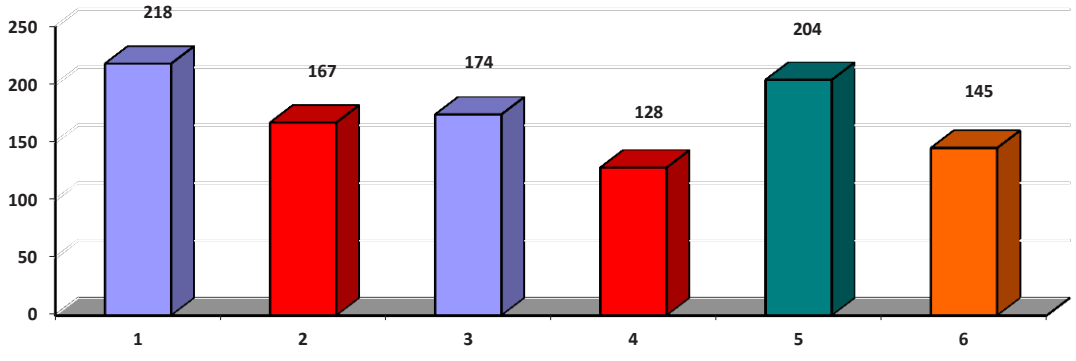
Indicatiors	n	R	min	max	X	S	V	As	Ex
Strenght of a strong hand grip	44	31,00	7,00	38,00	19,57	7,63	38,98	,627	-,006
Strenght of a weak hand grip	44	29,00	5,00	34,00	16,98	7,66	45,1	,757	-,072
Depth of inclination	44	21,00	95,00	116,00	107,07	5,40	5,03	-,362	-,587
Long jump	44	95,00	70,00	165,00	127,30	17,38	13,65	-1,239	4,272
Running 30 m	43	4,01	5,49	9,50	6,37	,733	11,52	3,351	12,643
Fan test	43	23,22	18,78	42,00	22,22	3,50	15,77	4,525	24,913
Squats for 20sec	44	10,00	12,00	22,00	19,23	1,93	10,02	-1,686	4,102
Beeptest	44	4,90	1,40	6,30	3,46	1,14	32,92	,846	,612
Crunches for 30 s	44	17,00	10,00	27,00	20,96	3,87	18,47	-,463	,116
Pushups for 30 s	44	22,00	1,00	23,00	9,32	5,68	60,92	,821	,127

DISCUSSION

The successful learning and use of the various technical elements of the game tennis on court of the students depends largely on their physical fitness. Therefore, the establishment of the level of development of the basic physical properties and their further improvement is essential to the effectiveness of training activities.

The practice of tennis on court brings high requirements on the strenght skills of the students. The good development of the muscle strength is of great importance for the mastery and the effective implementation of such important elements of tennis as the serve and the various hits of the ball.

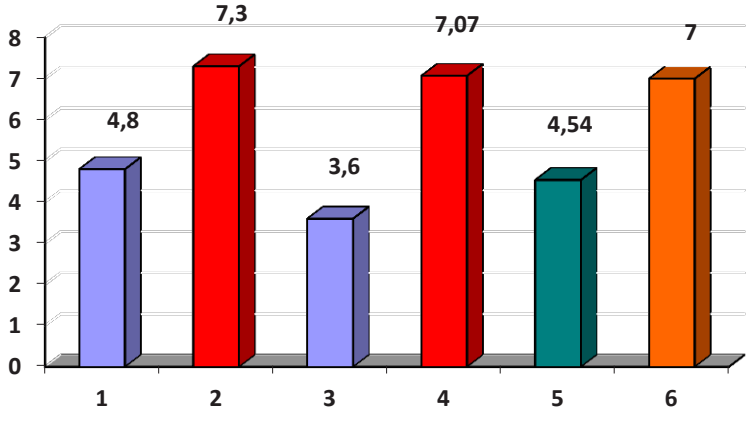
The state of the explosive power of the legs is essential for the successful execution of different game situations in tennis. Therefore, the development of this physical skill is crucial in the training and coaching process. Determining the extent of its development in new players is a good benchmark for the starting level and the work ahead. The results (Fig. 1) in the study of students on this indicator (long jump from place) are x = 218 cm (2006) And x = 175 cm (2012).



Legend: 1-SU(men/2006); 2-SU(women/2006); 3-SU(men/2012); 4-SU (women/2012); 5-AU-P (men); 6-AU-P (women)

Fig.1. Level of development of explosive power in the legs of students (men and women)

The comparison with the results from a test of students from the Agricultural University - Plovdiv (AP-P) by A. Ivanov (2004) x = 204.5 cm, shows that male students from SU are better by 13.5 cm, and female students x = 167 cm (SU) and x = 145 cm (AU-P) by 22 cm (Pt = 95%). (Fig. 1). According the scale of Kavdanska E. (2002) the data demonstrates that male and female students from Sofia have a low degree of development of the explosive power of the legs.



Legend: 1- male students of SU(2006r.); 2.-female students of SU (2006); 3-male students of SU (2012); 4-female students of SU (2012); 5-youngsters (male) at 20 years of age NS; 6- youngsters (female) at 20 years of age NS

Fig.2. Level of development of the skill flexibility of students from Sofia University (2006/2012) and their peers from the National Research (NR) 1980

Tackling some difficult balls in the playing process of tennis on court is effectuated with best effort and great extension of the body. Flexibility is a physical quality that should be developed at a high level. This condition is necessary to be manifested in various free and quick movements during the game. Many of the highly ranked players pay high attention in their training activities to develop and improve this specific skill. Although students are not highly ranked players, it is crucially important to work on the development and improvement of the physical skill flexibility in the training and coaching process. The average achievement of male students from Sofia University measured by test „Depth of inclination“

is x = 4.8 cm, and female students, x = 7.3 cm (Fig. 2). Similar to the results of the „National surveys of physical development, physical fitness and neuro-psychological reactivity of the population) Yanev, B., P. Sterev et al., 1982)“ in which the depth of the inclination is the only test in which women outnumber men, women in our studies are more flexible than men. Achievements of the male students surveyed at Sofia University are better than those of their counterparts from AP-P 2.6 cm X (SU) = 4.8 cm; X (IP-P) = 2.2 cm (Pt> 95%), while the average score of the female students surveyed by AP-P (x = 8.3 cm) is slightly better than that of their colleagues from the Sofia University (7 = 7.3 cm) by 1.0 cm (Pt <95%) [5].

Development of physical skill speed and its manifestations is crucial for the good play of a big part of the game situation. Specific for its development is the need for a long period of training. Average achievement out of the servey on 30m smooth running of SU male students is x = 4.99 sec (2006) and x = 5.20 sec (2012), and for female students x = 5.42 (2006) and x = 6 , 37 sec (2012) (Table. 1, 2, Fig. 3). Those results compared with the normative standards of the evaluation table (Iv. Dimov, 2001) of tennis players 30 meters running, is within the „very poor evaluation“, which is an achievement of 4.75 to 6.48 sec. [2]

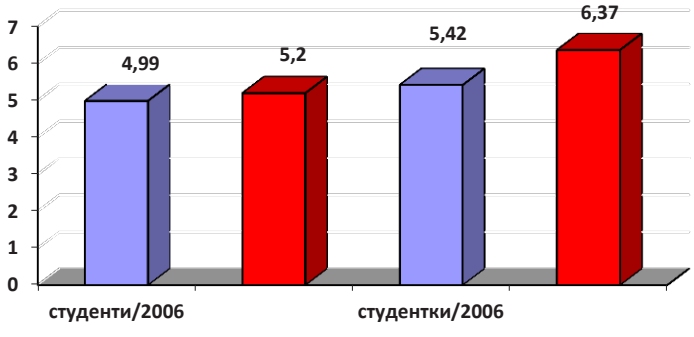


Figure 3. Level of development of physical skill speed of students from Sofia University

The „Maximum number of squats for 20 seconds“ gives us information on the specifics of the development of the speed-strength endurance in the legs skill. The results of the national surveys on men show that this indicator grows up to the age of 15 and begins to decline after 23-24 years of age.

Achievements of our students tested at Sofia University are significantly lower than the results of their peers from 1980 (Yanev, B., P. Sterev, 1982). The average result of male students in the University is x = 16.4 pc. and of female students is x = 11.8 pc.

Speed endurance is measured by test „Fan“. The average results for men are x = 20.75 seconds and for women x = 22.22 sec.

Endurance was measured with an adapted test endurance EUROFIT „Beeptest.“ The average result for men is x = 6.13 level and for women x = 3.45 level.

Normative standards for assessing the physical fitness of students for training in tennis on court purposes

One of the most effective ways of maintaining good physical fitness of students trained in tennis on court is to exert control on it. Its objectives are to examine the selection of trainees at the start of the training process and maintaining a good level of physical fitness within the process of education. Our control is preliminary and ongoing. The preliminary control is exerted during the formation of the training groups and the selection of prepared players for the representative teams. Operational control is performed repeatedly throughout the course. Here below we present an example of established tables for quantitative assessment of male and female students. The full information is available in information source [6].

Table 3. Normative standards for the development of strength endurance of the abdominal muscles – male students

Assessment	Scale				Percentage of accidents
Very high	Above	35			2.27
High		31	-	35	13.59
Above average		29	-	30	14.99
Average		23	-	28	38.29
Below average		20	-	22	14.99
Low		15	-	19	13.59
Very low	Below	15			2.27

Table 4. Normative standards for strength hand grip - female students

Assessment	Scale				Percentage of accidents
Very high	Above	35			2.27
High		28	-	35	13.59
Above average		24	-	27	14.99
Average		16	-	23	38.29
Below average		12	-	15	14.99
Low		4	-	11	13.59
Very low	Below	4			2.27

CONCLUSIONS

1. The level of development of the main motor skills of the students from Sofia University "St. Kliment ohridski" is low, which makes necessary the training on tennis on court to include special efforts dedicated to the overall development of the main and the specific motor abilities of the students.
2. Normative tables are prepared for quantitative assessment of the level of development of the fundamental motor skills for male and female students. These are highly informative for operational control and management of training process.

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STUDY OF ANTICIPATION IN HANDBALL THROUGH INTERACTIVE TESTS

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Key words: video clip, interactive test, handball

I. Formulation of the problem

In handball, as a team game, the final success is a matter of team efforts, i.e. of all handball players. Without disregarding this truthful statement, we will have to emphasize that at its bottom, from a sports technical point of view, the factor of most significant importance is the winning of the "one-to-one" contest, which puts the duel between the offender and defender **in the first place** and the one between the offender and the goal keeper – **in the second place** (not in order of importance).

In sharp conflict situations, which actually are the essence of the handball game, anticipation (A) has crucial importance.

According to P.K. Anokhin (1979), anticipation is a specific form of "**PRE-EMPTIVE REFLECTION**" during which the image of the result of the action of its actual conception is formed in human mind.

When used in the context of sport psychology, the term "anticipation" is understood as the ability to predict partner's or opponent's moves.

In our point of view, **anticipation** in handball **is a preemptive creative mental and motor activity!**

Intuition, is defined by us as a sense, ability to unconsciously penetration into the essence of phenomena, insight.

Intuition and anticipation are interrelated and they interact with each other!

On the other hand, in extreme situations of competition, the operational thinking (its intellectual parameters), which helps to shorten the time for decision-making and its optimization, also holds an essential place. At this point we have to underline that ***game situations in handball run at high speed and the choice of technical and tactical maneuvers, decisions and actions are subject of strict time.***

The role of anticipation in the "duel" between offender and goalkeeper and vice versa, powerfully stands out in this specific aspect. Right at this point, the ability of the shooting handball player (of the goalkeeper respectively) to mentally and intuitively foresee (and forestall) the actions (or counteractions respectively) of the opposing subject, stands out as of the very first importance!

A given action can be performed before the appearance of the expected signal through the „movement" of thought. This is specifically clear in "discerning" (i.e. "deciphering") of game situations or in outplaying with the offender / defender / goalkeeper, when the handball player guesses of what is forthcoming!

Anticipation creates **skill –** the actions (and counteractions respectively) of the shooting player and the goalkeeper to be confidently performed within a split second, called **ex-prompto (ready on the spot)**, which can be considerably improved through many years of training ever since childhood (7-8 years of age).

In our point of view, the potential moment for solving this problem lies in unraveling the "mysteries" of anticipation in handball and outlining the route to its formation right from the earliest childhood.

II. Research methodology

Aim:

To establish (diagnose) the state (level) of anticipation in terms of handball players' age in a specific for them game environment under competitive conditions.

Tasks:

1. Selection of suitable video clips on motor activities in handball and composition of anticipation assessment tests.
2. Arrangement (systematization) of the selected video clips by series of their distribution into groups and their video editing.
3. Development of a software for interactive selection of video clips, setting a tactical question, assessment of examined person's response correctness and time.
4. Processing and analysis of obtained research results.
5. Development (elaboration) of a normative table.

The creation of a new research method on anticipation in handball was preceded by three pilot researches which provided an opportunity to specify the manner of work, the instructions, to make a number of improvements in the specially developed software.

On the grounds of all the records of handball matches at the Olympic Games 2012 and the World Championships 2009 for women and 2013 for men, 70 situations were selected for the test which were compiled into 5 subtests involving 14 tasks (situations) each of them. Using this 70-items variant of the test (i.e. of 70 situations), 149 handball players (of which 111 men and 38 women) from 8 clubs in 7 cities/towns – Sofia, Svishtov, Varna, Dobrich, Burgas, Haskovo and Bankya were examined.

The solution of the first and second tasks required a selection of the videoclips, video editing and their preparation for putting into the computer memory. The video editing computer program **Adobe Premiere Pro**, which was purchased through the project, was used for the accomplishment of the above.

Examples of the tasks from the test are presented at the picture below (fig.) 1.:

Fig. 1.1.: Contest between an offender and goalkeeper and vice versa (static) at 7m throw.

Fig. 1.2.: Contest between an offender and goalkeeper and vice versa (dynamic)

Fig. 1.3.: „Deciphering" of offenders' actions or moves by defenders.

Fig. 1.4.: „Forestalling" defenders' actions or moves by offenders

Fig.1.5.: „Discerning" of the actions of the defense and the goalkeeper by the offender

III. Development of a software for interactive selection of video clips, setting a tactical question, evaluation of examined person's response correctness and time

The solution of the third task required a development of a device for demonstration of video clips, a possibility for an easy interactive access to them and evaluation of time and correctness of the practical actions of the examined person. A standard computer was chosen to serve as such a device for its operational flexibility by inputting a specialized program and measurement of the response time, assessment of answer's correctness and output of a final result for the examined person in line with the adopted standards of statistical data processing. Apart from that, the projection of the video clip had to be able to stop at a specific moment, which is typical for choosing further actions of the team. The measurement of the response time followed from that moment on. We preferred the option of a computer program built from Pascal giving an easy interactive access to the selected clips, control of the visual presentation of the game situation from the video clip, measurement of the time for giving an answer, assessment of its correctness and recording (archiving in a standard computer format) of the results in the computer memory.

The video clips were divided into five distinct groups based according to their intended use in the practical handball activities. The individual results obtained in the process are insufficient for an overall assessment of the collective abilities of the team. Therefore, we moved on to further processing through a variation analysis of team's results. They were directed towards the measurement of the successful answers percentage for the separate five menus. Moreover, the average response time was also found. A graphical model of the team, visually showing the comparison of the results obtained from individual players, was created by means of the coefficient adopted by us.

IV. Processing and analysis of obtained research results

While conducting the research and processing the results, we proceeded from the theoretical assumption that anticipation, i.e. the very pre-emptive action (foreseeing) itself, can be divided into two interrelated parts: **motor activity** and **game environment** (space and time).

Handball players are required to:

1. To foresee the „fields" of the ball (game environment).
2. To comprehend the purposefulness of their own movements in the event of probable changes in the positioning of the opponent (motor activity).
3. To correctly assess the course of the game and to program their conduct/action (game environment).
4. To foresee the ultimate purpose or the subpurposes, the alternatives and the stages of the action (motor activity).
5. To predict, i.e. to grasp the consequences of their own actions and those of the opponents in advance (complex).

Results of the conducted research

At this stage, in view of the number of the individuals covered in this study we are going to make an analysis of the obtained common results of handball players (both men and women).

The following summary is derived from the analysis of table 1, which illustrates the mean values of the average response time in seconds for both genders:

1. The time for anticipation of an action of male and female offenders is equal to (4,8 sec.), while regarding the actions of defenders the difference is quite insignificant (5,7 sec. against 5,5 sec.) in favour of female players.
2. Anticipation of actions in the contest between a goalkeeper and a player (in 7 m. throwing) – the time is shorter for female handball players (6,45 sec. against 6,9 sec. for male handball players), which could be explained by better technical and tactical counteraction of male goalkeepers. And vice versa, in a dynamic (one to one) situation, male handball players give a correct answer within a little bit shorter time (5,98 sec. against 6,1 sec.).

Table 1. Mean values of the average response time for both genders (sec.)

№	Series – S1	Average – t	
		men	women
1.	Anticipation of actions of handball players (contest: goalkeeper-player) in static situation (7 m. throws) –„one to one" - **B static**	6,9	6,45
2.	Anticipation of actions of handball players (contest: goalkeeper-player) in a dynamic situation (in motion)– „one to one" - **B dynamic**	5,98	6,1
3.	Anticipatory actions of **defenders** (according to offenders' actions) **Defender**	5,7	5,5
4.	Anticipatory actions of **offenders** (according to defenders'actions) **Offender**	4,8	4,8
5.	Anticipation of actions of the goalkeeper and of the defense (interactions) **when shooting into the offender's goal** - **Goalkeeper**	5,7	6,6

Fig. 2 reflects the average values of the coefficient obtained after dividing the % of correct answers by the average response time, i.e. the higher numerical values mean higher results.

Our conclusions are as follows:

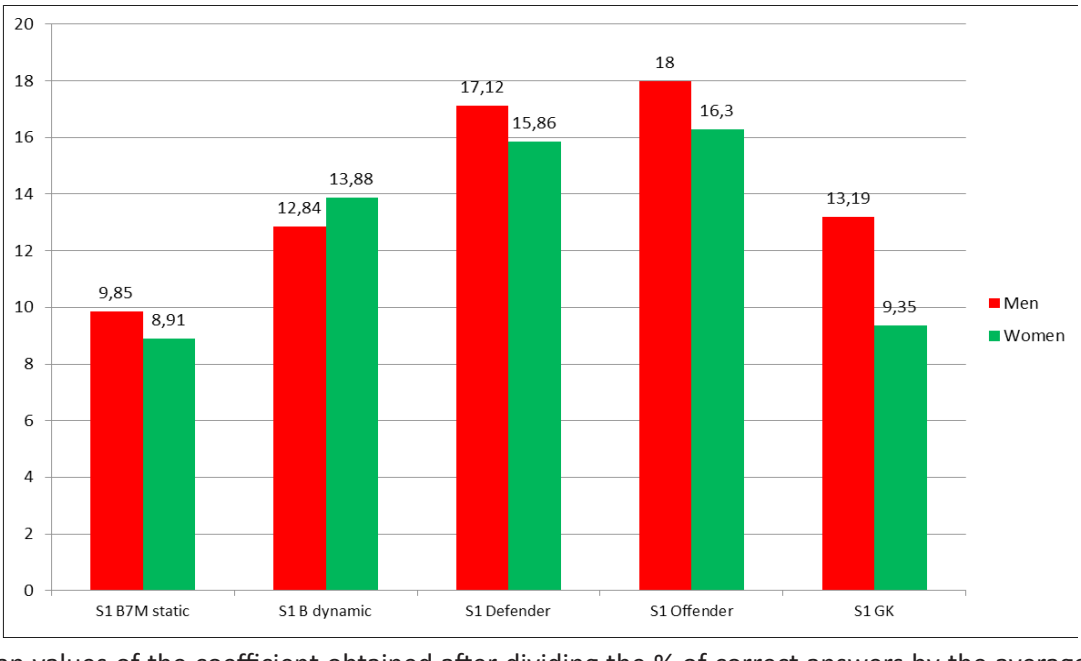

Fig. 2. Mean values of the coefficient obtained after dividing the % of correct answers by the average response time for both genders

1. The most significant differences in favour of men are obtained for the coefficient of defenders'anticipatory actions (Defender) – 17,12 against 15,86, of offenders (Offender), respectively 18 and 16,3, as well as in the anticipation of the interactions of the goalkeeper with the defense (13,19 against 9,35).
2. The coefficient of female handball players is higher in anticipatory actions in dynamic contests between the goalkeeper and a player ((one to one) - 13,88 against 12,84.
3. Significantly lower is the difference in the coefficients for anticipatory actions of the handball players in the contest goalkeeper-player (one to one) in static situations (9,85 against 8,91 for women).

The specified differences in the coefficients of the two genders give us grounds to make the following summaries:

1. The handball players (men) give correct answers to photographic game situations more successfully (for a shorter time) for the exception of the dynamic contest situations (5,98 against 6,19 for women).
2. The average values of the coefficients of male handball players are considerably higher than those of female handball players in conflict game situations which in our opinion is due to the greater experience gained in greater number of competitions, planned in the sports calendar of the BHF.
3. The comparatively lower coefficient for men and women, obtained in the contest goalkeeper-handball player (static and dynamic) is a result of the lesser and more elementary possibilities in the actions of the offender and defender in the 7 m throws.

Our confidence that the „Study of Anticipation in Handball through Interactive Tests" will be of real benefit in the future work of coaches is confirmed by the "Analysis of the results obtained in the test and the performance of individual handball players in competitive environment", presented by the coach of „Cherno more" Varna – Yordan Dzhipov.

We will take the liberty of quoting one section of it:

„**S1 B 7M Stati4en"** (fig. 3) – in static contests (offender-goalkeeper), the results are also absolutely logical. The best result is achieved by the goalkeeper Mihail Penev (coeff. 25.06), followed by Branimir Balchev (coeff.15.11) and Zhivko Dimov (coeff. 12.25) – the two backs, who are the handball players with the best results in the team and Dimitar Georgiev (right wing), who is distinguished for his very high performance in shooting. These are (in this order) also the performers of 7m throws of the team.

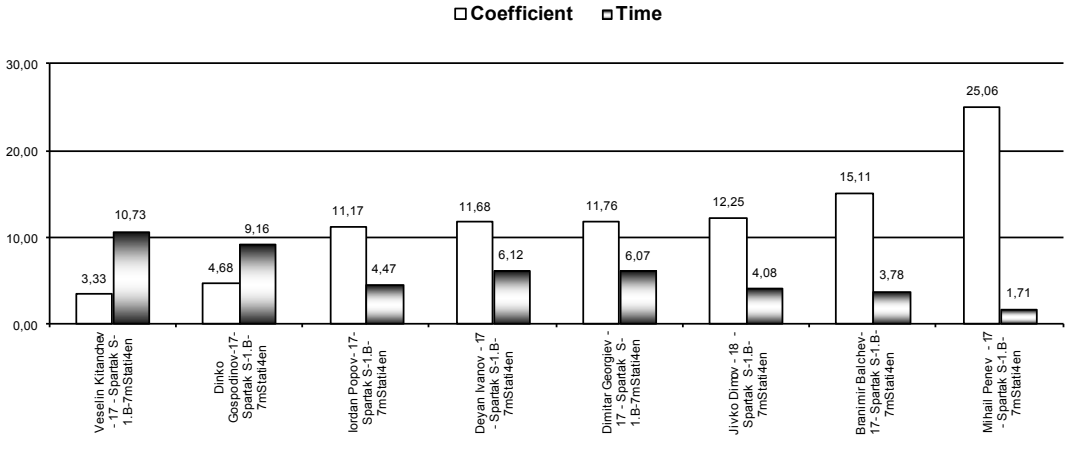

Fig. 3. Individual average values of the coefficient and the response time for the questions of group "B-7 M Stati4en"

„S1 defender" – regarding the defense, the results of the test definitely coincide with the handball players' performance in the course of matches. The best results refer to Br. Balchev (coeff.32.00), who is the most complex player and is the foremost leader of the team. The second result is for the goalkeeper M. Penev (coeff. 30.44), who is shorter in height but has an exceptional overview on the game and makes up for his height with quick and right decisions, very good placement and interrelation with the defense. In general, the test provides exclusively valuable information, both about the weaknesses (on which the team is supposed to work) and on the advantages (on which the tactical development of the game can be built). **Therefore, in my opinion, the information from this research work is valuable and its benefits spread to both aspects: 1** – where should the accent be placed in the coaching work; **2** – how should the qualities and abilities of the handball players be most efficiently used. And a number of other inferences for each of the handball players.

V. Elaboration of a normative table

Table 2 is composed of six columns containing:

The marks from 2 to 6 are in the first column.

The average value of the coefficient obtained after dividing the % of correct answers by the average response time of the examined handball players in the separate centers is located against the row which contains mark 4 in the columns B-7M Stat, B-Dinami4en, Defender, Offender, GK.

Statistical distribution is determined to be normal, since the variation coefficient fluctuates within the range from 19% to 29%, the excess is within the boundaries from -1.78 and 0.37, asymmetry is within the boundaries from -0.27 and 0.45.

Against the row containing mark 5, in the neighboring columns, you can find the calculated value obtained as a result of summing up the average value X and the mean quadratic deviation S.

Against the row containing mark 6, in the neighboring columns, you can find the calculated values of the average coefficient value and the doubled value of the mean quadratic deviation.

Table 2. Normative table for assessment of the results obtained in the examination of men

Mark	B-7M Stat	B-Dinami4en	Defender	Offender	GK
6	15,59	18,44	24,70	25,34	20,09
5	12,72	15,64	20,91	21,67	16,64
4	9,85	12,84	17,12	18,00	13,19
3	6,98	10,04	13,33	14,33	9,74
2	4,11	7,24	9,54	10,66	6,29

The calculated value obtained as a result of subtraction of the mean quadratic deviation S from the average value of coefficient X can be found against the row containing mark 3.

The calculated value obtained as a result of subtraction of the doubled value of the mean quadratic deviation S from the average value of coefficient X can be found against the row containing mark 2.

Thus, five stages have been determined to distribute the values of the coefficient obtained on dividing the % of correct answer by the average response time.

CONCLUSION

The analysis of the data obtained in the research shows that anticipation is an intellectual process, as far as its indicators are moderately positively connected with general intelligence (i.e. the speed of information processing by the psyche/mind).

We can make the conclusion that the test contains information which can be used by the coaches in their practical activities.

The psychometric characteristics of the test are subject of future research.

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CONTROL LEARNING IN SPORT AND REHABILITATION

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Key words: *goal-directed movements, control optimization*

1. INTRODUCTION

Motion performance optimisation is needed in various daily life and sport activities: standing-up, walking, running, jumping, swimming, reaching, grasping, picking-up, throwing, etc. The usual performance requirements are for movement accuracy, movement execution time, and energy expenditure [23,9]. The human musculo-skeletal system is an extremely complex dynamic system and the challenging question is how it is controlled by the central nervous system (CNS) and the human performance - optimized with respect to these complicated requirements.

Besides to able-bodied individuals, we have to pay special attention to disabled people for their efficient and effective motor rehabilitation, [22,4]. A great number of people with movement disorders due to stroke, trauma, or neurological diseases need to recover their motor control performance in some optimal way. Depending on the disability, we may have to solve various optimisation problems for the skeletal, muscular and neural subsystems.

To meet the above challenges, it is very important how to properly decompose complex modelling, identification and optimisation tasks into sets of much easier-to-find satisfactory solutions. For the purposes of efficient rehabilitation and sport performance optimization, we need advanced concepts for sensorimotor learning and appropriate system identification of the controlled human motion, [6,21,24,11]. It is of primary importance to properly identify the structure of the dynamic models and the corresponding control functions.

At first, a set of variables (controlled outputs) that best characterize human dynamic performance in the required motion task has to be defined. Second, we have to find those driving forces/torques that mostly contribute to the dynamic performance in this task. The relationship between the control inputs and the controlled outputs can be represented by a properly specified control transfer function (matrix). The main elements of that function can be determined applying the so-called multibody system (lumped parameter) approach [20,18,19] and the Newton-Lagrange formalism.

Thus for analysis of specific motion tasks and their control optimisation, we can have simplified mathematical models that sufficiently well represent the corresponding kinematics, dynamics, and control functions. Further on, in order to achieve efficient rehabilitation and performance optimization it is very important to know how to optimise the corresponding control functions. The proposed optimization approach is based on underlying principles and advanced concepts from multibody dynamics, optimal control theory, neurophysiology, and control learning. We will give two important examples to explain the basic features of our approach: arm reaching task and steps performing task.

2. NEURO-PHYSIOLOGICAL BACKGROUND

Bernstein [2] has suggested that synergies among the muscles are established by the nervous system to reduce the number of degrees of freedom that it must independently control. This fact is in accordance with the robotics principle of decentralization at the lowest (execution) level of the control system. Further, the patterns of electromyographic activity for a point-to-point movement of a limb are, in general, three-step (acceleration-pause-deceleration), Fig.1: initial burst of activity in agonist muscles, followed by a pause of agonist activity, and then, activity in antagonist muscles, [5]. Excitation signals are parametrically modified to fit the requirements of different motion tasks. In the direct-search control optimization approach, presented in Section 3, test control functions with shapes/structures similar to that of the human control functions have been proposed.

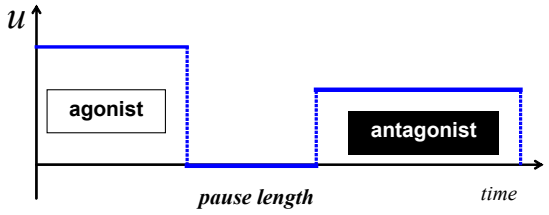

Fig. 1. Excitation signals to muscles

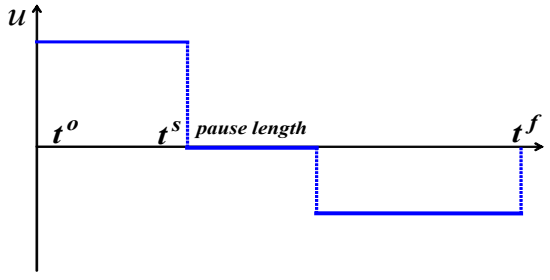

Fig. 2. Test control functions

Furthermore, the control signals for human movements are not calculated anew each time; rather, movements are controlled by stored, pertinent force-time functions, whose parameter values are generated according to the required motion task, [3]. Parameters learned by the human are the control magnitudes and switch times, [10], and they are the most important parameters in our control learning procedure presented in Section 3.

In the case of posture/motion stabilization tasks, the feedback control strategy characterizes the spring-like behaviour of the neuromuscular system in such a way that whenever the limb is disturbed, it will return to its equilibrium posture, [8]. The control system stiffness is an important quantity in studies of movement control, [14], because its magnitude determines the resistance to external perturbations. The human achieves control stability in such cases applying feedback controllers of sliding-mode type, [7].

3. METHODOLOGY

With a given motion task, each joint in the human model can be considered as actuated, free, or fixed. By proper aggregation of the human body segments, we can sufficiently well represent the human kinematics and the input-output relations for this task. At first, a set of controlled outputs that best characterize human dynamic performance in the required motion task has to be defined. Second, we have to find those control inputs (forces, torques) that mostly contribute to the dynamic performance in the required motion task. The relationship between the control inputs and the controlled outputs can be represented by a properly specified control transfer function (matrix). The main elements of that function can be determined applying the multibody system approach [20,18,19] and the Newton-Lagrange formalism. In general terms, the structure of the controlled body dynamics can be described by the following system of differential equations

(1) $$\ddot{q} = M(q)^{-1}(B \quad - C(q,\dot{q}) + g(q)$$

where, *q* is the vector of the performance variables/controlled outputs, *M* is the inertia matrix, *C* is the vector of velocity forces, *g* stands for friction and gravitation forces, matrix *B* represents the actuator location, and *u* is the vector of control inputs (forces, torques).

The control magnitudes $\bar{u}_i$ are supposed to satisfy the following natural condition for controllability:

(2) $$\operatorname{sign}\ddot{q}_i = \operatorname{sign} u_i, \quad \text{if} \quad |u_i| = \bar{u}_i \ , \ i = 1,\ldots,n$$

Mathematically speaking, such a condition is satisfied when the control transfer matrix (TM) $A = M^{-1}(q)B$ is generalized diagonal dominant (GDD):

(3) $$c_i A_i \ > \sum_{j \neq i} c_j \mid A_j \mid, \text{ for some } c_i > 0 \ , \ i = 1,\ldots,n$$

In what follows we consider two control synthesis approaches: one for goal-directed motion tasks and another for posture/motion stabilisation tasks.

3.1 Goal-directed motion tasks

In such tasks, the some joint angles and their velocities have to attain required final values after some finite time. It is very interesting what could be the structure of the corresponding control functions in order to achieve optimal trade-off and performance with respect to movement accuracy, movement execution time, and energy expenditure. We have found [12], that efficient optimization of the dynamic performance can be achieved by test control functions with three-step, bang-pause-bang, shape, Fig. 2.

It has been found, both theoretically and in numerous computer simulations, that the positioning accuracy, movement execution time and the energy expenditure are mostly sensitive to the parameters describing such control functions: control magnitudes, switch times and pause lengths. Moreover, in the next section there will be given a reference to several studies that this control concept is consistent with the neuro-physiology.

Our approach for direct-search performance optimization has the following main steps:

1. Define a set of three-step test control functions;
2. Select most appropriate pairs of control parameters and controlled outputs;
3. Control synthesis of accurate goal-directed movements and performing time/energy optimisation.

In step 1), the control magnitudes $\overline{u}_i$ are supposed to satisfy the GDD-condition for controllability, Eq. (2). In step 2), for each controlled output we assign a control parameter, which mostly influences this output. We determine three groups of control parameters: first (the switch times) for solving the required two-point boundary value-problem, second (the control magnitudes) that takes care for the movement time minimization, and third (the pause lengths) – for the energy minimization. These groups of control parameters make it possible to decompose the complex performance optimization task in much simpler ones and, correspondingly, they participate in the three-level optimization procedure, Step 3). Bisection algorithms are used for solving the control synthesis equations and the time/energy optimisation problems. These rather natural algorithms do not require accurate (even any!) mathematical modelling and can be considered as algorithms for self-learning control synthesis. And what is more, the control learning procedures converge within minimum number of trials.

3.2 Posture/motion stabilisation tasks

Unlike in the previous motion tasks where open loop control is presented, here we have to consider closed-loop, feedback control. The following reduced model for the error dynamics can be used for the purpose of the feedback, stabilizing control design

(4) $$\ddot{e} = A(q)u + d$$

where $e = q - q^{ref}$ and $A = M(q)^{-1}B$ is the control TM; vector *d* stands for uncompensated terms, as well as for measurement and environment noises.

As a measure of tracking precision, we take the absolute value of $s = \dot{e} + \lambda e$, $\lambda > 0$. We consider decentralized controllers, which means that, during motion, the stabilizing control force u_i of each actuator depends solely on the corresponding controlled output s_i.

A decentralized controller is robust against random disturbances *d* with known upper bounds $\overline{d}$ if it gets the local subsystem state $(\dot{q}, q)$ at each joint to track the desired state $(\dot{q}^{ref}, q^{ref})$ with maximum allowable absolute values $\overline{s}$ of errors *s*. A necessary and sufficient condition for the dynamic system (1) to be robustly controlled by a decentralized controller is that matrix *A* be generalized diagonally dominant (GDD), [13]. It can be easily verified that any mechanical system with two degrees of freedom has control TM which is GDD.

With *A* being GDD, the non-negative matrix theory [17] states that there always exists a positive vector $\bar{u}$ of control magnitudes that solve the following system of equations

(5) $$A_{ii}\bar{u}_i - \sum_{j\neq i} |A_{ij}|\,\bar{u}_j = \bar{d}_i$$

where $\bar{d}_i$ are some upper bounds for the disturbances.

For the feedback stabilization, we can use sliding-mode controllers or other bounded-input controllers, and the magnitudes of the control functions are estimated from the optimal trade-off relations (5). To avoid chattering, the following continuous control functions of saturation type can be used

(6) $$u_i(s_i) = \bar{u}_i\ \mathrm{sat}(s_i/\delta_i),\ i=1,\ldots,n$$

where: $\mathrm{sat}(y)=y$ if $|y|<1$; $\mathrm{sat}(y)=\mathrm{sgn}(y)$ if $|y|\geq 1$

Eqs. (5) present optimal trade-off relations between the bounds of model uncertainties and the control force limits. The greater the determinant *D* of this system of linear equations, the less control forces are required to overcome the disturbances. In other words, *D* quantifies the capability of mechanical systems to be robustly controlled in a decentralized manner.

4. CASE STUDIES AND RESULTS

4.1 Arm/leg model with two degrees of freedom

Consider a two-joint manipulator model [15, 16], which is driven by the corresponding control torques at the joints. As said above, such a mechanical system can have independent joint control.

In a reaching task, the controlled outputs are the reached final values for the joint angles. These values are mostly influenced by the switch times of the corresponding control torques. We have performed dynamics-based computer simulations with various targets, [15]. The convergence to them is very fast, Fig. 3.

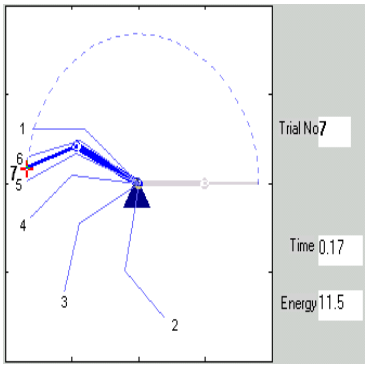

Fig. 3. Fast convergence to the target

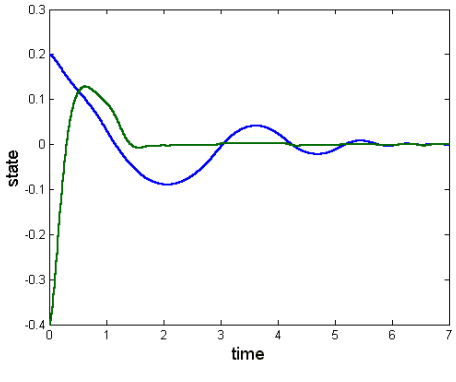

Fig. 4. Link position errors

Now we consider a two-link manipulator model with elasticity at the joints to represent a human limb. A full dynamic model and its numerical data for the problem of its robust feedback stabilization are given in [11]. A computer simulation is done in the worst case of stretched-out manipulator configuration. It was found that, even with substantial external disturbances, the link position errors converge to zero, as shown in Fig.4.

4.2 2D and 3D human models in steps performing

In the process of performing a step, we distinguish four phases: double-support (DS), taking-off (TO), single-support (SS) and landing (L):

DS-phase: Both legs are on the ground and the state reached at end of the previous phase (the landing phase) is adjusted to the state needed as the initial condition for the next phase (the taking-off phase).

TO-phase: During this phase the leg to be transferred is only pushing-off the ground and hence takes a relatively short time. The biped dynamics for this action can be characterized by the dynamics of the "trunk-supporting leg" system which has two degrees of freedom: one at the ankle of the supporting leg and one at the hip. Two actuators are used to control this double-inverted pendulum system - one at the hip of the supporting leg and the other is the transferring leg itself which exerts a torque on the supporting leg due to the interaction between the actuator at the ankle of the transferred leg and the ground. The TO-phase ends at the moment when the new transferring leg leaves the ground surface.

SS-phase: This phase is when the biped is pivoting around the ankle joint of the supporting leg. The other leg is rotated with respect to the supporting one until it reaches the configuration required before landing at the specified foothold. At this stage, the robot motion is controlled via three torques - two in the trailing leg (hip and knee), and one at the hip of the supporting leg.

L-phase: Here the leg, which has been swinging, touches the ground and produces a force (by the same actuators as in TO-phase) thus opposing the biped's motion to reduce its velocity to an appropriate value.

The most complicated control problem is posed during the SS-phase when almost all the joints are to be actuated and the joint motions are in general strongly interacting. We decompose SS-motion into two unconstrained, goal-directed movements as shown in Fig. 5.

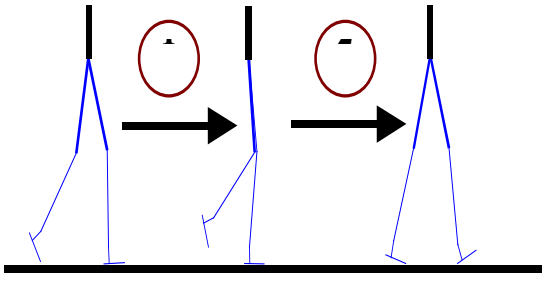

Fig. 5. Decomposition of SS-motion

In the computer simulation (Fig. 6), simplified dynamic models were used for all the locomotion phases. With the objective to optimize the locomotion speed, bang-bang test control functions were employed. Applying our control learning approach, the required goal-directed movements were synthesized with an acceptable accuracy after 10-20 test movements.

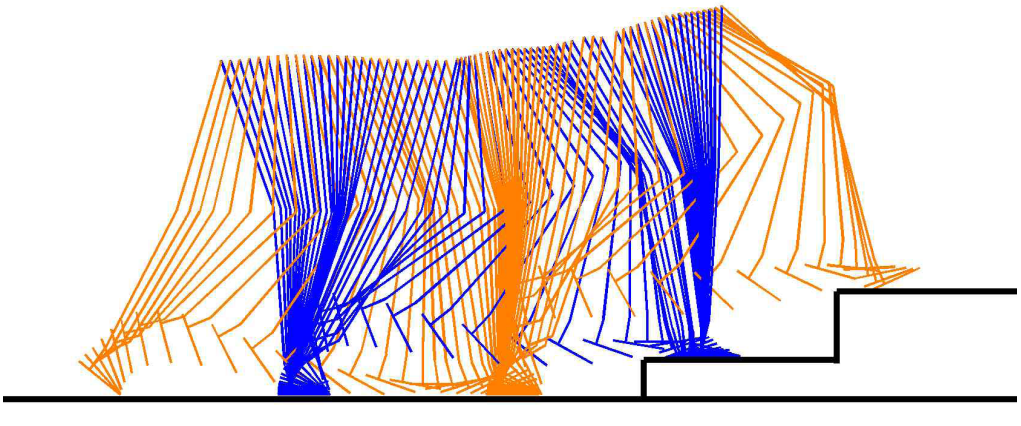

Fig. 6. Performing steps

For our study on 3D human locomotion we consider the simplified human model in Fig. 7. There we can see the main driving forces for the HAT (head-arms-trunk) system during pushing-off the left leg. With this simple scheme it is not difficult to find answer to the challenging questions in 3D humanoid locomotion: What are the parameters that control the length and height of steps, the speed and direction of locomotion and how humanoids or disabled people to (re-)learn them?

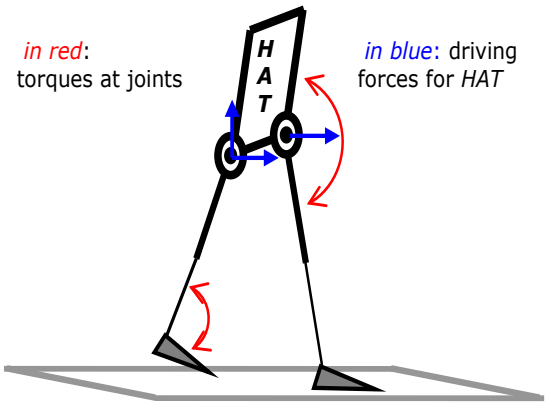

Fig. 7. On steps performing in 3D

Considering Figs. 5 and 7, we can see that human body motion at each phase can be simply represented as motion of a few coupled normal and inverted pendulums. These simple controllable mechanical systems are with one or two degrees of freedom and they are controlled either in open loop or closed-loop mode.

Figs. 5 and 7 can help to explain why it is better to apply more effort at the ankles than at the hip joints in cases when there are some neuromuscular lesions (pains) in the spine/pelvis. That conception has been experimentally proven in [15] considering various clinical experiences.

5. DISCUSSION

Recent studies at leading R&D centers of neurological rehabilitation say that three important principles must be observed, [1, 16]: *assistance-as-needed, embodied motor control and learning, and motivate patients for self motor learning.* Our control concepts and methodology for control design and optimal control learning is in unison with these principles! We have proposed a generic conceptual framework for structure identification, analysis and design of control functions to achieve the best possible human motion. It is based on underlying principles and advanced concepts from optimal control theory, neurophysiology, and controlled multi-segmental dynamics.

To summarize, we think that we have the necessary scientific basis to develop efficient rehabilitation for various movement disorders and various motion tasks in activities of daily living. The proposed concepts and algorithms could be very useful in designing also adequate control strategies for efficient motion analysis and sport performance optimization.

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THE BASKETBALL GAME AND THE PHYSICAL EXPERIMENT

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INTRODUCTION

The connection between the laws of kinematics and basketball game is very important. In basketball the art of an overhand throw in basketball is called a "shot"; however, there are many types of shots: hook shot, jump shot etc. The two handed push shot gives the ball two different motions: the motion of the center of mass that the ball exhibits and the rotation of the ball about its center of mass [1]. In this experiment, we are investigated the classical basketball shot in the basket from a physical point of view.

METHODOLOGY

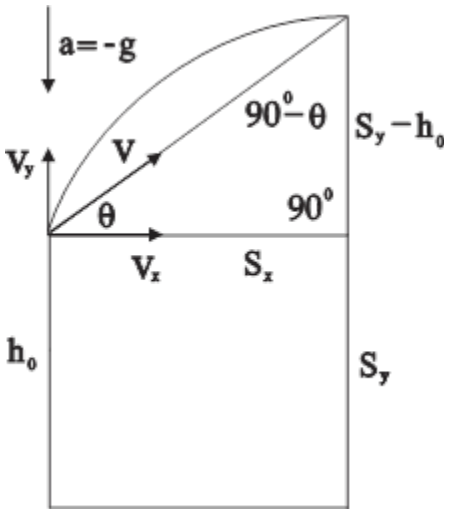

Figure1. The scheme of the physical experiment

We choose 9 basketball players with different height from 1,8 to 2,2 m for the experiment. This is the initial condition of our experiment. In dependence of the height of basketball player changes the place from which he will shoot the ball, the angle of the shooting, the speed and time of flight. The air resistance is ignored during the experiment [1].

RESULTS

Table 1. The results of physical experiment are systemized in the next four tables.

№ of the experiment	the angle shooting q [deg]	the time of the flight t [s]	the height of the basketball player h_0 [m]	the distance of the flight S_x [m]	the angle at which the ball enters in the basket 90^0 - q [deg]	the velocity of the flight v_0 [m/s]
1.	51	0,8386	2,2	3,6	39	6,822
2.	51,5	0,8438	2,15	3,61	38,5	6,873
3.	52	0,8491	2,1	3,62	38	6,9242
4.	52,5	0,8548	2,05	3,63	37,5	6,9751
5.	53	0,8607	2	3,64	37	7,0271
6.	53,5	0,867	1,95	3,65	36,5	7,078
7.	54	0,8733	1,9	3,66	36	7,1297
8.	54,5	0,8801	1,85	3,67	35,5	7,1813
9.	55	0,8871	1,8	3,68	35	7,2324

Table 2. The angle shooting q = 53^0, the height of the basketball player h_0 = 2m and the angle at which the ball enters in the basket 90^0 - q = 37^0

№ of the experiment	the time of the flight t [s]	the distance of the flight S_x [m]	the velocity of the flight v_0 [m/s]
1.	0,8544	3,6	7,0012
2.	0,856	3,61	7,0076
3.	0,8576	3,62	7,0141
4.	0,8592	3,63	7,0206
5.	0,8607	3,64	7,0271
6.	0,8623	3,65	7,0335
7.	0,8639	3,66	7,04
8.	0,8655	3,67	7,0464
9.	0,867	3,68	7,0529

Table 3. The distance of the flight S_x = 3,64m and the height of the basketball player h_0 = 2m

№ of the experiment	the angle shooting q [deg]	the time of the flight t [s]	the angle at which the ball enters in the basket 90^0 - q [deg]	the velocity of the flight v_0 [m/s]
1.	51	0,82	39	7,0538
2.	51,5	0,8301	38,5	7,0444
3.	52	0,8402	38	7,0368
4.	52,5	0,8504	37,5	7,0307
5.	53	0,8607	37	7,0271
6.	53,5	0,8713	36,5	7,0239
7.	54	0,8818	36	7,023
8.	54,5	0,8925	35,5	7,0234
9.	55	0,9037	35	7,0222

DISCUSSION

In order to analyze the projectile motion of the ball, it is first important to break down the parabolic motion into two basic components, the horizontal motion and the vertical motion. If the ball experiences no force in the horizontal (or x direction), then the acceleration is zero in that direction and the ball moves with a constant velocity. The horizontal velocity of the ball is the x component of the initial velocity u_x (equation 1).

The only component of velocity that varies in a parabolic motion is the vertical velocity because it experiences an acceleration due to gravity. When the acceleration in the x direction is zero, $S_x = v_x t$ (Fig. 1) where $v_x = v_0 \cos\theta$ (Fig. 1) (1) where, s_x is the range (or horizontal distance) at time t, v is the ball's velocity, θ is the angle of projection, v_0 is the initial velocity and t is the time elapsed from when the object was released.

For the vertical distance, the acceleration is assumed to be that of gravity: $S_y = h_0 + v_y t - (gt^2)/2$ (Fig. 1), $v_y = v_0 \sin q$. (2)

It is possible to write an equation in terms of S_y and S_x, using $S_x/v_x = t$, from equation 1 into equation 2.

$S_y - h_0 = S_x \tan q - (gS_x^2)/(2v_0^2 \cos^2 q)$ (3)

Table 4. The angle shooting $q = 53^0$, the distance of the flight $S_x = 3{,}64$m and the angle at which the ball enters in the basket $90^0 - q = 37^0$

№ of the experiment	the time of the flight t [s]	the height of the basketball player h_0 [m]	the velocity of the flight v_0 [m/s]
1.	0,8841	2,2	6,8412
2.	0,8783	2,15	6,8863
3.	0,8725	2,1	6,9323
4.	0,8666	2,05	6,9792
5.	0,8607	2	7,0271
6.	0,8548	1,95	7,076
7.	0,8488	1,9	7,1259
8.	0,8428	1,85	7,1769
9.	0,8367	1,8	7,229

These three equations (1, 2 and 3) basically dictate the parabolic motion of a particle through a drag free medium and with only gravity acting on it. In our experiment, $S_y = 3{,}2$m, S_x varies from 3,6m to 3,68m and q changes from 51^0 to 55^0 (Tables 1, 2, 3 and 4).

CONCLUSIONS

The first physical experiment shows that when the angle shooting and the distance of the flight increase with the decreasing of the basketball player height, then the time and the velocity of the flight increase.

The second physical experiment shows that when the angle shooting and the height of the basketball player are constants, then the distance, the time and the velocity of the flight increase.

The third physical experiment shows that when the distance of the flight and the height of the basketball player are constants, then the angle shooting, the time of the flight increase and the velocity of the flight decreases.

The fourth physical experiment shows that when the angle shooting and the distance of the flight are constants, then the time of the flight, the height of the basketball player decrease and the velocity of the flight increases.

ACKNOWLEDGMENTS

This paper is supported by the Project BG051PO00l-3.3.06-0003 “Building and steady development of PhD students, post-PhD and young scientists in the areas of the natural, technical and mathematical sciences”. The Project is realized by the financial support of the Operative Program “Development of the human resources” of the European social fund of the European Union.

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KINEMATIC ANALYSIS OF THE "SHIKO" EXERCISE IN SUMO

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INTRODUCTION

In the late 80's of the last century sumo develops a status of international amateur type of sport. In 1992 the international sumo federation is established. There are more than 87 national federations registered worldwide, and World, European and Asian tournaments are held on regular basis. There are both men's and women's competitions.

Today there are many academic works, dedicated to the theory and practice of competitive wrestling (freestyle and classic wrestling, judo, sambo, karate, taekwon-do and others) from Bulgarian as well as foreign authors (1,2,3,4,5,6,7,8). An exception of this to a certain degree is the sumo wrestling. This type of sport remains less researched from scientific point of view, despite its century's long history and international recognition.

GOAL

As this exercise has more representative than competitive functions, the main goal consisted of evaluating the area structure of the movement, the way it's performed, the static and dynamic stability of the posture, ease and rhythm of the movements, description of the main elements during the exercise performance.

METHODS

An experienced person, specialized in sumo, weighing 170kg and 185cm tall, took part in the experiment.

A standard video camcorder with a rate of 25 frames per second was used to register the movements, which defines a time interval of 0.04s between the frames. In this case the use of such camcorder produces completely satisfactory results, given the natural rhythm of the studied subject's movements. The optical axle of the camcorder was perpendicular to the area where the movements took place. The recorded video material was digitized and edited to complete cycle of movements. The final video files were put through video computer analysis system (1), which allows registering of the vertical and horizontal coordinates in the area of chosen points of the body of the subject, during the execution of the planned movements. For each cycle an Excel file is received, allowing for flexible interpretation and graphical presentation of the results.

The subject performed three exercises and one was chosen for analysis by the experts.

Area coordinates of 19 body points of the subject were registered: toes, heel, ankle, knee and hip joints – at the leg; finger tips, wrist, elbow and shoulder joints – at the arm; PCOM of the head. The trajectory of the CCOM (common center of mass) of the body during the exercise and its location in highest rising leg posture, were defined subsequently. The speeds and velocities of the registered points, as well as the time intervals of the phases of movements upward, downward and holding the mediate posture were also calculated.

RESULTS AND ANALYSIS

Quality characteristics, which by the experts' opinion are the most important elements during the execution of the exercise are illustrated on fig.1 :

A – the back is straight;

B – the rising leg is moving upward without getting close to the supporting leg;

C – the raised leg is straight and strained;

D – the support leg is straight and strained;

E – the foot of the raised leg is bent at the ankle joint and it's toes point towards the body

F – the eyes point towards the big toe of the supporting leg.

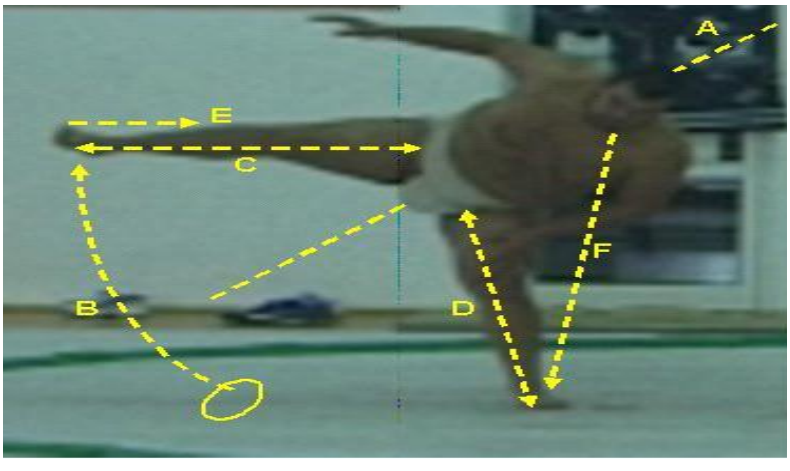

Fig. 1. Basic quality characteristics of the "shiko" exercise

The movements of this exercise can be described as consecutively lifting of one of the feet, as high and to the side as possible, and the competitor must fulfill the requirements of the main elements during the execution of the exercise.

For the purposes of the analysis the exercise is divided into five phases (fig.2):

Fig.2. Common frames of the phase structure of the exercise

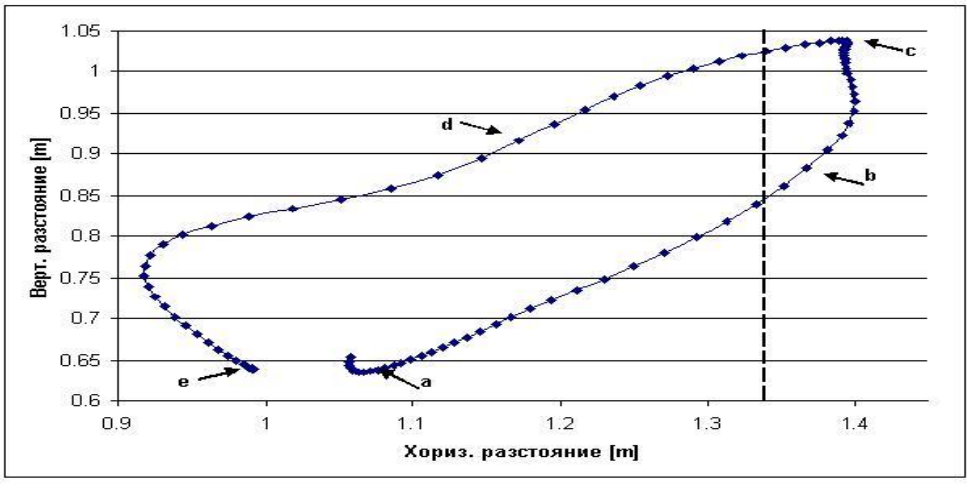

Fig.3. Trajectory of CCOM of the subject

first phase of upward movement – from basic posture to lifting the rising leg from the support (a-b);

second phase of upward movement – from lifting the rising leg from the support to reaching the maximum height of its foot (b-c);

hold – the interval of time, during which the foot of the rising leg is at the maximum height (c);

first phase of downward movement – from the end of phase 3 to touching the support with the rising leg (c-d);

second phase of downward movement – from the contact of the rising leg with the support to getting into basic posture (d-e).

Fig. 3 illustrates the location of CCOM of the subject during the execution of the exercise, which frames are shown on fig.2.

Each frame corresponds to moments in time, characterizing the borders of separate phases of movement. To ensure more clear connection these frames are labeled with their corresponding names onto the CCOM trajectory. On fig. 3 using vertical dotted line, the border defying whether the CCOM is located inside the support area during the support-less phases of the movement is also marked. This way the CCOM is located inside the borders of the area of the supporting foot, to the right of the dotted line.

During the first phase of the movement, which begins at point **a** on the graphic, spreading out of the legs starts in such manner that the CCOM should be moving upward and towards the support leg. The goal is at the end of the phase to have the support leg spread out to its limit and if possible the CCOM should be located above the support zone of the other leg. The realization of this goal would provide security and great stability to the movements of the next phases. In this case this goal is fulfilled, as in the end of the phase; point b from the trajectory of the graphics of CCOM is located to the right of the dotted line.

The second phase of the movement begins from lifting the rising leg from the support (point b) to raising it to its maximum height. The main element here is that the rising leg must be lifted upward without getting close to the supporting leg. To ensure consequently redirecting of the rising leg towards the hip joint, the main muscle groups controlling the movement work mainly in “overcome” regime, doing positive (concentrated) work. The pressure on these muscles constantly increases with the upward movement, as the rotation moment created by the rising leg also increases. The equilibrium stability can be provided by increased pressure on the muscle groups as well as balanced transfer of the CCOM inside the borders of the support area in opposite direction, as to create counteracting rotation moment. This movement however should be limited and not to create any horizontal shakings. The results for the trajectory of CCOM on fig. 3 show that the subject moves lightly and only inside 6cm borders horizontally his CCOM during this phase (from point b to point c), which shows great degree of physical condition as well as an excellent mastery of the exercise.

The third phase of the exercise consists of holding the foot of the stretched out rising leg at the height that was achieved at end of last phase. The quality of the phase of hold is defined by the execution of the main elements of body’s posture, in accordance to fig.1. The executed posture of the experienced subject is shown on fig. 2 (c). Fig. 4 shows system of coordinates (stick figure) of the same posture, and the location of CCOM is defined as well.

What we see from mechanical point of view, is that the subject has fulfilled successfully the requirements for the posture, and also ensure the best parameters for its equilibrium stability. Mainly this is due to the fact that the projection of the CCOM onto the X axle passes through the coordinates of the ankle joint of the supporting leg (with 2mm difference, which is inside the area for allowed error of the registering system). This way the upset rotation moments reach their maximum equilibrium stage and the dynamic stability of the posture is considerable.

During the fourth phase the rising leg moves downward and continues until contact of the toes with the support area is made. The muscle groups responsible for the movement work in a retreating regime, performing negative (off-centre) work. This is due to the counteraction of gravity, ensuring light movement downward with considerably less velocity than the earth’s gravity pull. As a result of the

complicated moving task the trajectory of movement of CCOM in downward direction, does not match the one during the upward movement (from point c to point d), as shown on fig. 3. For a time interval of about 0.3 sec the projection of the CCOM leaves the support area, which leads to additional strain on the muscle groups. As a result at the end of this phase (point d), the location of CCOM has moved horizontally about 20cm.

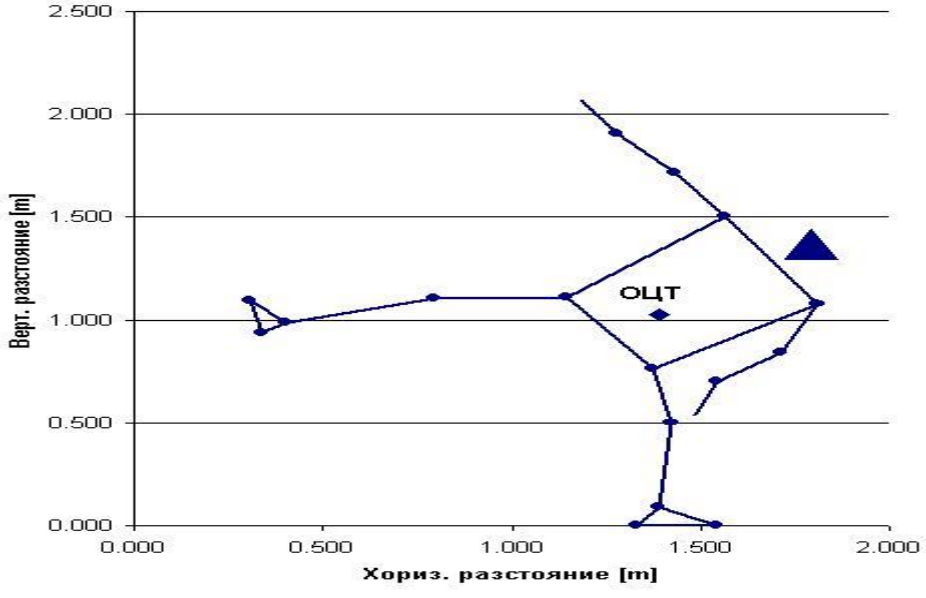

Fig.4. Stick-figure of the subject for the third phase of the exercise

Going back to main/basic posture takes place during the final fifth phase. The character of the trajectory of CCOM is considerably different than the one during the first phase and posses' a noticeable deviation in horizontal direction than the previous phase.

For the rhythmic structure of the exercise, defined by the duration of the different phases, the following results were received: Phase 1 – 1.04 $\pm$ 0.18 s; Phase 2 – 0.68 $\pm$ 0.10 s; Phase 3 – 0.12 $\pm$ 0.04 s; Phase 4 – 0.80 $\pm$ 0.12 s; Phase 5 – 1.08 $\pm$ 0.18 s. Despite the relatively small time intervals, we can still note the difference between times in upward and downward movement, as the longer time in phase 4 corresponds with considerably longer trajectory of the CCOM in this phase.

Another characteristic which also defines the quality of the performance of the exercise is the ease of movement. The lack of sudden changes in the trajectory of the CCOM can be viewed as an integral index of this characteristic, and can be evaluated considerably more precisely by its first derivative (the speed of movement of the CCOM) which graphics are shown on fig.5.

The change in direction and the characteristics of the movement can be defined much more precisely from the data for the speed, horizontal and vertical direction, as well as the general speed. In this relation we can note that during the upward movement the speeds in both directions have similar maximum value of 0.55 m/s and relative shape, which means equally applied force and good space control. During the movement downward however we can see noticeable difference in the graphics' characteristics and a higher maximum value, mainly in horizontal direction. Obviously the control in retreat regime of work makes the execution difficult and leads to additional compensating efforts to stabilize the velocity in downward direction.

As mentioned above this exercise has more representative functions. In this connection during its execution the synchronization of the rising leg and arm, as well as the distance passed by their farthest parts, leave good impression. On fig. 6 are shown the trajectories of the movement of the rising foot and arm. Similarly to the trajectory of the CCOM of the whole body, here we can also note the different trajectories during upward and downward movement. The difference is more considerable at the arm, due to its connection with the upper body, where the amplitude of movement is greater.

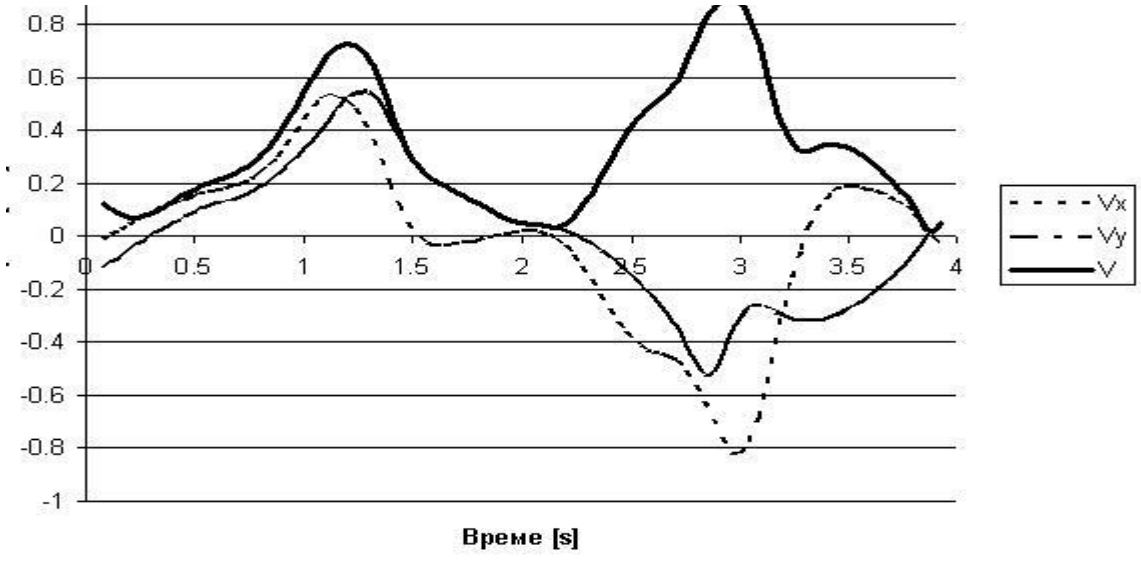

Fig. 5. Linear speeds of CCOM of the subject X.X.

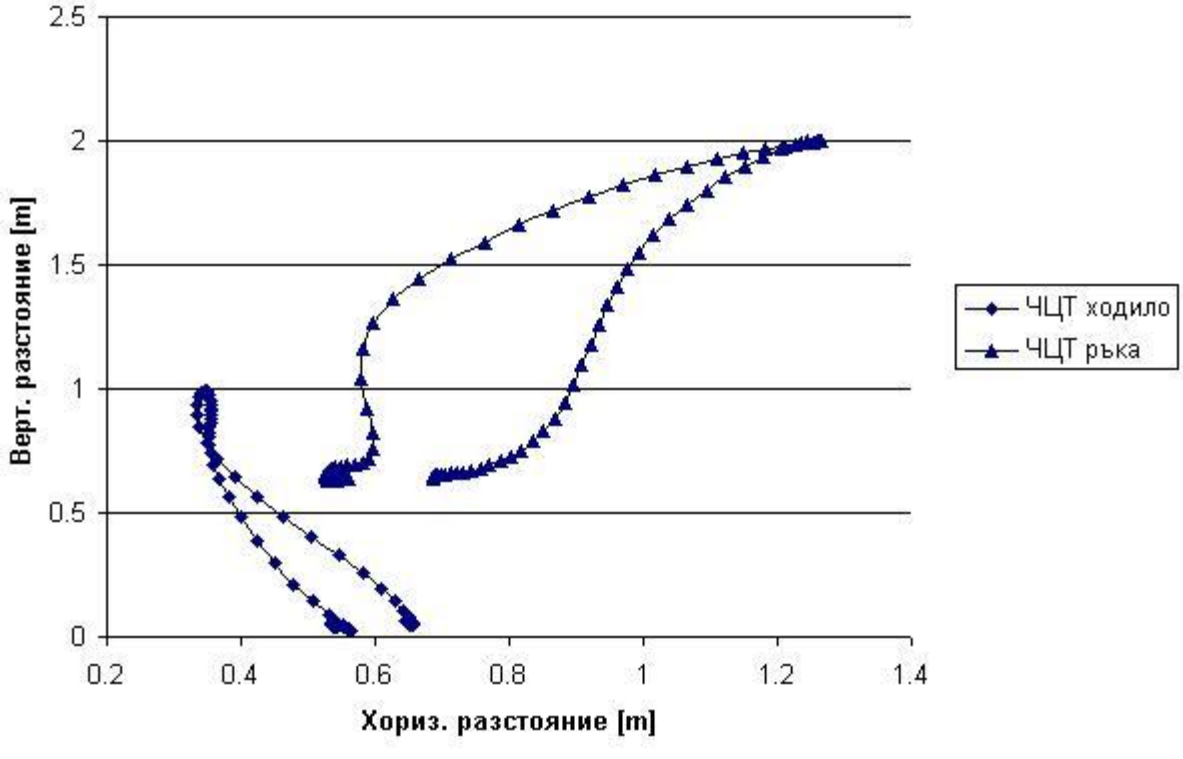

Fig. 6. Trajectories of PCOM of the subject's foot and arm

The synchronization between the movement of the foot and arm in vertical direction can be analyzed by the development of their corresponding linear speeds in the same direction shown on fig. 7. As a segment with less mass, the arm is faster in the beginning of the upward movement, but in the second delayed part they are synchronous to the highest point, where their speed is once again zero in the holding phase. Here the immobility of the foot is shorter and it starts its downward movement earlier, but at the final phase they are synchronous again. The results are a good testimonial for the performer's physical and space control of the exercise abilities.

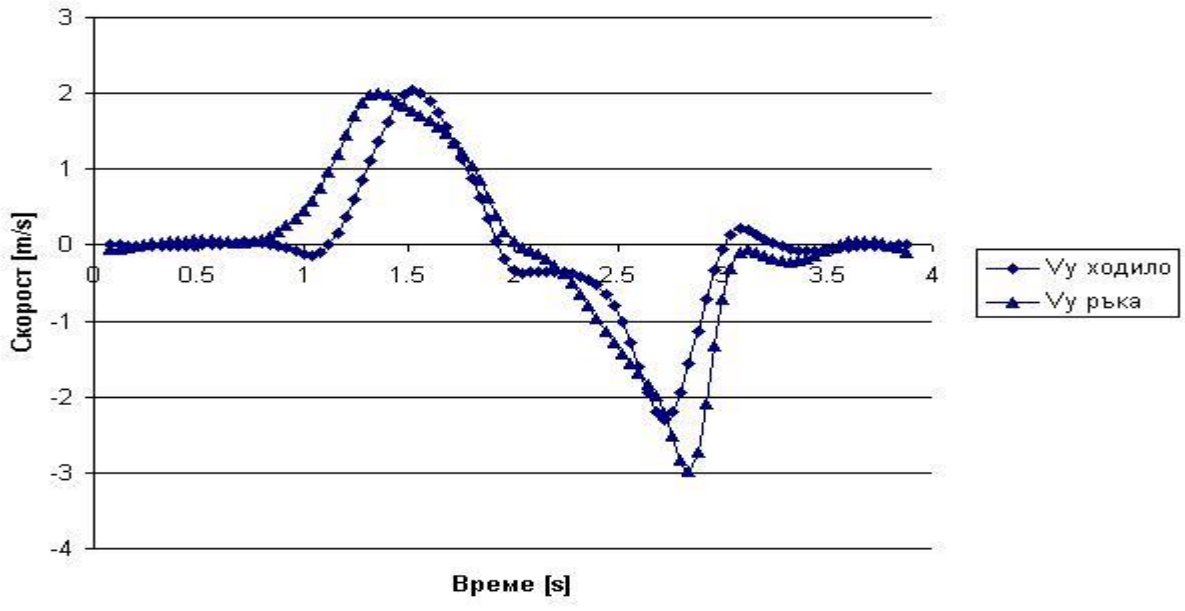

Fig. 7. Linear speed in vertical direction of PCOM of the subject's foot and arm

CONCLUSIONS

1. As a result of the complicated moving task, the trajectory of the CCOM in downward direction does not match the one in upward direction. This is due to the counteraction of gravity in order to ensure the downward movement is performed with ease and considerably less velocity than the earth's gravity pull.
2. In the holding phase the upset rotation moments are in maximum equilibrium with the CCOM, and the dynamic balanced stability is considerable. Obviously the control in retreat regime of work makes the execution difficult and leads to additional compensating efforts to stabilize the velocity in downward direction.
3. As a segment with less mass, the arm is faster in the beginning of the upward movement, but in the second delayed part they are synchronous.

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RESULTS OF MEASUREMENT OF STATIC STRENGTH CAPABILTIES IN COMMANDOS

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Keywords: force, measurement, isometric mode, commandos.

Introduction

Muscle strength as the primary motor quality of man is manifested in static, gradual and retreating movements. It is generally accepted that in a static mode, the strength is called isometric and is characterized only by the tension in the physiological rung without any movement in space. [5]

Its measurement is indirect, as for this purpose specialized torque devices are used [2]. There is plenty of data published, to which we can add the received data from our research, targeted at officers of the squad to combat terrorism (Specialized Anti-Terrorism Squad – SATS).

Aim of the study

The aim of the study is to establish the strength capabilities of some major muscle groups of the body of commandos, which are significant for the realization of their professional duties.

Tasks of the study:

1 Study of static strength capabilities of two-headed arm muscle and quadriceps thigh muscle of employees from SATS by computerized methods for measuring static-strength options - DINO 1.

2 Reading and systematization of data on primary strength indicators - maximum force, average force, gradient force and strength impulse from individual measurements of static-strength capabilities for each commando.

3 Preparation of statutory assessment tables.

Object of the study is the quality "strength" in its form – isometric force – specific for particular range of people - employees of SATS.

Subject of research are the partial strength capabilities of individual muscle groups - two-headed arm muscle, three-headed arm muscle, quadriceps thigh muscle, two-headed thigh muscle, back muscles, abdominal muscles in their diversity of expression as maximum, medium, gradient, strength impulse.

Subject of study are a total of 36 persons, employees of SATS.

METHODOLOGY

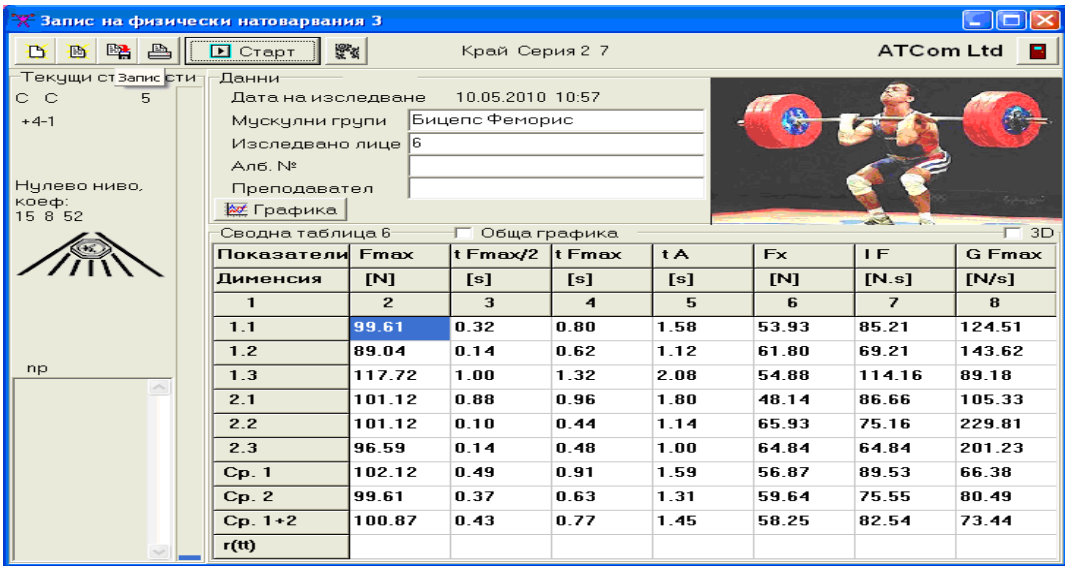
1. Literature and internet research;
2. Experimental study using computerized methods - DINO 1 for direct measurement of muscle strength, which includes the following departments: * programmable display unit "Dino - 1" * calibrations load cells - range 1-3000 N, set with output cable with connector * charger * accessories.

In the rows the successive measurements can be seen; the symbols above the columns are:

- Fmax - the maximum force (N);
- t 1/2 Fmax - time to reach half of the maximum force (s);
- tFmax - time to reach maximum force (s);
- tA – time of the entire cycle of duration of the applied force (s);
- Fx - average force (N);
- IF - strength impulse (Ns);
- KF- force index (-);

3 Theoretical analysis and synthesis.

4 Mathematic and statistical methods



Показатели	Fmax	t Fmax/2	t Fmax	t A	Fx	I F	G Fmax
Дименсия	[N]	[s]	[s]	[s]	[N]	[N.s]	[N/s]
1	2	3	4	5	6	7	8
1.1	99.61	0.32	0.80	1.58	53.93	85.21	124.51
1.2	89.04	0.14	0.62	1.12	61.80	69.21	143.62
1.3	117.72	1.00	1.32	2.08	54.88	114.16	89.18
2.1	101.12	0.88	0.96	1.80	48.14	86.66	105.33
2.2	101.12	0.10	0.44	1.14	65.93	75.16	229.81
2.3	96.59	0.14	0.48	1.00	64.84	64.84	201.23
Ср. 1	102.12	0.49	0.91	1.59	56.87	89.53	66.38
Ср. 2	99.61	0.37	0.63	1.31	59.64	75.55	80.49
Ср. 1+2	100.87	0.43	0.77	1.45	58.25	82.54	73.44
r(tt)							

Fig. 1. Original data from strength measurement with „Dino -1"

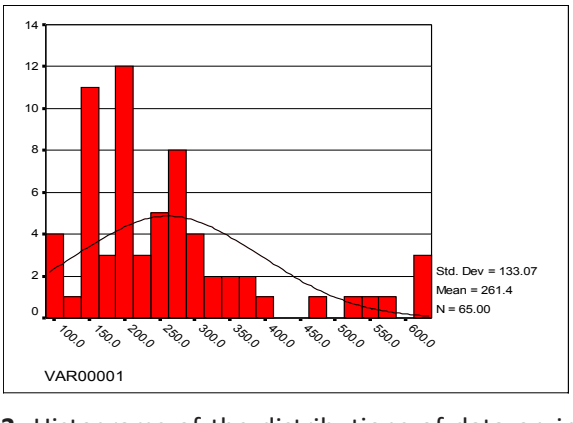
RESULTS

Results from our testing of strength capabilities of the two-headed arm muscle and quadriceps thigh muscle are summarized in Tables № 1 to № 4 and are presented in Fig. № 1 to № 10.The full amount of data is published in info. source № [6].

A) Results for the strength capabilities of the two-headed arm muscle;

Table 1 . Strength capabilities of the two-headed arm muscle of commandos - n = 66 (study of 22 Commandos)

		min	max	R	X	m-$_x$	S	As	Ex
№	Indicators								
1.	F- max (N)	251	497	246	378,7	8,09	65,71	-0,250	-1,184
2.	t/F$_{1/2}$ max (сек.)	0.02	1.75	1.73	0.73	0.05	0.39	0,242	-0,301
3.	t/F max (сек.)	0.02	2.45	2.43	1.16	0.08	0.65	-0.298	-0,745
4.	t A (сек.)	0.21	6.31	6.10	2.21	0.15	1.19	0,362	1,376
5.	F$_x$ (N)	122,25	318,4	196,14	183,12	5,30	43,07	1,253	1,368
6.	IF (N/сек.)	197,55	651,4	453,8	398,77	15,25	123,91	0,119	-0,989
7.	K F(-)	46,89	358,2	311,3	171,61	7,23	58,74	0,918	2,143



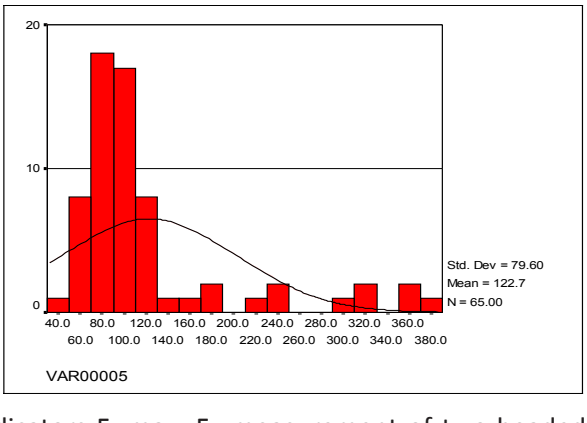


Fig. 2; 3. Histograms of the distributions of data on indicators F- max; Fx measurement of two-headed arm muscle.

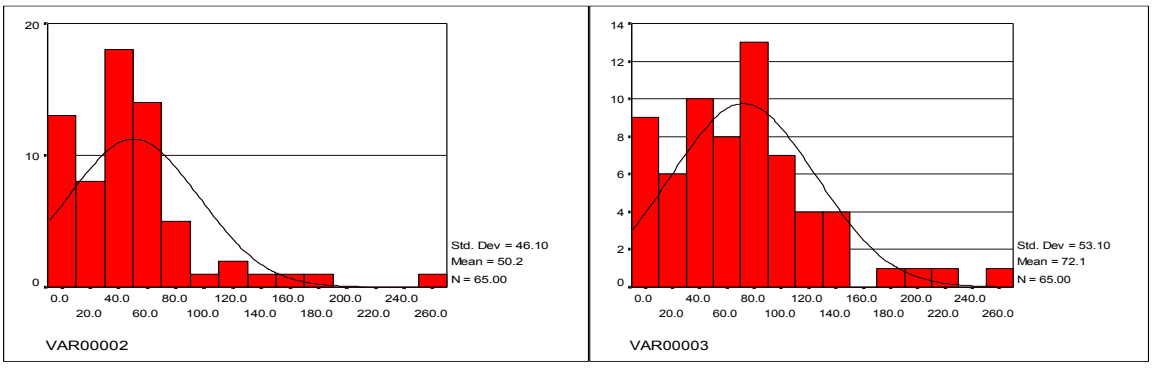


Fig. 4; 5. Histograms of the distributions of data on indicators t / F1 / 2 max; t / F max; t A in measurement of two-headed arm muscle

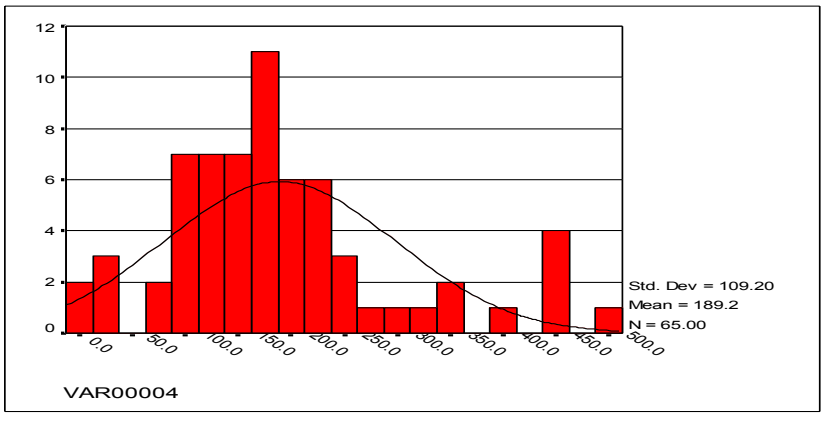


Fig. 6. Histogram of the distribution of data on indicators t / F1 / 2 max; t / F max; t A in measurement of two-headed arm muscle

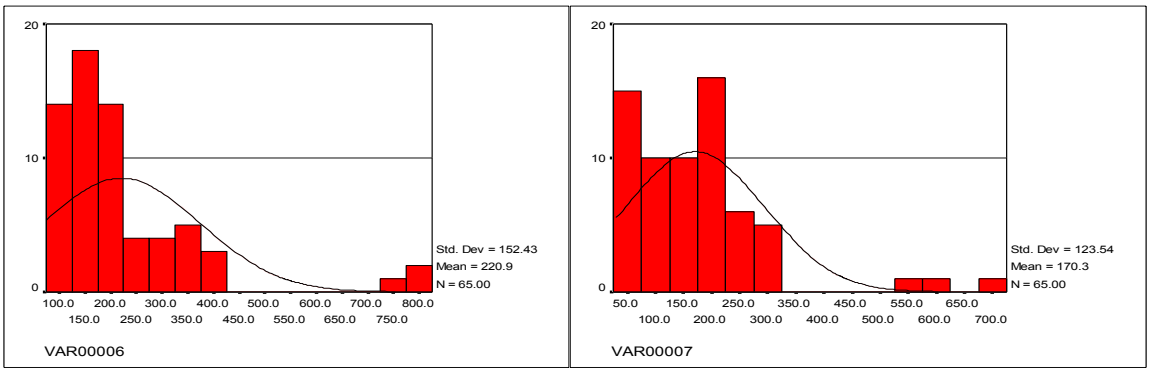


Fig. 7; 8. Histograms of the distributions of data on indicators IF; KF in measurement of two-headed arm muscle

Table 2 . Scoreboard for assessment of strength capabilities - two-headed arm muscle of commandos

№	Assessment indicators	Low	Satisfactory	Good	Very Good	Excellent
1.	Maximum strength(N)	под 281	281 - 347	347 – 413	413 - 479	Над 479
2.	Average strength(N)	под 117	117 - 161	161- 205	205 - 249	над 249
3.	Strength impulse N/S	под 220	220 - 340	340 - 460	460 - 580	над 580
4.	K1	под 80	80 - 140	140 - 200	200 - 260	над 260

B) Results for the strength capabilities of the quadriceps thigh muscle

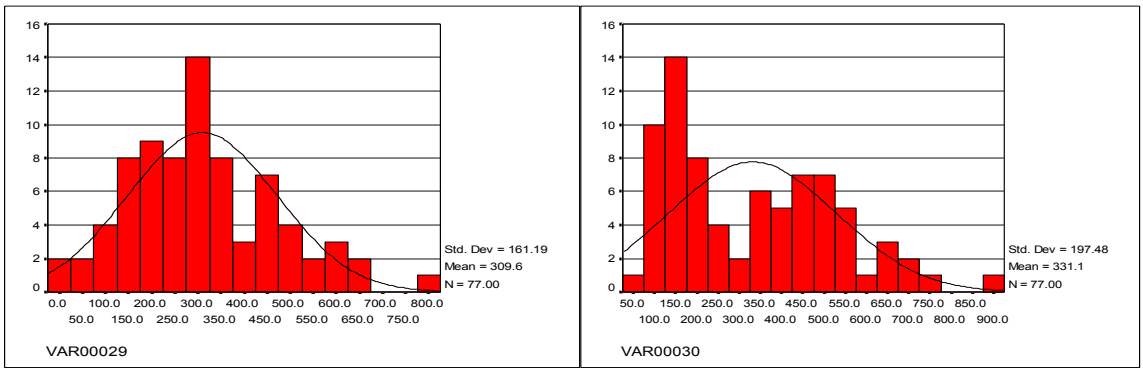


Fig. 9; 10. Histograms of the distributions of data on indicators F- max; Fx measurement of quadriceps thigh muscle

Table 3. Strength capabilities of the quadriceps thigh muscle of commandos - n = 99 (study of 33 Commandos)

		min	max	R	X	m-$_x$	S	As	Ex
№	Indicators								
1.	F- max (N)	344,6	1041,87	697,26	605,21	18,19	180,05	0,805	0,075
2.	t/F$_{1/2}$ max (s)	0.054	1.47	1.46	0.82	273	0.27	-0,415	1,348
3.	t/F max (s)	0.06	1.92	1.86	1.22	4,39	0.44	-1,018	0,833
4.	t A (s)	0.22	4.56	4.34	2.40	0.08	0.79	-0,579	2,350
5.	F$_x$ (N)	110,73	452,75	342,02	239,74	8,01	79,25	0,899	0,717
6.	IF (N/s)	301,50	1335,61	1034,11	576,71	22,00	217,75	1,481	2,659
7.	K F(-)	112,41	523,72	411,31	266,18	10,80	106,91	0,836	-0,111

Table №4. Scoreboard of strength capabilities - quadriceps thigh muscle

№	Assessment indicators	Low	Satisfactory	Good	Very Good	Excellent
1.	Maximum strength(N)	< 335	335 - 515	515 - 695	695 – 875	> 875
2.	Average strength(N)	< 120	120 - 200	200 – 280	280 - 360	> 360
3.	Strength impulse N/S	< 358	358 - 467	467 - 685	685 - 794	> 794
4.	K1	< 107	107 - 213	213 - 309	309 - 415	> 415

DISCUSSION

A) Strength capabilities of the two - two headed arm muscle.

The two-headed arm muscle is actively involved in many of the activities carried out by commandos during time of action - these are all types of tractions, handling weapons, assisting colleagues or injured people, immediate challenges in detention of terrorists and many other activities.

With this regard the control of commando's strength capacity is of utmost importance. This not only requires periodic measurements (current control), but also development and implementation of relevant scoreboard tables for assessment of quantitative data. The results of the tests, implemented by us, are summarized in Table № 1. There are three sets of data:

First – about strength options as maximum and average muscle strength;

Second – for explosive strength options such as gradient, time to reach maximum strength and time of strength activity;

Third - as integral indicators.

Analyzes showed that the three groups are characterized with large variance, which in the first group of data can be considered as a function of the really big differences in strength capabilities of the research contingent. In the normal distribution in nature, it is possible to develop regulatory assessment tables following the method of sigmal deviations.

From the analysis of histograms № 1, 2, 3, it is clear that there are left traction distributions - towards lower strength levels, which is not typical and does not characterize the high strength capabilities of the Bulgarian commandos.

This undoubtedly reflects the content of the scoreboard tables that form also the corresponding requirements in the selection process of applicants and control process in operating commandos.

In the second group of indicators the observed large differences, however, can mainly be attributed to differences in the way of implementing efforts in the process of measurement. No respect of requirements of standardization due to inexperience, underestimating or misunderstanding, instantly affects the quantitative values and is recorded by the device. It is clear, however, that smaller time values prevail, ie there is a high level of explosive strength. With this regard the formed data bank is informative in terms of current capabilities of the researched subjects, but it is not appropriate to develop normative scoreboard tables. Additional arguments are found in the analysis of the nature of the distributions of the data. The dominating quantitative values are the lower quantitative values (left traction distributions), which are positive assessment criterion since the measured indicator is time. New researches are required with very well respected standard requirements. This will allow also the development of scoreboard assessment tables.

Same analyses are valid for the third group of indicators, but since they are a function of the previous two groups, the influence of the latter is positive and it is possible to prevent a compromise that allows the development of relevant scoreboard assessment tables.

In its significance they constitute an additional informative indicator of the strength capacity of the two-headed arm muscle in commandos.

B) Strength capabilities of the quadriceps thigh muscle

Quadriceps thigh muscle is the most actively involved muscle in carrying out the normal life activities of man. When it comes to commandos, where transitions, sudden sprints and unexpected challenges are an integral part of their work, the importance of the strength capabilities of this muscle is even greater.

The results of our control measurements are shown in Table №.3 The analyzes show very high values for both maximum and average strength, which is indicative of the high level of physical adequacy in the research contingent.

Histograms of 9 and 10 show that the data are normally distributed, which enables us to develop normative scoreboard tables using the method of sigmal deviations.

For the second group of indicators there are large differences as for the two-headed arm muscle. The large scope of the values we attribute again to the way efforts are applied in the process of measurement.

Here also we can see lower time values dominate, which means that officers of the squad have a high level of explosive strength.

The sufficient number of measurements allows informative scoreboard tables to be developed for the three groups of indicators, which in time will undoubtedly undergo adjustments after a necessary expert rethinking and adding of new data.

CONCLUSIONS

1. Measurements and control tests implemented by computerized measuring circuit have a number of advantages consisting of rapid and accurate reading and systematization in tables and graphs of

quantitative values of very specific indicators. This allows the sports teacher to direct his attention to individual in-depth comparative analysis of the measurement results and to formulate clear theoretical and practically significant conclusions.

2. Universal dynamometric system DINO- 1 and the calculation of the quantities of a number of informative indicators as F- max; t / F1 / 2 max; t / F max; t A; Fx; IF; K F; at the time of measurement of specialized software are a concrete example of a modern computerized measuring system. Its implementation in the research process and results are effective indicators for monitoring and evaluating the state of the motor – strength- in isometric mode in officials from SATS.

3 The values of maximum strength capability and explosive strength of the muscle groups flexors and extensors of the lower and upper limbs, and dorsal and abdominal muscles in Bulgarian commandos were very high. The data form a specific model features of strength capabilities for selection and control of people, working as antiterrorists.

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STRUCTURE OF THE MOVEMENT OF THE LOWER LIMBS IN TENNIS PLAYERS MOVING TO THE BALL

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Keywords: *tennis, footwork, methods, structure, analysis*

INTRODUCTION

Footwork is the main part of the game tennis. Without their help, the player cannot reach the ball and play it the best way. The better footwork increases the chance for proper implementations of strokes in tennis. The bad move on the court, increase the probability the player to be too close or too far from the ball.

Movement is the first step to establish a strong foundation of the body. Tennis players faces with different directions of movement of the ball and they have to move in the best way to it to be able to reach it.

The proper move towards to the ball gives additional force to the blow itself, which is derived from the kinetic energy of the body after impact and adds extra force of the ball. If this does not happen often, player's movement is parallel to the base line, the player's body is turned sideways, or one leg is laterally rotated and the body is away from the ball, not toward it.

Purpose

The main purpose is to analyze step by step the correct moving by the court to the ball, as traced chronologically different methods and techniques for its implementation. We are going to focus primarily on footwork and necessary elements constituting this movement.

Tasks:

The main tasks that we set must show the basic tools and methods that help the tennis player to properly play ball coming from the opponent. We chose the following tasks:

1. Specify different parts of the movement;
2. Identify the main methods and techniques used for the tennis player who is move towards the ball.
3. Analyze each of the movements of the tennis player.

METHODOLOGY

According to Белиц-Гейман [1] during movement of the tennis player on the court, he must decide the following tasks:

- He should move to ball in the most favorable direction, as this is done with the help of eyes;
- He should prepare for the implementation for a stroke the most convenient point with the help of the torso and legs;
- He should complete the stroke and move into a new tactical position, allowing him to prepare for the next steps;

Referring to studies by Paul Gold [2], Mark Papas [3], L. Matveyev [4] we can represent the movement of the tennis player to the ball, divided into phases constituting the movement as a whole. Looking at the different phases of the movement, we can perform our aims with better clarity. We can introduce the basic movements that are used by tennis players to move to the ball, divided into seven basic steps.

1. The ready position is the foundation for almost all footwork. How you move around the tennis court in one way or another relates back to the ready position. More generally, the ready position is an athletic position that allows you to move quickly around the tennis court in any direction. The feet must be at shoulder width apart, or a little bit wider. The knees should be slightly bent and the

weight should be on the fingers of the feet, not the heels. The upper body should be relaxed; the arms and the tennis racket must be out in front of the body. It's also important that the upper body should not be hunched over, bending forward. The back should be straight. The eyes should look opponent and especially the tennis ball, not looking down at the tennis court (picture 1).

Picture 1

2. The split step and the ready position are very closely related, and mechanically speaking the split step is simply a small hop you take while in the ready position. When tennis player perform a split step and take that small hop, he only wants to get about an inch high off the tennis court. What is critically important is that when he landed, his weight needs to come down and load up in his legs. When the player come down from the split step, he want the weight to equally compress both of his legs like springs, so that he can push off explosively in the direction of the tennis ball. This is much more effective than being flat-footed (picture 2).

Picture 2

3. After the split step, the tennis player has to start moving toward the tennis ball. The very first step after split is called the first step movement. To perform the first step movement, the player needs to step out with outside foot and turn it so that it is more or less parallel with the baseline. He has to transfer his weight to outside foot, and push off in the direction of the tennis ball with his inside foot, getting the heel up.

From this position, the player is ready to run to the tennis ball or immediately start taking adjusting steps. The first step movement is almost the same thing as the pivot and shoulder turn, preparation for implementation the forehand or backhand groundstrokes (picture 3).

Picture 3

4. After split step and first step movement is completed, next step is moving out to the tennis ball. When moving to the ball, the tennis player should not let her out of sight. When moving the ball to the tennis player should not let her out of sight. Movements to the ball going fast small steps to allow the tennis player reach the ball. Implementation looks easy, but it is essential for the effective implementation of the strokes in tennis. If the movement is not with small quick steps, stroke on the ball would be too early, too late or inaccurate. Going to the ball with a few quick steps will allow better preparation for impact (figure 1).

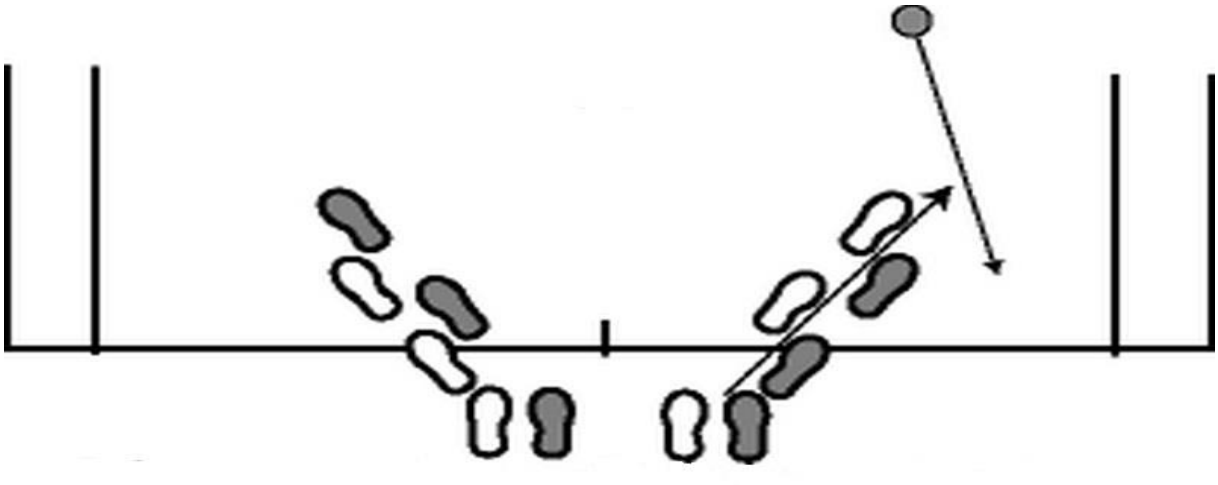

Fig. 1

After the tennis player makes hit the tennis ball, the next footwork step is relatively simple. He should get his lower and upper body back facing the net. The speed of conversion depends on the position of the player's body after the implementation of the shot. After turning, the player must start back at the center of the court and return to the starting position.

After the body is facing the net and groundstroke is completed, next step is to recover back to the middle of the tennis court. There are several ways to recover, and the side shuffle is probably the simplest one. The side shuffle is a great recovery method because it allows getting back to the center of the court, but it also allows changing direction and moving back out wide very quickly. To side shuffle, step out with outside foot, and then bring the inside foot in. The feet never touch each other when perform this step.

Another method to return to the starting position is using a cross step. It is applied after the tennis player is played ball and facing to the net. This is done when the outer leg pushed off and crossed with the inside leg as it passes behind him, down to earth. The body continues to be given to the net. Thus, the tennis player can cover a greater distance (picture 4).

Picture 4

CONCLUSIONS

According Белиц-Гейман [5], О. Машка and В. Шафаржик [6] and M. Vale [7], the execution of the technical steps and their performance does not only depend on the level of mastery elements as a whole, but also on the degree of development motor skills. Their constantly changing state within each game, set and match (lasting 2-3 hours or more) affects a significant impact on the technique of the players. In support of the above, according T.Todorov [8] tennis can be characterized as "A sequence of muscular effort, separated by short periods of rest." All this combined with a well-measured movement on the court is the foundation of every great game and victory.

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APPLICATION OF META-ANALYSIS FOR SUMMARIZING RESULTS FROM PUBLISHED STUDIES

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Key words: meta-analysis, effect size, forest plot

INTRODUCTION

Essential stage of the research process is an examination of the scientific problem in existing literature. This is usually done narrative - authors comment the findings about the status of the tested scientific hypothesis in various scientific publications. At the same time, due to the unification of sports science terminology and the tests used in research, the summary of the published results can be realized not only narrative, but also on substantially higher level. This is achieved by applying a specially developed statistical method, known as meta-analysis (MA). The term is introduced by Glass (1976), according to which "The *Meta-analysis is the analysis of analyses i.e. the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings* [5]. R. Rosental, et al. (1995) define MA as " *quantitative summary of research domains that describe the typical strength of the effect or phenomenon, its variability, its statistical significance, and the nature of the moderator variables from which one can predict the relative strength of the effect or phenomenon"* [12]. Thus "*MA allows researchers to arrive at conclusions that are more accurate and more credible than can be presented in any one primary study or in a nonquantitative, narrative review*" [13].

In the last 30 years the importance of MA increases extremely. Number of publications, that comment the results of a meta-analysis, grows exponentially [15], especially in the fields of medicine, psychology, biology, marketing and etc. In more limited extent, MA is applied in the field of physical education and sport [6].

The aim of this study is to describe the main features of the meta-analysis and its application in the field of sport science.

Tasks of the study are:

1 To describe the basic algorithm for implementing a meta-analysis;
2 To illustrate the application of meta-analysis the field of sports.

Theoretical background

In contrast to the traditional statistical analysis, the unit of observation in MA is a separate publication ($\boldsymbol{i}$). Their total number is denoted by $\boldsymbol{k}$. The value of given summary statistics (mean, difference between means, correlation coefficient, etc.) in specific article ($\overline{\boldsymbol{T}}_{\boldsymbol{i}}$) is a point estimate of the population parameter θ (the Greek letter theta). In most cases, the meta-analysis did not use the concrete values, cited in the studies, but their standardized values, called indicators of effect size ($\boldsymbol{ES}$). Important characteristic of MA is that the weight of the results of each study, involved in the analysis, is different - the results from larger samples sizes have a greater impact on summary statistics. The inverse variance weights ($\boldsymbol{W}_{\boldsymbol{i}}$) is used, thus the impact on summary statistics have the sample size ($\boldsymbol{n}_{\boldsymbol{i}}$) and the variance ($\boldsymbol{V}_{\boldsymbol{i}}$) of the values.

The implementation of MA go through the following steps [3,13]:

Defining the research problem. It can concern the state of the motor, technical or mental skills; relationships between variables; differences between characteristics of various age-sex groups, between athletes from different sports; changes occurred under different training methods etc.

Identification of the studied variable, called the *dependent, response or outcome variable*. Factors, which affect the studied variable (studied phenomenon), are called *independent, explanatory or moderating variables*. These are the characteristics of the study (methods of study, method of sampling, measured parameters); the characteristics of the respondents (gender, age, type of sport), the type of applied training methods (if the comparison of experimental vs. control group is studied).

Exploration of literature and selection of publications. This is a laborious and difficult analytical process, at first, by reason of overwhelming amount of published information, at second - because it's difficult to put together research indicators, methods of their measurement, experimental schemes etc. Sometimes, the publications suffer from lack of necessary for MA calculations information, too.
Once the list of publications, that meet the requirements for entering into the summary, is collected, the following coding scheme is applied: (1) ID- identification number of the study; (2) Authors, title and source of publication; (3) Estimated effect size; (4) Sample size; (5) Moderating variables which, in the case of heterogeneity, can be used to detect the presence of subgroups of publications; (6) Quality of the study - reliability and validity of the tests used, which sometimes can lead to exclusion of the particular publication from the analysis; (7) Calculation procedures used. This is because, despite the accepted standards for publishing of scientific information, sometimes have to calculate needed statistical indicators indirectly - on the basis of graphically presented averages, through hypothesis testing (test statistic or significance level) results, etc.

Statistical analysis. It is performed in two stages [13]:

Stage I. Analysis within each of the selected studies. This is done in order to calculate the required effect size (**ES**) measures. According to W. Nugent, 2006 [11], they can be divided into three groups:

1. **Single group summary** [2,11]. If the outcome variable is quantitative, the summary includes mean values ($\overline{\boldsymbol{T}}_{\boldsymbol{i}}$)**.** For the purposes of analysis, should be considered also the standard deviations ($\boldsymbol{SD}_{\boldsymbol{i}}$) and sample sizes ($\boldsymbol{n}_{\boldsymbol{i}}$).

2. **Summary of the differences (D) between two dependent or paired samples, known as D-family.** The effect size ($\boldsymbol{ES}$) measures are used. They describe the magnitude of differences in standardized (free of the original measurement) units, as the difference found is divided by its standard deviation. Most commonly $\boldsymbol{ES}$ used are the **Cohen's d** and **Hedges' g** (equations 10, 11 for independent and 15, 16 and 17 - for paired samples). In scientific research the Cohen's $\boldsymbol{d}$ is used more often, but for the purposes of MA the Hedges'$\boldsymbol{g}$ is preferred. That's because the value of g is corrected and removes bias of the results from small samples. There are no difficulty to calculate $\boldsymbol{ES}_{\boldsymbol{i}}$ in case of independent samples, because the publications usually cite the mean values ($\overline{\boldsymbol{X}}_{\boldsymbol{1}}; \overline{\boldsymbol{X}}_{\boldsymbol{2}}$), standard deviations ($\boldsymbol{SD}_{\boldsymbol{1}}; \boldsymbol{SD}_{\boldsymbol{2}}$) and sample sizes ($\boldsymbol{n}_{\boldsymbol{1}}; \boldsymbol{n}_{\boldsymbol{2}}$). Difficulties, at this stage of the analysis, occur in case of paired samples, because the published studies usually don't cite the correlation coefficient ($\boldsymbol{r}_{\boldsymbol{i}}$) between the two related samples, but it's crucial for the calculation procedure. Many equations for indirect calculation of Cohen's d (for example equation 17) have been developed. It's possible to use an approximate value for $\boldsymbol{r}$ from similar researches,

Table 1. Calculation of indicators of effect size and weights of the studies, included in meta-analysis

Pearson product moment correlation coefficient (r)	$Z_r = 0.5ln\left(\frac{1+r}{1-r}\right)$ (5) Converting **Zr** to **r** $r = \frac{e^{2Z_r}-1}{e^{2Z_r}+1}$ (6)	$V_{Z(r).i} = \frac{1}{n-3}$ (7)	$SE_{Z(r).i} = \sqrt{V_{Z(r).i}}$ (8)	$W_i = \frac{1}{V_{Z(r).i}}$ (9)
Difference between two independent samples (D)	$d_{Cohen} = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}}}$ (10) $g_{Hedges} = d\left(1 - \frac{3}{4(n_1+n_2)-9}\right)$ (11) If the Student's t-test is published: $g = t\sqrt{\frac{n_1+n_2}{n_1 n_2}}$ (12)	$V_{g.i} = \frac{n_{1.i}+n_{2.i}}{n_{1.i}n_{2.i}} + \frac{g_i^2}{2(n_1+n_2)}$ (13)	$SE_{g.i} = \sqrt{V_{g.i}}$ (14)	$W_i = \frac{1}{V_{g.i}}$ (20)
Difference between two related samples (D)	$d_{Cohen} = \frac{\bar{Y}_1 - \bar{Y}_2}{S_D}$ (15) където $S_D = \sqrt{S_1^2 + S_2^2 - 2rS_1S_2}$ (16) If the Student's t-test is published: $g = \frac{t}{\sqrt{n}}$ (17)	$V_{g.i} = \left(\frac{1}{n_i} + \frac{g_i^2}{2n_i}\right)2(1-r_i)$ (19)	$SE_{g.i} = \sqrt{V_{g.i}}$ (19)	

The symbols used are described in the text.

also. Another problem can arise because of existence of different methods of calculating the ES indicators, which sometimes leads to slightly different outcome results. It's necessary to calculate the variance ($\boldsymbol{V_{g.i}}$), standard error ($\boldsymbol{SE_{g.i}}$) and the weight ($\boldsymbol{W_{g.i}}$) of the each study at this stage of the analysis, also.

3. **For summarizing the correlation coefficients, known as R-family.** Preliminary preparation require to compute the Fischer's Z scores of the cited correlation coefficients (equation 5), variance ($\boldsymbol{V_{Z(r).i}}$), standard error ($\boldsymbol{SE_{Z(r).i}}$) and the weight ($\boldsymbol{W_i}$) of the results. After the completion of the analysis, the obtained summary coefficient and confidence interval should be transformed back into the correlation coefficient using equation 6.

Stage II. Summarizing the results in the following steps:

1-th step. Identification of the overall central tendency ($\overline{\boldsymbol{T}}$). Two models for integrating the results are used – the fixed-effects model and random-effects model [2, 9].

- **Fixed-effects model.** The summary is based on the assumption, that all publications are point estimates of **one common ES** (one population with mean ES =θ). Therefore, the only source of dispersion is within publications (within studies). For aggregation the results the equation 23 (table 2) is used. The weights ($\boldsymbol{W_{i.f}}$) of the individual studies are calculated by the aforementioned formulas (see general equation 22). Characteristic of this model is that the weights amplify greatly the impact of publications from large samples. The small studies may be even excluded from the analysis.
- **Random effects-model.** This model (Hedges & Olkin, 1985) is based on the assumption that the true effect of the individual publications **vary** and they likely to provide information for **different populations**. Therefore, the analysis describes *the distribution of the effect sizes* and their mean value. There are two sources of dispersion - inside the published results (within studies) and between the results of individual publications (between studies). The total variation is decomposed into these two components - within studies, which is equal to the degrees of freedom ($df = k - 1$) and between-group variance - tau-squared τ^2 (equation 27). The weights ($\boldsymbol{W_{i.r}}$) used in this model (equation 30) are inverse of the sum of the fixed model weights and between-study variation (τ^2). The rest of the calculation procedure is similar to those described above. Characteristic of this model is that the weights are more balanced than the previous one.

2-nd step. Evaluation of the homogeneity of the results. This step is crucial in carrying out the MA because, according to the results obtained, the researcher decides which of methods, mentioned above, is correct to use. If the studies are homogeneous – fixed-effects model is correct. If the set of publications is heterogeneous – the random-effects model is preferable [8]. Two statistical indices for assessing the heterogeneity of the studies are used - Cochran χ2-test, known as the Q-test and I^2 index [3, 4, 7, 8]

Cochran's Q-test is used to test the null hypothesis, that the effect-sizes of the individual studies are equal. The test statistic is calculated by equation 21. Q-test has chi-square distribution with $df = k - 1$. If the empirical Q value is higher than critical one for given significance level (α), the null hypothesis rejects and concludes that the difference between individual studies is significant. To assess the magnitude of differences, the following index I^2 is used:

$$I^2 = 100\frac{Q - df}{Q} \qquad (35)$$

$\boldsymbol{I^2}$ presents the ratio of between-study dispersion and overall variation of the results. Higgins, Thompson, 2002 [cit. by 8] proposed the following scale for interpretation: 25% - low; 50% - medium, 75% - high heterogeneity.

Table 2. Meta-analytical procedures for summarizing the results of scientific articles

	Variance decomposition	Weights	Mean value ($\bar{T}$)	Variance (V)	St. error (SE)	Z-value
Fixed-effects model	**Total variance** $Q = \sum W_i(T_i - \bar{T})^2$ (21)	$W_{i.f} = \frac{1}{V_{ES_i}}$ (22)	$\bar{T}_f = \frac{\sum W_{i.f} T_i}{\sum W_{i.f}}$ (23)	$V_f = \frac{1}{\sum W_{i.f}}$ (24)	$SE_f = \sqrt{V_f}$ (25)	$Z = \frac{\bar{T}_f}{SE_f}$ (26)
Random-effects model	Between study variance $\tau^2 = \begin{cases} \frac{Q - df}{C} & if\ Q > df \\ 0 & if\ Q \leq df \end{cases}$ (27) where $df = k - 1$ (28) $C = \sum W_i - \frac{\sum W_i^2}{\sum W_i}$ (29)	$W_{i.r} = \frac{1}{V_{ES_i} + \tau^2}$ (30)	$\bar{T}_r = \frac{\sum W_{i.r} T_i}{\sum W_{i.r}}$ (31)	$V_r = \frac{1}{\sum W_{i.r}}$ (32)	$SE_r = \sqrt{V_r}$ (33)	$Z = \frac{\bar{T}_r}{SE_r}$ (34)

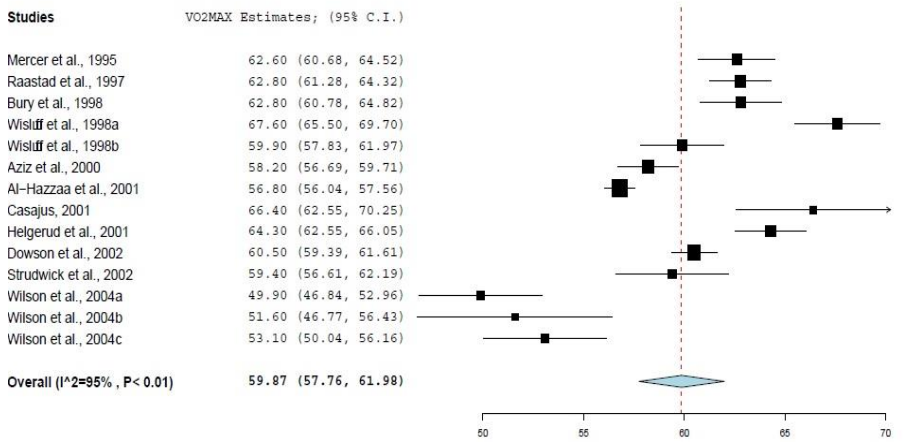

Figure 1. Maximal oxygen uptake of professional soccer players (meta-analysis)

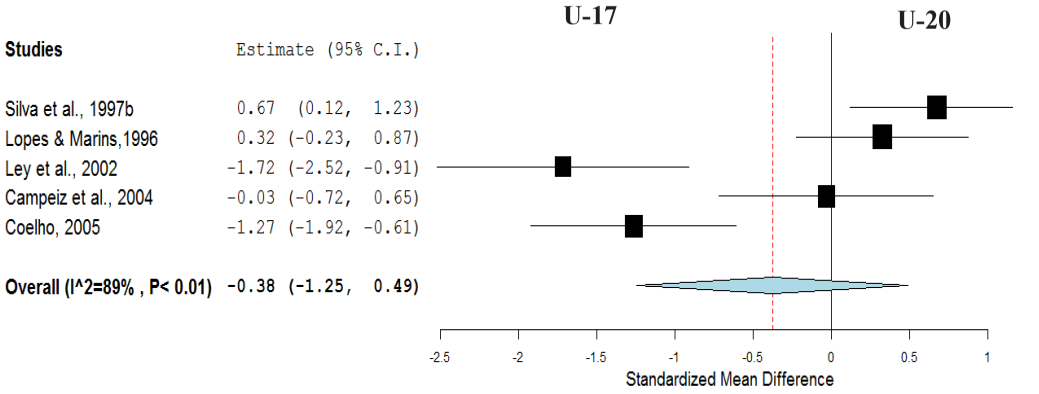

Figure 2. Forrest plot of the differences between VO_2max of 17 and 20 year-old soccer players

In case of high heterogeneity, it's reasonable to analyze the influence of moderating variables. Probably some articles comment results of different age, gender or qualification groups, or distinction of measurement method and/or methods of influence affects the status of outcome variable.

3-thd step. Assessment of summary effect.

- If the summary concerns the **differences between means**, it's necessary to test the null hypothesis, that the summarized ES is equal to 0. The well-known Z-test (equation 26) and the corresponding level of significance (α) are used. If $\boldsymbol{Zstatistics} < \mathbf{1,96}$ or $\boldsymbol{\alpha} > \mathbf{0,05}$ - the null hypothesis is accepted.
- If the **correlation coefficients are summarized**, it's necessary to determine the statistical significance of the pooled$\boldsymbol{r}$. The Z-test (equation 34) is used. If $\boldsymbol{Z_{statistics}} \geq \mathbf{1,96}$ or $\boldsymbol{\alpha} \leq \mathbf{0,05}$, the overall correlation coefficient is statistically significant.

4-th step. Presentation of the results. The MA results can be tabulated and/or graphically presented. The most popular graph is called **forest plot** [1,10]. The publications (the author and year of publication) are plotted on the vertical axis in alphabetical or chronological order. The published effect sizes and confidence intervals are displayed literally on the center of the diagram. Each analyzed publication is illustrated by line, representing the confidence interval ($\boldsymbol{ES_i} \pm \mathbf{1,96}.\boldsymbol{SE_{ES_i}}$) and square - the value of the point estimate ($\boldsymbol{ES_i}$). The size of the squares is proportional to the sample-size. The overall mean value is illustrated by a vertical line in the lower part of which is positioned a diamond. It's possible to mark the confidence interval ($\overline{\boldsymbol{T}} \pm \mathbf{1,96}.\boldsymbol{SE_{\overline{T}}}$) of the overall ES. If the differences between mean values are presented, can be drawn a reference line, positioned at zero difference. Explanatory text about the direction of the differencies (in favor of the experimental or control group, before-after) is advisable. The results from assessing the homogeneity of the results (Q, I^2), Z-test and corresponding significant level (α) are displayed at the bottom of the graph.

Illustrative examples

To illustrate the application of MA in the field of sport, published by C. Silva, J. Bloomfield, J. Marins, 2008 [14] results are used. They concern the oxygen consumption of soccer players and are obtained from scientific publications between 1996 and 2006 years. For data processing the free software used Open Meta is.

Example 1. The mentioned review cites 14 articles, dealing with maximal oxygen uptake of professional soccer players.The results are presented in table 3 and figure 1. To summarize the information from these publications it's necessary (1) To be choosen a method for aggregation the results, depending on the degree of their homogeneity; (2) To be calculated the weights of individual publications; (3) To be calculated the overall mean and corresponding confidence interval.

The average values observed in the individual studies differ in wide range - from 49.9 $ml.kg^{-1}{\cdot}min^{-1}$ to 67.6 $ml.kg^{-1}{\cdot}min^{-1}$. Q = 256,55 and corresponding level of significance (α = 0.000) show that the results from individual publications differ statistically significant. I^2 = 94.93% indicates that the magnitude of the differencies is large. This suggests that for summarizing the results, should be used the random-effects model. Table 3 presents the weights of the individual studies, calculated by both - fixed and random-effects models. It's clear that because of large sample size ($\boldsymbol{n_i}$= 154), the weight of Al-Hazzaa's study is greater. The forest plot illustrates the narrow confidence interval, too.

The average value, based on the apropriated fixed-effects model is 59,87 $ml.kg^{-1}min^{-1}$ (CI 57,76-61,98 $ml.kg^{-1}min^{-1}$). From forest plot is obvious, that the results of Wilson et al. (2004a) are considerably lower than the others. This could aim the analysis at detection of moderating variables that provoke

this difference (age, nationality, qualification, players position). It's posible to remove these results from the MA and find out the change of the heterogeneity statistics and etc.

Table 3. VO_2max of professional soccer players (meta-analysis

Study	Level	Nationality	n	Mean	SD	W i.fixed	W i•random
Mercer et al., 1995	PROF D1	English	15	62,6	3,8	1,039	0,064
Raastad et al., 1997	PROF	Norwegian	28	62,8	4,1	1,666	0,065
Bury et al., 1998	PROF D1	Belgium	15	62,8	4,0	0,938	0,063
Wisløff et al., 1998a	PROF D1	Norwegian	14	67,6	4,0	0,875	0,063
Wisløff et al., 1998b	PROF D1	Norwegian	15	59,9	4,1	0,892	0,063
Aziz et al., 2000	National	Singaporean	23	58,2	3,7	1,680	0,065
Al-Hazzaa et al., 2001	PROF	Saudi Arabian	154	56,8	4,8	6,684	0,067
Casajus, 2001	PROF	Spanish	15	66,4	7,6	0,260	0,054
Helgerud et al., 2001	PROF D1	Norwegian	19	64,3	3,9	1,249	0,064
Dowson et al., 2002	National	New Zealand	21	60,5	2,6	3,107	0,066
Strudwick et al., 2002	PROF PL	English	19	59,4	6,2	0,494	0,060
Wilson et al., 2004a	PROF defender	Northern Irish	12	49,9	5,4	0,412	0,058
Wilson et al., 2004b	PROF midfielder	Northern Irish	10	51,6	7,8	0,164	0,048
Wilson et al., 2004c	PROF forward	Northern Irish	12	53,1	5,4	0,412	0,058

Summary statistics

Fixed-effects model	**k**	$\overline{T}$ **fixed**	**V**	**SE**	**CI lower**	**CI lower**	**Heterogeneity statistics**
	14	59,599	0,050	0,224	59,160	60,040	**Q=256.55 df=13 α=0.000 I^2=94.93**
Random-effects model	**k**	$\overline{T}$ **random**	**V**	**SE**	**CI lower**	**CI lower**	
	14	59,872	1,161	1,078	57,760	61,984	

Example 2. In mentioned publication [14] is commented the difference between maximum oxygen consumption of players from two age groups - U-17 and U-20. Comparable data are found in 5 publications. From a statistical point of view, it's necessary (1) to standardize the differences between mean values of two independent samples with Hedges'g (2) to evaluate the homogeneity of the results with Q-test, and select a model of the summary, (3) to calculate the overall effect-size and (4) to test the statistical significance of the differences between players of two age groups with Z-test. The absolute value of the standardized difference ranges from 0,034 to 1,719 (table 4). According to accepted scale for interpretation of ES[1], there are two large differences in favor of U-20 age group, two - with moderate difference in favor of younger players. Such contradiction in the magnitude and direction of differences logically leads to the conclusion, that the group of studies is characterized with high (I^2 = 89,5%) by size and statistically significant heterogeneity (Q = 38,11, α = 0,000). The approach, taken in accordance, is that the random-effect model is appropriate. The mean value $\overline{T}_{random}$=-0.379. The test of the null hypothesis $H_o: \theta = 0$ shows that the difference is not significant (Z = 0.858, α = 0,391), i.e. the conclusion, based on this small number of articles with inconsistent information, is that there is no difference in oxygen uptake of players from both age groups.

CONCLUSIONS

1. The meta-analysis has a large capability to combine results from the growing amount of published scientific information and obtain stable conclusions about the studied phenomenon, to move from empirical information to the accumulation of human knowledge.
2. For effective implementation of the meta-analysis techniques is necessary:
   - to follow the strict standards for realization of the research process and for publishing the scientific information;
   - to be made a correct analysis of the moderating variables and avoid the mixing information from substantionaly different groups of studies.

[1] 0.3 - small, 0.5 - moderate, 0.8 - large difference (Cohen, Ley et al., 2002, Coelho, 2005)

Table 4. Differences in VO_2max of 17 and 20 year-old soccer players (meta-analysis)

Study	U-17			U-20			Difference (D)	Hedges'g	$W_{i.\ fixed}$	$W_{i.random}$
	n_1	Mean $_1$	SD_1	n_2	Mean $_2$	SD_2				
Silva et al., 1997	19	66,0	4,8	42	62,1	6,1	3,90	0,671	12,788	1,054
Lopes & Marins,1996	24	60,4	3,2	28	59,1	4,5	1,30	0,324	13,145	1,056
Ley et al., 2002	23	55,3	2,8	12	59,9	2,2	-4,60	-1,719	6,125	0,967
Campeiz et al., 2004	15	49,5	2,9	18	49,6	2,9	-0,10	-0,034	8,595	1,013
Coelho, 2005	26	56,1	2,0	18	59,2	2,9	-3,10	-1,266	9,185	1,021

Summary statistics

Fixed-effects model	**k**	$\overline{T}_{fixed}$	**SE**	**Z**	**α**	**Heterogeneity statistics**
	5	-0,193	0,1417	1,360	0,174	**Q=38,11 df=4 α=0,000** **I^2=89,5%**
Random-effects model	k	$\overline{T}_{random}$	SE	Z	α	
	5	-0,379	0,4424	0,858	0,391	

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INVESTIGATION OF MUSCULAR COORDINATION AT DIFFERENT INTENSITY IN ROWING

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Key words: *muscular coordination, rowing, surface EMG, different intensity*

INTRODUCTION

Rowing is a sport in which the technical skills are as important as physical skills of the competitors. The right rowing technique is very important for correct rowing stroke and maximal energy economy for the oarsman. The rowing technique is very complicated, because oarsman makes a lot of movements in one rowing cycle. For that reason the specialists separate the rowing cycle into two phases: drive phase and relaxing phase. When the rowing technique is going to be studied or to be investigated, it will be better to look on the rowing cycle like three separate moving segments: lower limbs, trunk and upper limbs. In rowing like in other sports, there are some variants (styles) of technique. There are a lot of publications which investigate and analyze the differences and changes in rowing technique, but there are a few with new methodic for diagnostic. In sport science there are a lot of methods for analyzing the competitor's technical skills and one of the newest and revealing method is surface radio electromyography. With this method we may analyze the work of each surface muscle or muscle group, which are responsible for movement of each oarsman's segment (lower limbs, trunk or upper limbs).

The aim of our investigation is the change of muscular coordination of basic muscular groups which are responsible for oarsman's movements.

METHODS

Rowing experts are interested in dynamic of the change on the elements from the rowing technique when the intensity is different. In our research the change of intensity of the load is directed to the change of the stroke rate. In this research were examined six elite rowers with high functional level on average age of 24.5 years. The test was conducted on the Concept II Dynamic rowing ergometer (Concept II Inc, Morrsvile, Vermont, USA). The data from muscular activity, during the drive phase, was caught and analyzed from mobile surface electromyography "BTS Bioengeneering FREEEMG 300" and the accompanying software. The work load intesities were set according to a researched based on a 2000 m. race distance and were from four one minute repetitions each one with different stroke rate (20, 24, 28 and 32). The competitors had thirty seconds rest time between each intensity.The EMG hardware has eight probes, so they were put on the basic and the bigger muscles which are responsible for the movements in rowing drive phase. The muscles we investigated were: Gastrocnemius Lateralis(GL); Rectus Femoris (RF); Gluteus Medius (GM); Biceps Femoris caput longus (BFCL); Latisimus Dorsi (LD); Deltoideus Posterior (DP); Triceps Brachii caput longus (TBCL); Brachioradialis (B).

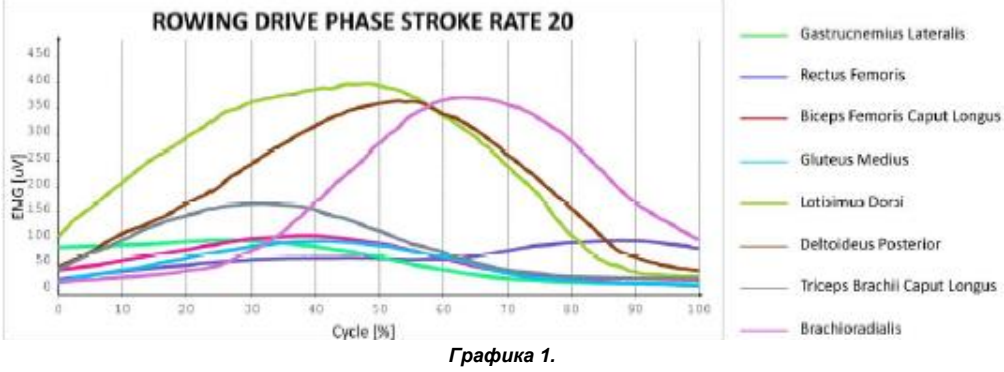
RESULTS AND DICUTION

After the testing of six elite rowers and the collected data, the data was processed, illustrated and calculated. The collect raw signals from EMG were filtering by RMS (Root Mean Square) and by Band Pass Filter (BP Filter). After filtering the signals only the real data with correct signal without interference was obtained. The synchronized video files with the EMG, which was captured parallel with the recorded EMG signals, helped for defining the rowing drive phases in all signals. After the definition of the rowing drive phase the cycles were averaged with the correspond standard deviation of each signal.

Таблица 1.

Average Cycle Time			
Stroke rate 20	Stroke rate 24	Stroke rate 28	Stroke rate 32
1.997±0.108 sec.	1.598±0.118 sec.	1.250±0.112 sec.	1.029±0.078 sec.

Averaged rowing drive phase helped to be illustrated and found the difference in muscular coordination with the change of the stroke rate of the rowing cycle. The next graphs, from №1 to №4, illustrate the muscular coordination of all investigated muscles in different intensity.



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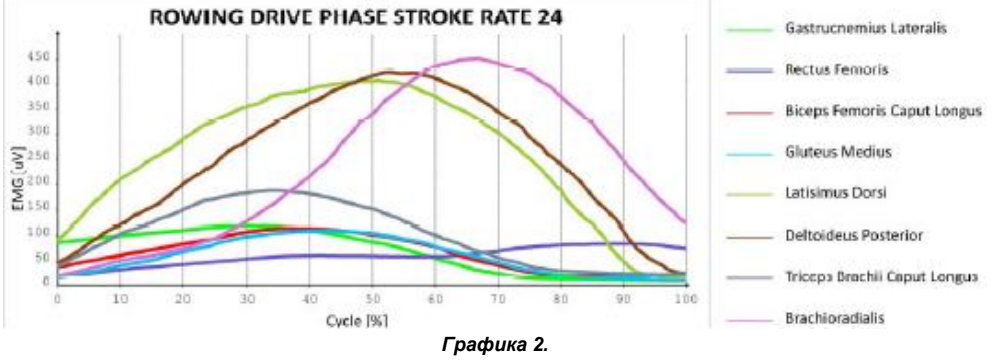

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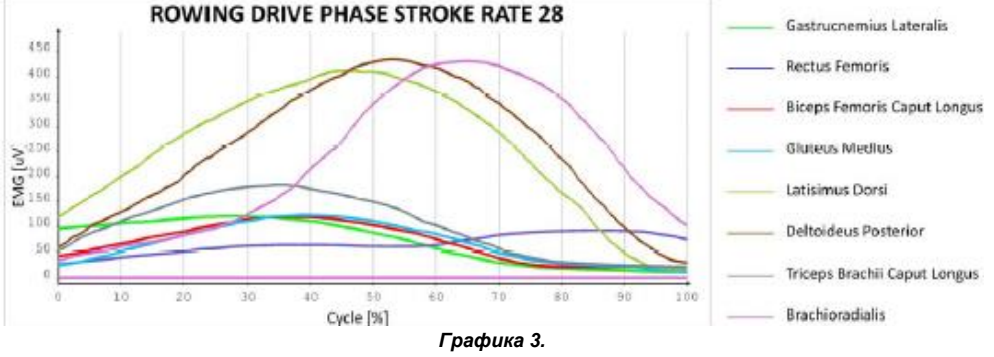

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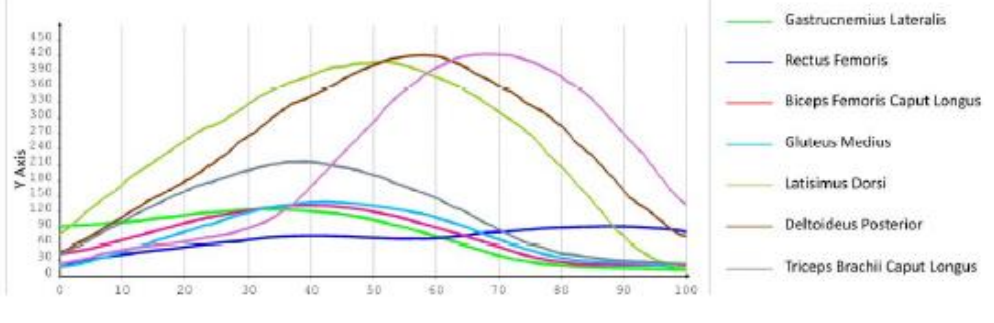
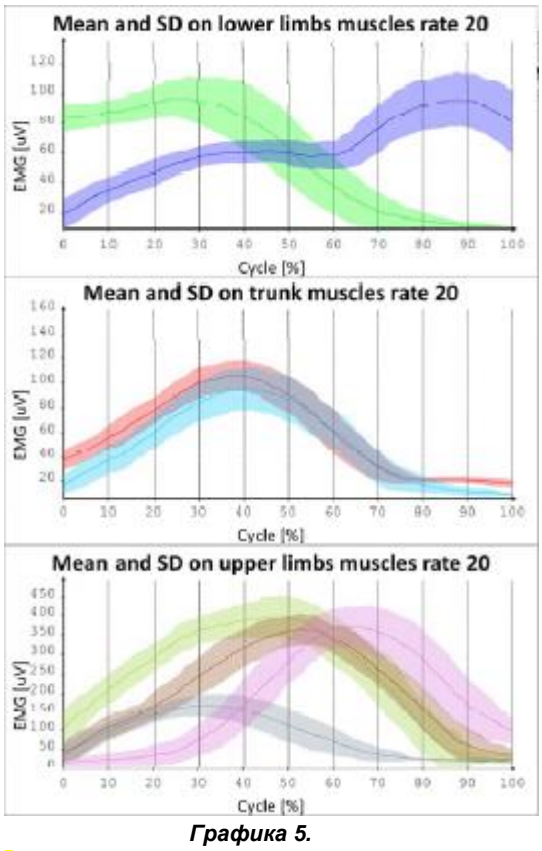


Графика 4.

After analyzing all tested muscles in rowing drive phase, next stage was to put them in pairs according to the correspond segment (lower limbs, trunk, upper limbs). Muscles which are responsible for movements of Lower limbs are (GL) and (RF); for trunk – (BFCL) and (GM); and for upper limbs – (LD), (DP), (TBCL) and (BR).



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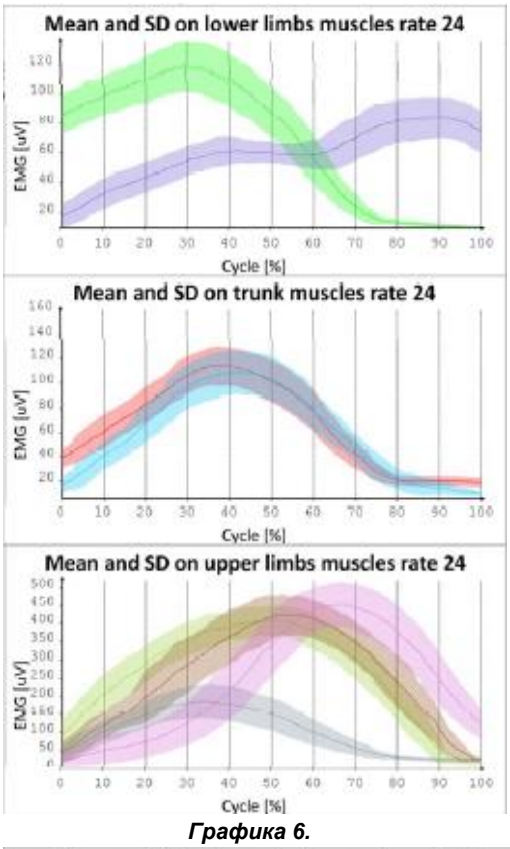

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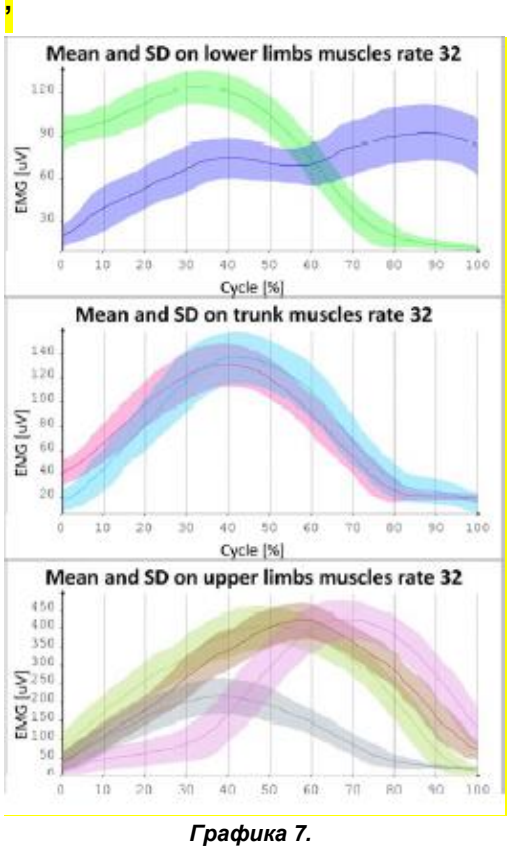

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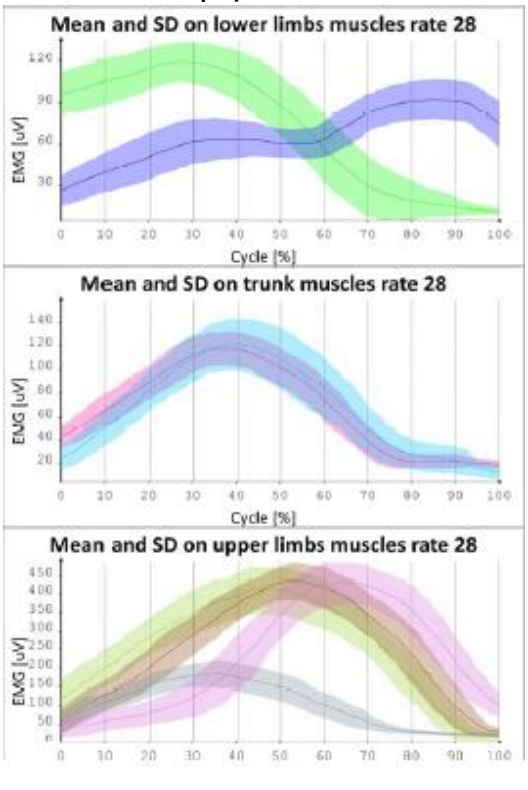
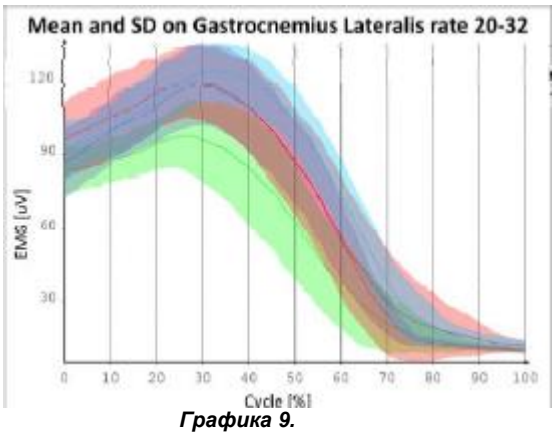


Графика 8.

To be fully analyzed the muscular coordination, it was compared every one muscle, which was included in the test, with itself in different stroke rate. These results were illustrated in graphs from №9 to №16*6.*



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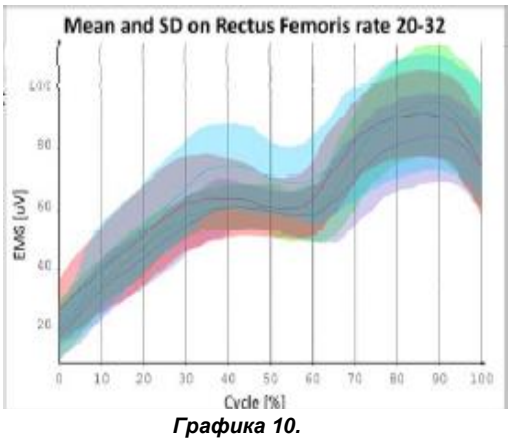

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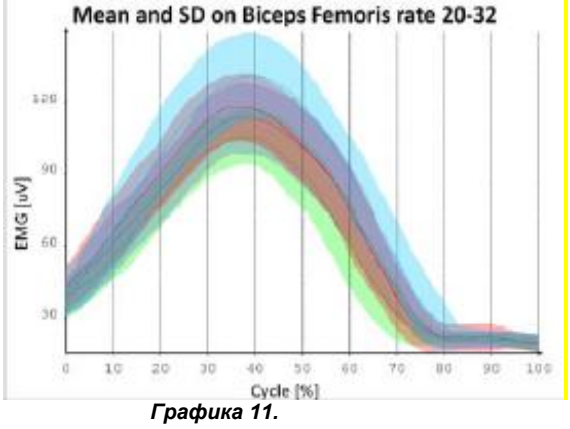

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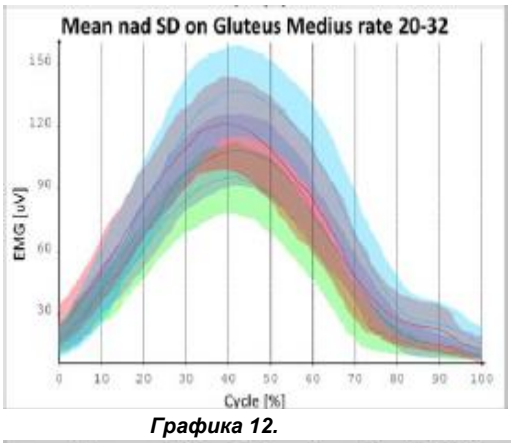

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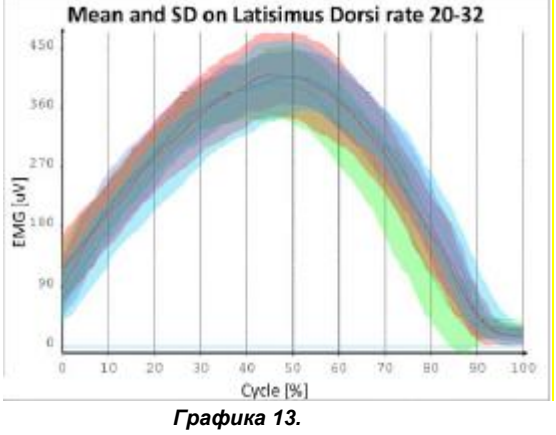

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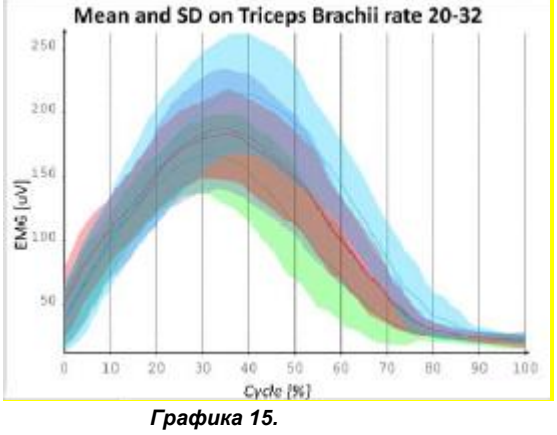

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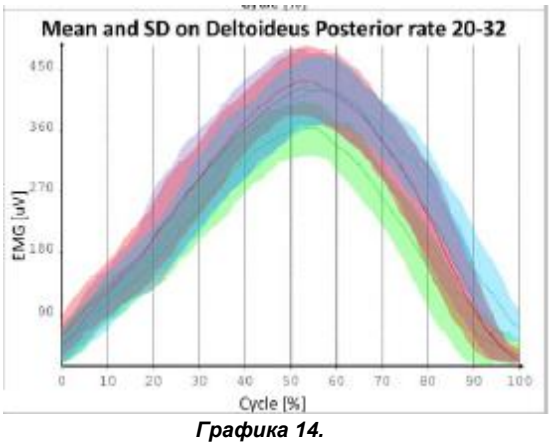

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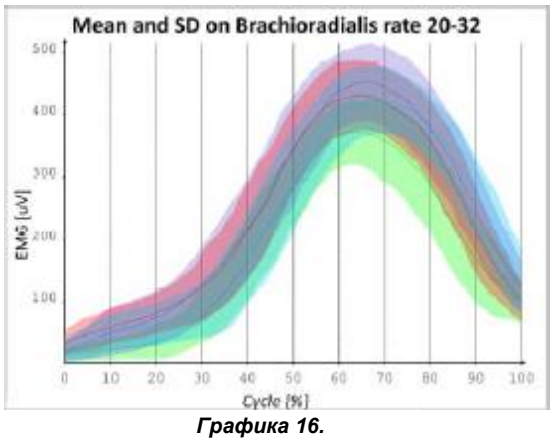

Графика 16.

The results show that with increasing the stroke rate it is observed:

- The competitors have minor change of coordination of their movements. The change consists of that the competitors show 5 % delay of their realization of the maximum muscle intensity although the time decreasing for movement's performance in comparison with the average rowing cycle equated to 100 %.
- Minor difference of coordination with stroke rate from 20 to 32, may be caused by the insufficient exercise duration (in this case 1 minute for each interval). The aim of next investigation will be to analyze the coordination with experiment which will be longer (may be 6-7 minutes, near the time of one race). Longer interval will contribute to bigger fatigue, which will contribute to violation of muscular coordination.
- The experiment was designed to show that with the stroke rate increasing will increase the muscular activity. After analyzing the maximal muscular activities of averaged cycles with different stroke rate, it was established increasing in the muscular activity. There are an exception only with two muscles - Deltoideus Posterior and Brachiiradialis. These muscles have the same maximal muscular activities during the three stroke rate intervals.

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QUANTITATIVE BIOMECHANICAL EVALUATION OF A SHOT TO THE BASKET IN BASKETBALL.

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Keywords: *biomechanics, quantitative criteria, motion control*

Sports achievement depends on many factors related to the psychological, physical, technical and tactical training of an athlete. In different sport disciplines, they have different weights. In basketball, we see everything: challenges, team tactics, physical training, technical mastery and the weight of all of them is significant. However, since the ultimate goal is a successful shot in the basket, we can say that what is leading is the sport and technical mastery.

Among the many ways to shoot in the basket (over head, fan-shaped, with a jump, from below, etc.), an especially fundamental place is held by shooting free throws. It was one of the first technical tricks that are taught to beginners. Its proper mastery is a prerequisite for building good technique with other types of shootings. Strict standardization makes it a preferred choice for research. Of high importance is also the fact that a large percentage of the outcome of basketball games is decided by the realization efficiency of free throws.

It is interesting to note that over the past 50 years, the precision in the realization of free throws in NBA has not changed and remains about 70% [2].

Of course, there are possibilities for improvement, and they are well demonstrated by the achievement of Calvin Murphy in NBA (San Diego Rockets, 80-81) - 95.8%. [5].

As far as the flying phase of the ball obeys objective mechanical laws, there is a temptation to draw conclusions solely based on this kind of mathematical formalism. Examples of this are the "magic" formula of Siverberg (starting angle 52^0, 3 Hz of backspin and 2.8 behind the center of the basket) [4] and the analyzes of John Fontanela for dependencies between the velocity of the ball, height of the basketball player, the height of the trajectory and the most suitable shooting angles [3]. The opinion of Jerry Tarkanian [6] is just the opposite as sees "art" in the performance of basketball shooting.

An essential feature of the shooting in the basket (unlike many other sport and technical activities) is that the controlling system in fact controls the movement only to the beginning of the flying phase. Therefore, the outcome will depend on an adequate idea of the "necessary future". Complying with the "necessary future", the controlling system forms the velocity vector.

Our working hypothesis assumes that the magnitude and direction of this vector are controlled by relatively independent mechanisms.

The objective of this study is to quantify the behavior of the controlled biomechanical characteristics at shooting to the basket from free throws. Realizing this objective, we also pursue the task to uncover some idiosyncrasies in the control of the researched motor action to justify the further improvement of the educational and training process.

Organization and methodology

10 students from the NSA were tested. The only criterion for their selection was that they have not competed in basketball. Each of them performed four series of 10 shootings in the basket from free throws. Shootings were filmed with a standard camera (motion: 25f / 1s). We digitized the video and edited it to one complete cycle of motion. The resulting videos were processed with a video computer analysis system [1], which allows registration of vertical and horizontal coordinates. Subsequently, the coordinates are treated with the appropriate software module of the system, as kinematic characteris-

tics of the researched points as a function of time are obtained with its help. For smoothing of digitized data, an incompletely damped low frequency digital filter with a cut frequency of 10 Hz was used in advance. For processing the results of the study, mathematical formalism of classical mechanics and variation analysis were used.

RESULTS AND ANALYSES

(Fig. 1 and 2) present the model characteristics of the trajectories of the flying phase, respectively at a constant value of V_o as an amount and varying of the values of α_o and at a constant value of α_o at varying of V_o. (Fig. 3 and 4) illustrate the experimentally obtained trajectories for 2 test persons. The comparison with the model characteristics shows significant levels of variations in control, both in the amount of V_o and α_o. This result is quantitatively presented in (Table. 1 and 2). It is noteworthy that in total for the group, cases of variations in the amount of V_o andα_o are evenly distributed (V = 9.2% and

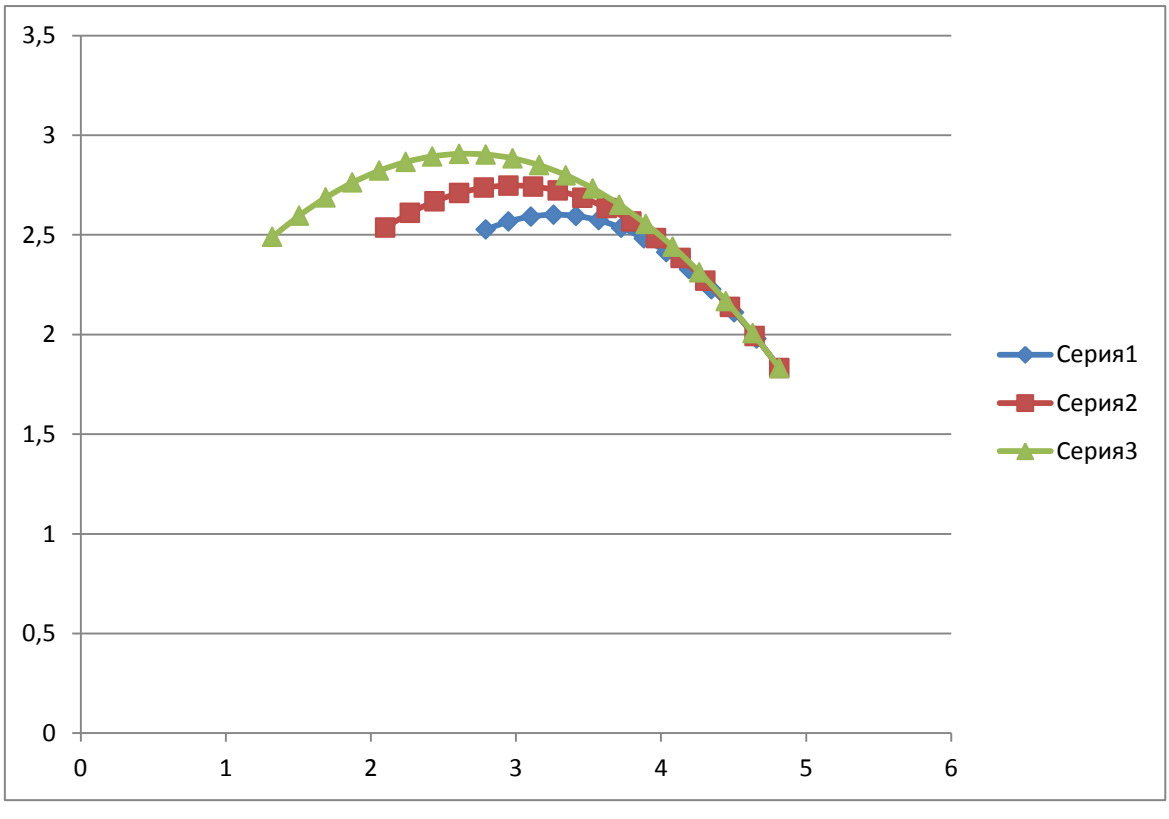

Fig.1

V = 9.55%). The same applies to the statistics of behavior of Vx and Vy (V = 11.54% and V = 11.3%). The highest coefficient of variation has the angle at which the ball falls in the basket (for α_3 V = 13.5%). This is obviously due to the placement of hmax both in vertical and in horizontal direction. From a theoretical point of view, α_3 is also strongly dependent on the resistance of the air, respectively, the square of the velocity of the ball. On the other hand, the resistance will also depend on the concomitant rotational movement, but to clarify the quantitative relationships, additional planned experiments are necessary. Following the idea promoted by the working hypothesis, we sought cases where tested persons demonstrated relative stability of V_o in variability of α_o, and cases in which the characteristic α_o is stable, but there is a higher variability in V_o. (Table 3 and 4) presents data on two such cases. In the first case, the coefficient of variation for V_o is 3.44% and forα_o - 5.18%. The corresponding values for the second tested person are 5.05% and 3.74%. In all cases, the variations in the vertical velocity is higher than the ones in the horizontal. This can easily be explained by the mechanisms by which the motor system is controlled by means of the support reaction. In this sense, there is an interest in future studies of the behavior of this parameter in the performance of shooting in unsupported phase (e.g. jump shot).

It is obvious that in different test persons, various degrees of accuracy in the control of the components of the vector of the initial velocity of the flying phase were observed. This result can be explained by the fact that the magnitude of the velocity V_0 is primarily controlled at the expense of tactile analyzer, while the angle α_0 is a result of a complex intermuscular synergy (respectively the proprioreceptors), creating movement in the kinematic chain.

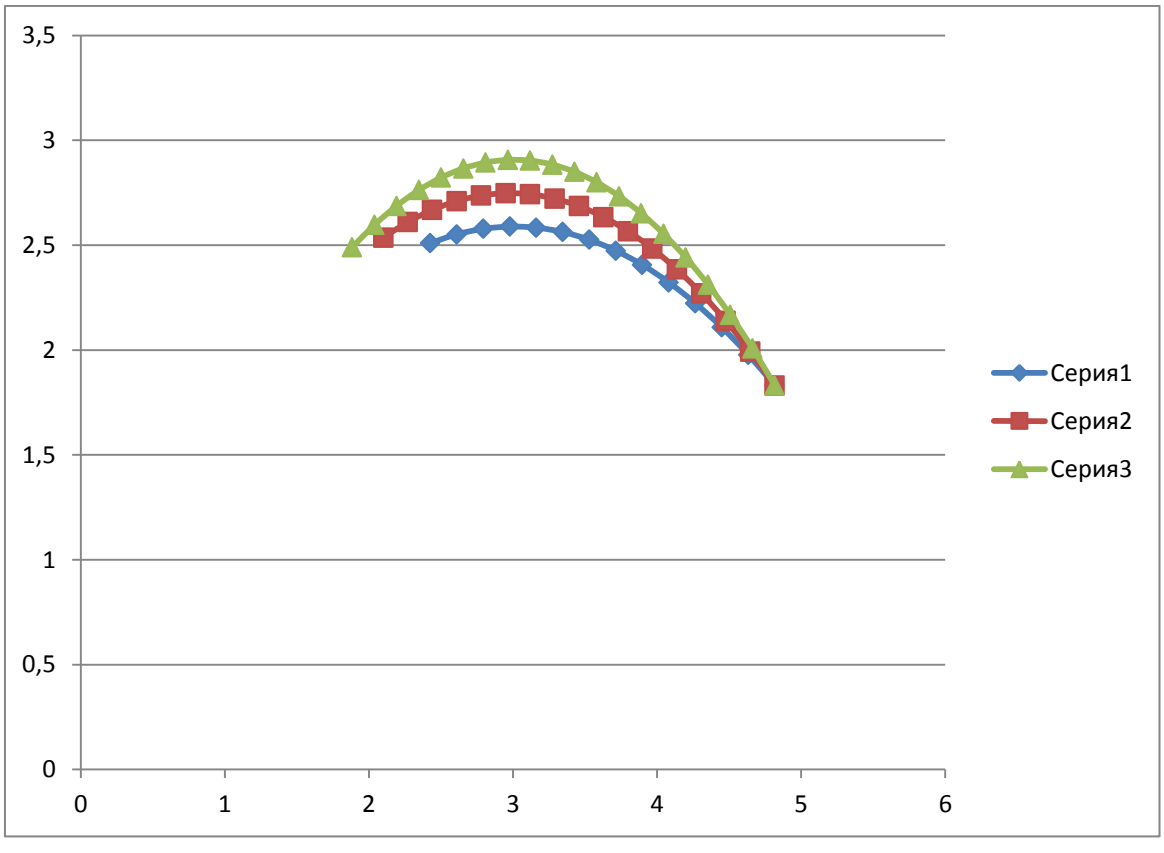

Fig. 2

Table 1. Average data for the group

V_0	S	V%	Vx	S	V%	Vy	S	V%	h max	S	V%
6.74	0.62	9.2	4.16	0.48	11.54	5.4	0.61	11.3	3.57	0.37	10.36

Table 2. Average data for the group

α_0	S	V%	α_1	S	V%	α_2	S	V%	α_3	S	V%
49.2	4.7	9.55	31.8	3.62	11.38	25.1	3.2	12.75	36.4	4.9	13.46

Table 3. Individual data

V_0	S	V%	Vx	S	V%	Vy	S	V%	α_0	S	V%
6.69	0.23	3.44	3.91	0.27	6.91	5.02	0.39	7.77	52.1	2.7	5.18

Table 4. Individual data

V_0	S	V%	Vx	S	V%	Vy	S	V%	α_0	S	V%
6.34	0.32	5.05	4.41	0.18	4.08	4.99	0.26	5.21	48.1	1.8	3.74

α_0 - take-off α_1 - to h max α_2 - from h max to the basket α_3 - in the basket

It should be noted that the tested person in (Table 3 and 4) exhibited the same values for “absolute efficiency” - 40% successful hits the basket. (16 out of 40 attempts). In other words, seemingly equal quantification of sports equipment on the basis of absolute performance, apparently due to varying degrees of accuracy in the management of various structures of the overall system of movement.

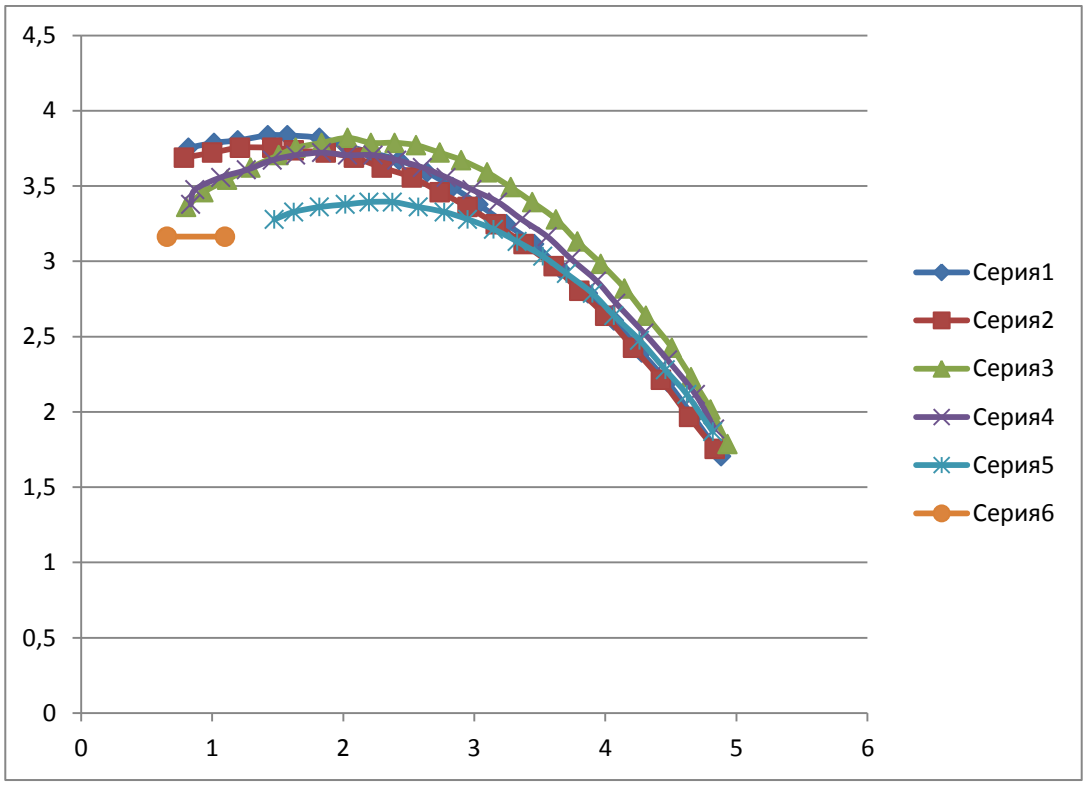

Fig. 3

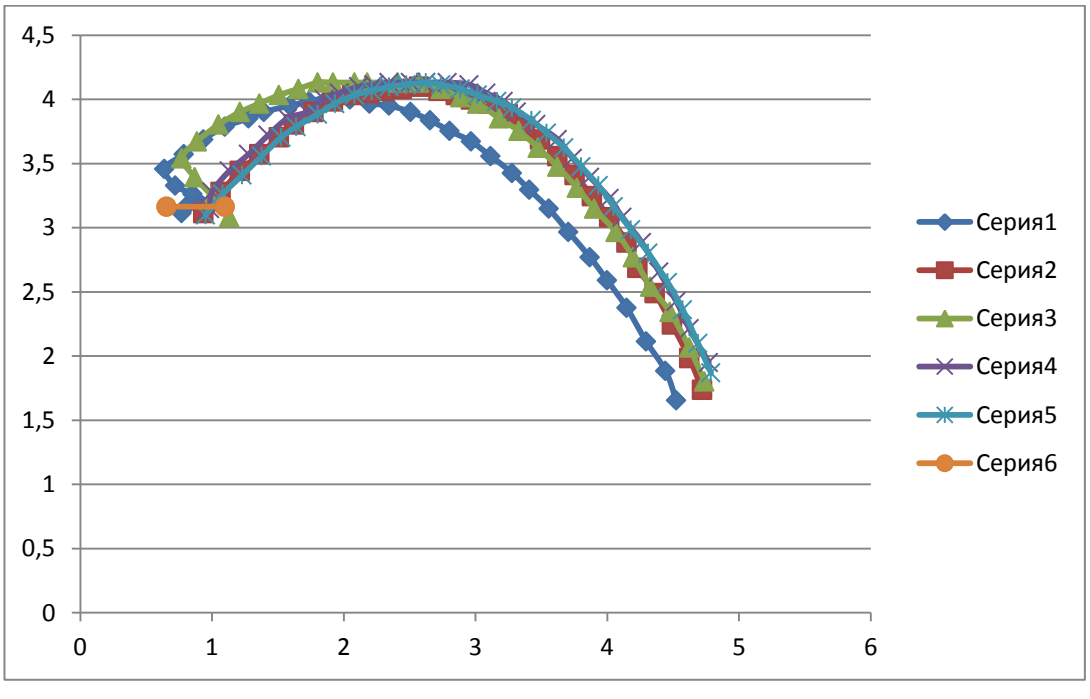

Fig. 4

Should not be forgotten that the adequate realization of the target function has a significant impact and movement during the flying phase, during which time the player will control effects. To fully clarify the overall structure of control system is necessary for accurate assessment and provide "model of necessary future."

In other words, the seemingly equal quantitative value of sports technique on the basis of absolute efficiency is apparently due to varying degrees of accuracy in the control of different structures of the overall system of movement.

It should not be forgotten that on the adequate realization of the target function, the movement during the flying phase – a period in which the player does not have control functions – also has a significant impact, To fully clarify the overall structure in the control system, an evaluation of the accurate notion and a "model of the necessary future" are also needed.

CONCLUSIONS AND RECOMMENDATIONS

1. The control of locomotory system is done by three relatively independent mechanisms – construction of a model of the necessary future and formation of the magnitude and direction of the initial velocity for the flying phase.
2. The quantitative evaluation of „absolute efficiency" through the percentage of successful attempts is too rough and ambiguous. Players with the same „efficiency" demonstrate different control capabilities of the three structures.
3. Independence in the control does not mean independence between the mechanical properties in the realization of the target function. This fact implies the realization of planned experiments for assessment of the finer structures in the system providing adequate behavior of compensatory mechanisms.
4. The obtained results convincingly demonstrate the need for the development of personalized methods for improvement the sporting and technical mastery.

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EFFICIENCY OF THE INTERNET BASED TEACHING PLATFORM (TESS)

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Key words: *Internet based teaching tool, sport, technical English*

The formation of intercultural communicative competences requires not only language knowledge and acquisition of certain linguistic patterns, but also observation of communication social norms and rules of oral interaction. The current aim of foreign language studies is the free orientation in a foreign environment. Consequently, modern active methods of education should be applied, using innovation technologies and encouraging self-dependent study activities of the learners.

With the recent growth of the Internet and other distance technologies, Web based courses have become an attractive option for expanding the available educational opportunities (Rivera & Rice, 2002).

Nowadays, the implementation of up-to-date information technologies in language acquisition increases learners' motivation and cognitive activity, allows the development of self-oriented interactive educational technology, and helps overcoming the psychological language barrier (Bulanova, 2012).

What is more, a number of surveys have proved that Web based educational platforms are considered to be equally helpful and even more satisfying for learners compared to the traditional form of presenting the teaching material (Kendall, 2001; Wernet, Olliges & Delicath, 2000).

The increasing accessibility to modern computer technologies makes them much more attractive in the process of teaching a foreign language, and they are considered to have a positive influence on the efficiency of the learning process and motivation (Russell, 1999; Schoech, 2000).

The Internet based teaching tool – TESS comprises four main sections - Volleyball, Basketball, Table Tennis and Common stations. Each of them includes a number of different stations related to different contents. The stations are constituted by three videos that set up the basis for the exercises presented to the users.

The aim of the present study is to reveal the level of efficiency of the Web based teaching platform TESS.

The tool was tested in 2013 among **137 individuals** of specific targeted population – coaches, referees, players, and sports persons from five different countries – France, Bulgaria, Portugal, Germany, and Hungary.

In order to establish whether the tool will be useful for the future users, the main **task** set was to receive the testers' feedback on the technical, pedagogical, and language contents of the tool after doing a whole station, which means viewing the three videos, doing each video's exercises, and exploring the vocabulary and the grammar associated with it.

The TESS tool is conceived to meet the needs of a specific population. That's why a **Likert-type questionnaire** was distributed among the 137 testers (all of them sports persons). Its questions were inferentially treated, considering several groupings – sport, role within the sport, organization type and country, to see if there was an effect of these independent variables on the variance expression of the answers. The questionnaire included a free comment section which descriptively presented the testers' comments regarding the technical, pedagogical, and language contents of the different stations.

RESULTS

The inferential analysis of the results consists of an analysis of variance, through the use of a one-way between subjects ANOVA. This type of test analyses the differences of variance of the scores (mean scores and standard deviation) for the different groupings established. The significant level, expressed by the test's *p* value, was set at .051.

The results from the analysis of the variance prove the testers' overall satisfaction with the tool. The mean scores given to all the items in the questionnaire are around 3 (fig. 1).

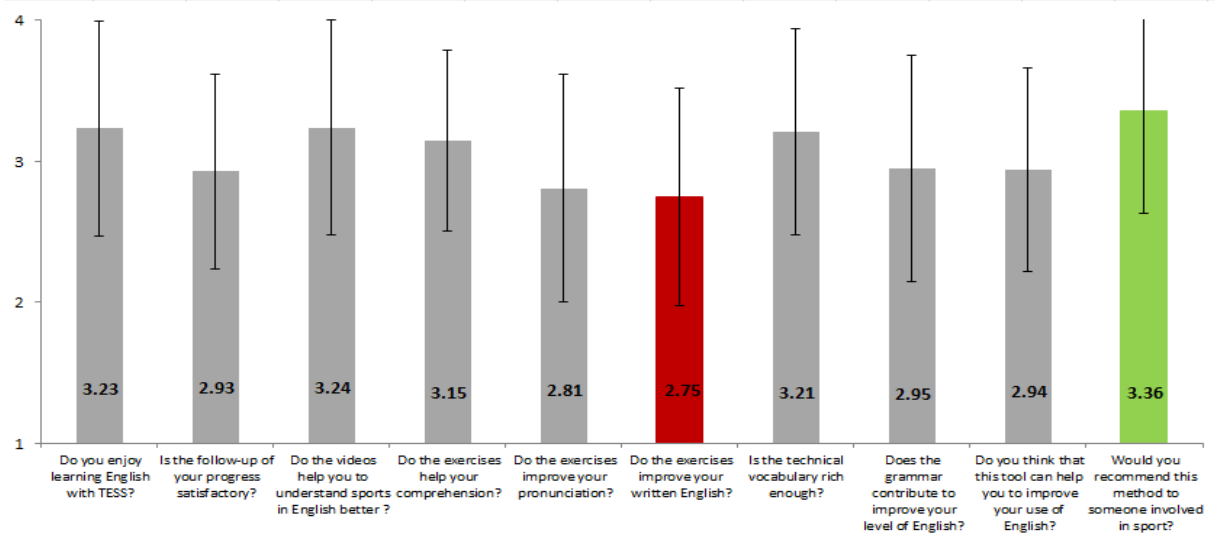

Fig. 1. Mean scores of the feedback questionnaire's answers (range from 1 to 4)

Table 1. Feedback questionnaire's answers per Sport

Questions	Volleyball	Basketball	Common Stations	Table Tennis
	M(SD)	M(SD)	M(SD)	M(SD)
Do you enjoy learning English with TESS?	3.47 (.74)	3.74 (.45)	2.71 (.69)	3.03 (.70)
Is the follow-up of your progress satisfactory?	3.16 (.57)	3.30 (.72)	2.65 (.71)	2.61 (.549)
Do the videos help you to understand sports in English better?	3.50 (.63)	3.37 (.74)	2.90 (.89)	3.11 (.67)
Do the exercises help your comprehension?	3.26 (.58)	3.44 (.64)	2.80 (.66)	3.11 (.58)
Do the exercises improve your pronunciation?	2.98 (.74)	3.30 (.67)	2.67 (.84)	2.36 (.72)
Do the exercises improve your written skills?	2.93 (.83)	3.30 (.61)	2.50 (.68)	2.33 (.54)
Is the technical vocabulary rich enough?	3.28 (.70)	3.48 (.70)	2.87 (.78)	3.19 (.67)
Does the grammar contribute to improve your level of English?	3.26 (.67)	3.19 (.79)	2.47 (.86)	2.81 (.67)
Do you think that this tool can help you to improve your use of English?	3.09 (.72)	2.93 (.83)	2.90 (.70)	2.81 (.62)
Would you recommend this method to someone involved in sport?	3.67 (.52)	3.74 (.66)	3.10 (.70)	2.94 (.72)

In order to reveal the statistical significance of the answers based on the **Type of sport**, the 137 users were distributed in four categories as follows: 43 from Volleyball, 27 from Basketball, 31 from Common Stations, and 36 from table Tennis. There was homogeneity of the variance between groups (a requisite to apply the test with confidence). Sport had a statistically significant effect on all the answers ($p < .05$), with the exception of the 9th answer, were no significant differences were found ($p > .05$) (Table 1).

There is no significant difference between the answers given by the Volleyball (VB) and Basketball (BB) responders, which is also present between the Common Stations (CS) and Table Tennis (TT) ones. However, the mean values of the answers of VB and BB are tendentiously higher than those of CS and TT.

In the 1st, 2nd, and 10th questions VB and BB significantly differ from CS and TT. In the 3rd question only VB and CS significantly differ from each other; in the 4th question CS significantly differ from VB and BB. In the 5th question VB and BB significantly differ from TT, and BB also significantly differ from CS. In the 6th question VB and BB significantly differ from TT, and VB also significantly differ from CS. In the 7th question only BB and CS significantly differ from each other. In the 8th question VB and BB significantly differ from CS, and VB is also significantly different of TT.

In order to reveal the statistical significance of the answers based on the **Role within Sport** the 137 users were distributed in four categories as follows: 37 coaches, 23 players, 7 officials and 70 sport people. The homogeneity of variance test showed homogenous variance between groups, that's why there is confidence in the analysis results. Role had a statistically significant effect on all the answers ($p < .05$), with the exception of the 9th answer, were no significant differences were found ($p > .05$) (Table 2).

Table 2. Feedback questionnaire's answers per Role within Sport

Questions	Coaches	Players	Officials	Sports Persons
	M(SD)	M(SD)	M(SD)	M(SD)
Do you enjoy learning English with TESS?	3.65 (.59)	3.70 (.47)	3.29 (.49)	2.86 (.75)
Is the follow-up of your progress satisfactory?	3.24 (.64)	3.17 (.65)	3.14 (.38)	2.66 (.66)
Do the videos help you to understand sports in English better?	3.57 (.56)	3.30 (.70)	3.43 (.79)	3.01 (.80)
Do the exercises help your comprehension?	3.43 (.60)	3.26 (.62)	3.14 (.38)	2.97 (.64)
Do the exercises improve your pronunciation?	3.24 (.68)	2.87 (.69)	2.86 (.69)	2.55 (.83)
Do the exercises improve your written skills?	3.27 (.77)	2.74 (.69)	3.14 (.69)	2.43 (.63)
Is the technical vocabulary rich enough?	3.41 (.69)	3.26 (.69)	3.57 (.79)	3.04 (.74)
Does the grammar contribute to improve your level of English?	3.38 (.68)	2.96 (.88)	3.00 (.58)	2.71 (.75)
Do you think that this tool can help you to improve your use of English?	3.03 (.83)	3.04 (.71)	2.57 (.53)	2.90 (.66)
Would you recommend this method to someone involved in sport?	3.81 (.40)	3.57 (.73)	3.71 (.49)	3.03 (.72)

The results show that sport people tend to have the lowest mean scores, and coaches the highest, with the exception of the 9th question, where officials were the lowest scores responders.

In the 7th and 9th questions there are no significant differences between the groups; even though the overall test in the 7th question is statistically significant (barely). The consistent significant difference in the rest of the questions is between the coach and sport person categories.

The sport person category also significantly differs from the player category in the 1st, 2nd and 10th questions, being that in the later it also differs from the official category. Lastly, coaches and players differ significantly in their answers in the 6th question.

In order to reveal the statistical significance of the answers based on the **Organization type** the 137 users were distributed in three categories as follows: 18 from Clubs, 7 from Associations and Federations, and 112 from Universities (Table 3).

Table 3. Feedback questionnaire's answers per Organization type

Questions	Clubs	Federations	Universities
	M(SD)	M(SD)	M(SD)
Do you enjoy learning English with TESS?	3.89 (.32)	3.29 (.49)	3.13 (.77)
Is the follow-up of your progress satisfactory?	3.22 (.55)	3.00 (0)	2.88 (.72)
Do the videos help you to understand sports in English better?	3.61 (.61)	3.57 (.53)	3.15 (.77)
Do the exercises help your comprehension?	3.33 (.49)	3.14 (.38)	3.13 (.68)
Do the exercises improve your pronunciation?	3.06 (.64)	2.57 (.53)	2.78 (.85)
Do the exercises improve your written skills?	3.11 (.76)	2.86 (.69)	2.68 (.76)
Is the technical vocabulary rich enough?	3.33 (.69)	3.57 (.79)	3.16 (.73)
Does the grammar contribute to improve your level of English?	3.39 (.61)	3.29 (.49)	2.85 (.81)
Do you think that this tool can help you to improve your use of English?	3.39 (.61)	2.71 (.49)	2.88 (.72)
Would you recommend this method to someone involved in sport?	3.78 (.43)	3.57 (.53)	3.29 (.75)

The contribution to the significant differences expressed in the ANOVA test came from Clubs and Universities, being that, when there were statistical differences, club's answers scores are higher than those of Universities.

In order to reveal the statistical significance of the answers based on the **Country** the 137 users were distributed in five categories as follows: 15 from Portugal, 16 from Hungary, 26 from Germany, 41 from France, and 39 from Bulgaria.

The variable **Country** has a statistically significant effect on all the answers (Table 4). Actually the statistical significance is expressed in all the questions, with the exception of the 9th (p<.05), at the .001 level.

Table 4. Feedback questionnaire's answers per Country

Questions	Portugal	Hungary	France	Germany	Bulgaria
	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
Do you enjoy learning English with TESS?	3,47 (,64)	3,63 (,50)	3,12 (,71)	2,46 (,71)	3,62 (,54)
Is the follow-up of your progress satisfactory?	3,13 (,52)	3,25 (,45)	2,66 (,53)	2,46 (,71)	3,31 (,69)
Do the videos help you to understand sports in English better?	3,67 (,49)	3,69 (,48)	3,17 (,67)	2,58 (,83)	3,36 (,71)
Do the exercises help your comprehension?	3,40 (,51)	3,25 (,58)	3,10 (,54)	2,68 (,63)	3,38 (,67)
Do the exercises improve your pronunciation?	3,13 (,74)	3,19 (,66)	2,37 (,70)	2,48 (,82)	3,21 (,70)
Do the exercises improve your written skills?	3,20 (,77)	3,06 (,77)	2,39 (,59)	2,32 (,56)	3,10 (,75)
Is the technical vocabulary rich enough?	3,73 (,46)	2,88 (,72)	3,15 (,69)	2,88 (,73)	3,41 (,72)
Does the grammar contribute to improve your level of English?	3,33 (,49)	3,31 (,70)	2,83 (,67)	2,29 (,81)	3,18 (,79)
Do you think that this tool can help you to improve your use of English?	2,67 (,82)	3,38 (,72)	2,83 (,59)	2,81 (,63)	3,08 (,77)
Would you recommend this method to someone involved in sport?	3,53 (,52)	3,75 (,45)	3,02 (,72)	2,88 (,65)	3,82 (,56)

As presented in Table 4, the lowest scores are associated, in almost every question, with Germany and France, with the exceptions of the 7th and 9th questions, where Hungary and Portugal, respectively, have the lowest scores. This directly relates to the significant differences between these groups, where

Germany's difference to the other countries is a major contributor to the tests significance. Germany significantly differs from all the other countries in the 1st, 3rd, and 8th questions. In the 2nd, 4th, and 6th questions it only doesn't differ from France. In the 5th and 10th questions it significantly differs from Hungary and Bulgaria; and in the 7th question its values significantly differ from Portugal and Bulgaria.

A major contribution also lies in France's differences from Portugal, Hungary and Bulgaria. It significantly differs from the three in the 5th and 6thquestions; also from Bulgaria and Hungary in the 2nd and 10th questions; and from Bulgaria in the 1st question.

The other contributions to the tests significances come from a significant difference between Portugal and Hungary in the 7th question, with Portugal having higher scores than Hungary. There are also significant differences between Portugal and Bulgaria in the 10th question, where Bulgaria has higher scores than Portugal.

CONCLUSION

The survey has successfully fulfilled its task. The obtained results are indicative of homogeneity of the tool's appreciation of value in the sample tested. All the organization types researched are unanimous that learning English with the TESS tool could help them to improve their use of technical English.

Volleyball and Basketball responders seem to be more satisfied with the tool, considering the higher scores in their evaluation.

The results suggest that the specificity of the tool content is more appealing for people strongly related with the sports presented, especially coaches, as opposed to Sport people, that significant differ from all the other categories in the recommendation of the tool.

The average higher score comes from the question "*Would you recommend this method to someone involved in sport?*", with a very expressive 3.36. This might be indicative that, even to those that might not see value in the tool to improve their use of English, they recognize its value to others.

As for the user's free comments, it should be highlighted that when negative, they mainly concern the technical aspects. The pedagogical comments include mainly positive feedback and some aspects' possible improvement. Regarding the language contents, it seems a relevance is given to the technical vocabulary over the general one, with diverging opinions, mainly based on the user's English level (the lower the level the more satisfied the user).

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BIOMECHANICAL FEATURES OF THE SIT SPINS IN FIGURE SKATING

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National Sports Academy "Vassil Levski", Sofia, Bulgaria biomechanics, figure skating, sit spins, angular momentum

INTRODUCTION

Spins are required elements of figure skating, in which a skater turns round his/her axis, his/her feet touching the ice. The speed of spinning can be changed by increasing or decreasing the skater's momentum of inertia (i.e. by bringing closer or moving free leg or arms further apart). Each spin should be fast, controlled and centered, and all these elements should be evaluated by judges when deciding on the final mark for the executed spin [2].

The aim of this study is an attempt to investigate and summarize some results of biomechanical research into the figure skating sit spins. Phases of the movement, functions of the phases and mechanical principles are combined in an effort to give the coach some background information about the event, but also to elicit comments and suggestions for future research from coaches and skaters.

METHODS

For implementation of the study highly skilled figure skater with height 180 cm and weight 73 kg perform sit spins. Standard digital VCR provided the registration of movement. Video material was treated with an author video computer system for movement analysis [1].To smooth out of digitized data was used digital low-pass filter with a cutoff frequency 6th harmonic of the natural frequency of movements. The biomechanical variables computed from the videotape data included free leg position, take-off angle, vertical and horizontal velocity, rotational velocity, time to attain the rotating position, and jump height.

For the purpose of this report the sit spin is subdivided into four distinct phases:

1) Approach – includes the initial acceleration of the athlete;
2) Propulsion – begins at the time of hyperextension of the arms and free leg and ends as the skater is separated from the ice during takeoff;
3) Flight phase – begins as the skater's supporting skate leaves the ice and ends as touches the landing surface;
4) Landing – from touching the ice to performing on ice sit spins.

RESULTS

Approach

The athlete will approach the takeoff with a linear velocity of approximately 4 m/s, however, less skilled athletes have a tendency to enter their jumps with less horizontal velocity.

During the preparatory phase the skater needs to change translational movement of the body on ice into rotation and can go on the flying sit spin through two separate ways. The first way starts at running back on the inside edge of the skate and goes into forward motion on the outer edge of the skate on the other foot. The second way is to carry out an internal turn and move forward on the outer edge. A key element of this phase is moving forward on the outer edge in targeting to takeoff (Fig. 1).

The duration of this phase is 0.40 s, starting conditionally accepted when skater steps with the other leg (Fig. 1b) and ends at the time of Figure 1d.

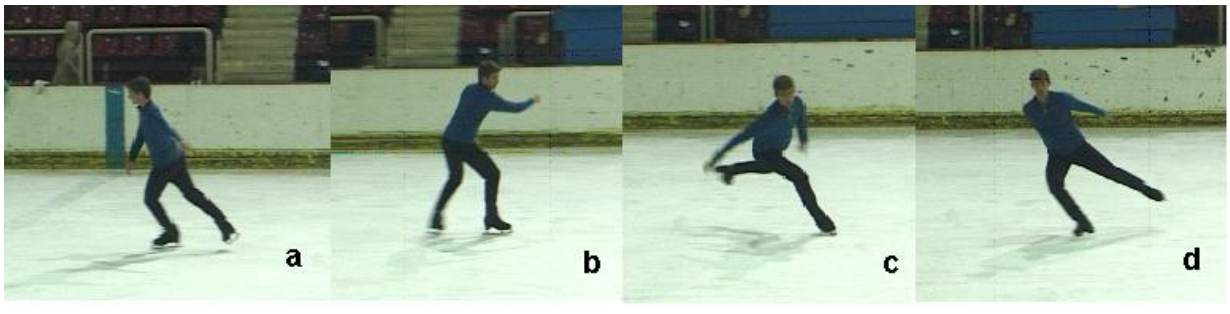

Fig. 1. (a) Skater prepares to jump as it moves backwards on the inside edge of the skate; (b) The athlete steps with the other foot; (c) The competitor is moving forward on the outer edge; (d) Skater prepares to jump as tilted toward the center of the fitted curve when moving, located on the outer edge of the support skate.

Propulsion

During this phase, the athlete must generate an optimum level of kinetic energy (translational and rotational) and at the same time to bring the segments of his/her body in proper posture for the separation of body upward from the ice. The duration of this phase is 0.36 s.

At the beginning of propulsion phase, the skater will increase the knee flexion of the supporting leg to 60-70 degrees, which will allow being in a better position to start the jump. When the competitor begins to increase flexion in the knee joint, upper limb and the leg will be in a state of maximum hyperextension.

Hyperextension of the shoulder and the hip is up to about 55-60 degrees relative to the line of the trunk, as a result the segments are parallel to each other (Fig. 2).

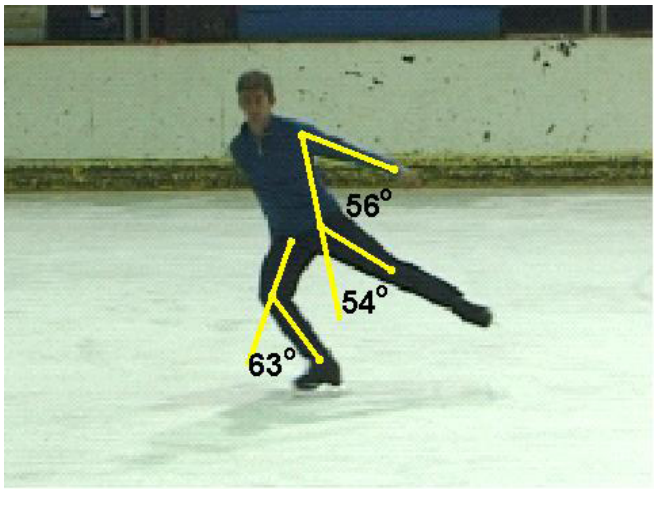

Fig. 2. Posture of the skater at the time of hyperextension of the arms and free leg before starting their forward movement

Subsequently, the competitor will rotate the leg and both arms forward and upward to the body. The free leg and the corresponding arm moving in a wide semicircle, while the hand on the side of the support leg swings forward to the body.

It is important that the free lower limb and the arms are expanded so that their centers of masses are located on the maximum possible distance from the axis of rotation of the body in order to increase the angular momentum which will be generated during the takeoff (see. Fig. 3a).

When free leg at the time of the forward movement reaches a horizontal position is initiated takeoff and separation of the supporting ice skate (see. Fig. 3b). The competitor rises in the air by extension in the knee and hip of the support leg, creating the initial velocity in the vertical direction during the takeoff.

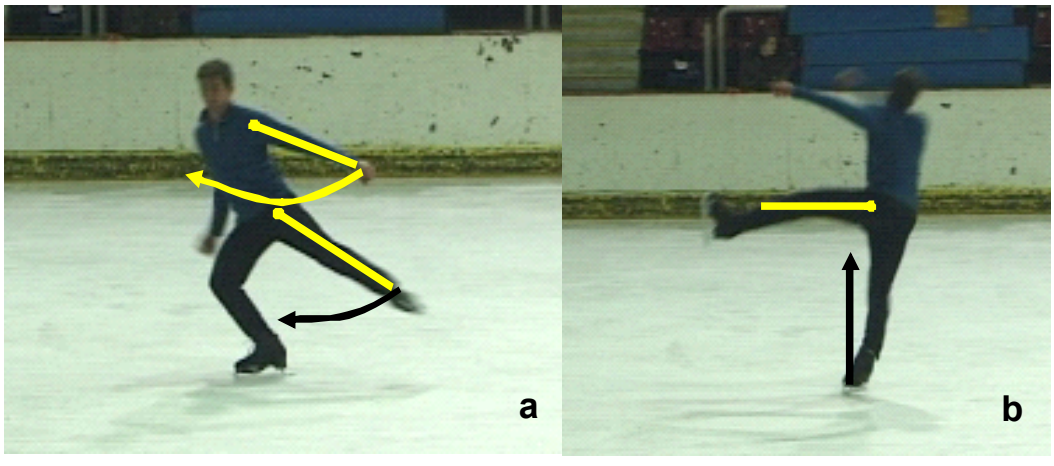

Fig. 3. (a) Skater rotates forward free leg and upper limbs in a semicircular motion; (b) At this point of the movement starts separating from the ice.

While the supporting leg is fully extended, free leg and both arms have completed their moves forward and upward as the arms are at shoulder level and the free leg is at waist level. An important requirement from mechanical point of view is this movement to complete at the moment of the separation of the support skate. Thus it adds an extra force impulse increases the supporting effect in the vertical direction, which on one hand assisted the muscular effort of the support leg and on the other contributes to the greater height of the jump.

The measured duration of propulsion phase is 0.36 s, as takeoff angle is 85 degree and the initial velocity in the vertical direction of the center of mass (CM) is 2.16 m/s.

Figure 4 shows the results of the rotation angle and angular velocity of the trunk about its longitudinal axis during the phases.

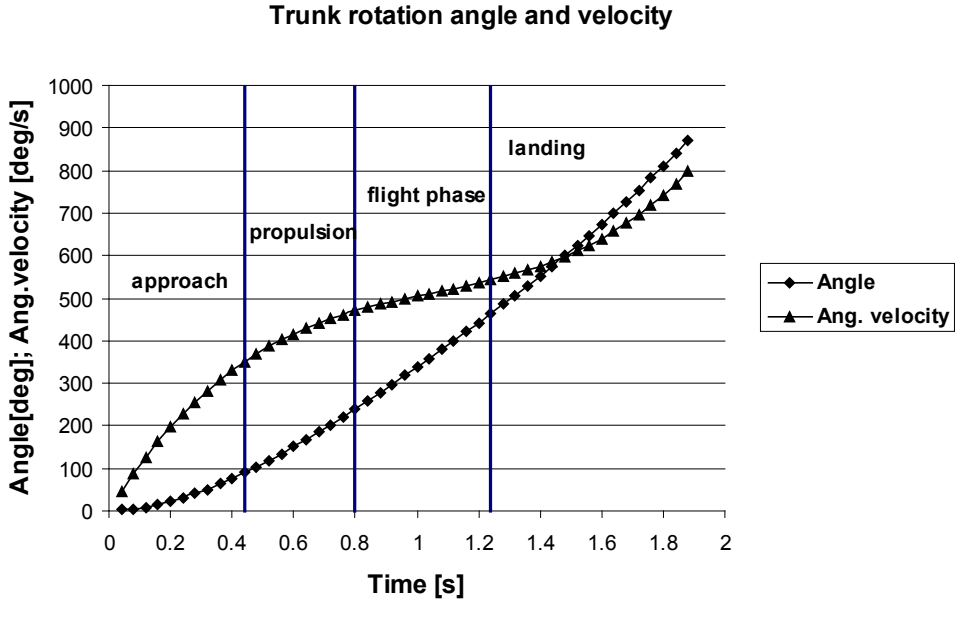

Fig. 4. Trunk rotation angle and angular velocity about its longitudinal axis

Flight phase

Once the competitor enters the flight phase, it must take the posture of sit spin before landing on the ice.

The sit spin position consists of a fully extended free leg, which is flexed at the hip forward of the body and is parallel to the ice surface.

The takeoff leg is flexed underneath the athlete with the thigh parallel to the ice and the lower leg extended down towards the ice.

While in the air, the free leg of the athlete will be a little off on taking the sit spin position as lags behind the body after the takeoff. Once the skater landed on the ice, the leg will go back to the body and take the perfect sit spin position.

During the sit spin the arms are extended and taken away from the body at about 90 degrees abduction in the shoulder joints.

Usually, when stands at the posture while rotating, there is a tendency the leg to lag behind rest of the body, leaving slightly more sideways.

Once the flight phase is complete, the skater extends the hip and knee of the takeoff leg and plantar flexes at the ankle joint of the landing leg.

The duration of this phase is 0.44 s.

Landing

The competitor must land of the support skate on the ice at slightly flexed ankle joint and subsequently to increase a flexion, preparing to take a sit spin position on the ice.

Once skate touches the ice, the competitor should almost immediately be in a sit spin position.

In this posture on the ice support leg is fully flexed at the hip and knee, free leg is flexed at the hip joint and knee is extended, the trunk is bent forward and extended in a straight line and the arms extended along the free leg.

DISCUSSION

When the skater after landing perform sit spins on the ice best technique required to strive to maintain less than 60 degrees angle in the knee of the supporting leg i.e. the lower posture is preferred.

Also, the back of the competitor must be straight and with a smaller angle of 40 degrees of flexion relative to the horizon (Fig. 5).

Fig. 5. Athlete demonstrates a good sit spin with a high degree of knee flexion in the support leg.

The free leg must remain straight, with thigh parallel to the surface of ice and minimal (to zero) flexing in the knee joint. The competitor must also press her thighs towards one another to provide a tight rotation.

Upper limbs of the skater should be taken forward in the shoulder joints of the body. There are no specific requirements for their position, but are recommended to be parallel to the thigh of the supporting leg. It is important not to lay hands on the leg of the competitor, as this leads to reduced equilibrium stability.

The head should be upright.

Rotation should be done on the front end of the skate blade on a constant rotational point whereby the competitor is not experiencing any lateral deviation (eccentricity). This lateral deviation in the rotation is associated with loss of balance or wobbly rotation.

CONCLUSION

Let in conclusion to pay attention to some common errors.

Skater begins the rise of the free leg very early during the takeoff and leg reaches maximum height before separation of the competitor from the ice.

As a result, the leg starts to move down, while the rest of the body moves up and skater is unable to take the posture of sit spin while in the air phase. To correct this, the competitor must keep the free leg and arms back for a long time and then use them in the takeoff. A good position in the air is achieved, if the athlete is able to retain the free leg approximately parallel to the ice at its maximum height.

Another common error is the case when the athlete can not reach the required position of sit spin during the flight phase. This may be associated with a lack of flexibility in the lower leg tendon of the leg or deficiency of muscle strength of the hip flexors in order to keep the leg in this extreme position.

One main error occurs at the time of rotation on the ice when the competitor does not reach the lowest position. This occurs when the skater is not able to position the thighs parallel to the surface of the ice, which is likely to be the result of weak muscles in the abdomen or inflexibility of the muscles extensors of the lower back, shank, or thigh.

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KINEMATICS OF DISMOUNT – DOUBLE SALTO BACKWARD PICKED ON THE PARALLEL BARS

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Keywords: *gymnastics, parallel bars, picked dismount, kinematics*

INTRODUCTION

Dismounts on parallel bars are exercises by which gymnasts completed their routines. As the dismount is more difficult and properly implemented so the impression is better and this is reflected in the final score value of the apparatus.

Generally a dismounts possess a swinging portion, flight part and landing.

The final task of the gymnasts consists not only to give enough height after separation from the apparatus, but swirling and moving sideways [7, 8, 13].

The basic dismount - salto backward straight was implemented in 1948. Subsequently are used other dismounts with turning around the longitudinal axis at 180° and 360° and dismounts when swinging backward. In 1969 was realized and demonstrated dismount double salto backward tucked [2].

According Yu. Gaverdovskiy (1979) at the time of separation of body from the apparatus, gymnastics center of mass (CM) projection passes through the footprint of the hand, in view of the creation of a pair of forces, carrying out the rotational motion. On the other hand, the total duration of the flying phase is 0.8 - 1.0 sec.

These studies provide information about kinematics parameters, technique of execution, training methods and creating individual models with future progressive difficulty [1, 10, 11, 12].

Discussed above questions about a dismounts on parallel bars are reflected by other authors [3, 14, 15]. The authors combine biomechanical laws with consideration of technique and methodology of training of dismounts and their future development.

In modern times, significant development and boost received the analysis of movements in sports and gymnastics [9].

In summary, we can say that the examination of the kinematics of the complicated dismounts, combined with specificity in their implementation, could contribute to improving and performing more difficult and original versions of well-known and implemented dismounts on parallel bars.

The aim of this study was research and determination of kinematics characteristics and their parameters of dismount - double salto backward picked on the parallel bars.

METHODS

In relation to the objective set was used TV video from the Internet, selected by an expert evaluation.

Video material was treated with an author video computer system for movement analysis [4].

To ensure reliable quantitative assessment of the parameters from video material with camera pan and zoom was applied method of dynamically scaling [5].

In cases of temporary hiding of registered points is using a modified cubic spline interpolation to restore the lost data [6].

The left foot toes and heel; the ankle, knee, hip, shoulder, elbow, wrist joints; the hand, the head and a two points on the bar were digitized.

To smooth out of digitized data was used incomplete damping digital low-pass filter with a cutoff frequency 6th harmonic of the natural frequency of movements before data being submitted to further analysis.

The data obtained from the video system are saved in Excel file that allows flexible interpretation and graphical presentation of results.

For the purpose of this study the dismount is subdivided into three distinct phases (see Fig. 1):

1) Preparatory actions (swinging forward) - begins at stand position of the gymnast to release hands from the bars (swinging phase) (1) – (4);
2) Main actions (flight phase) - begins as the gymnast leaves the bars and ends as the gymnast touches the landing surface (4) – (10);
3) Concluding actions (landing and amortization of rotation) - from touching the floor to standing in a stationary position (10) – (12).

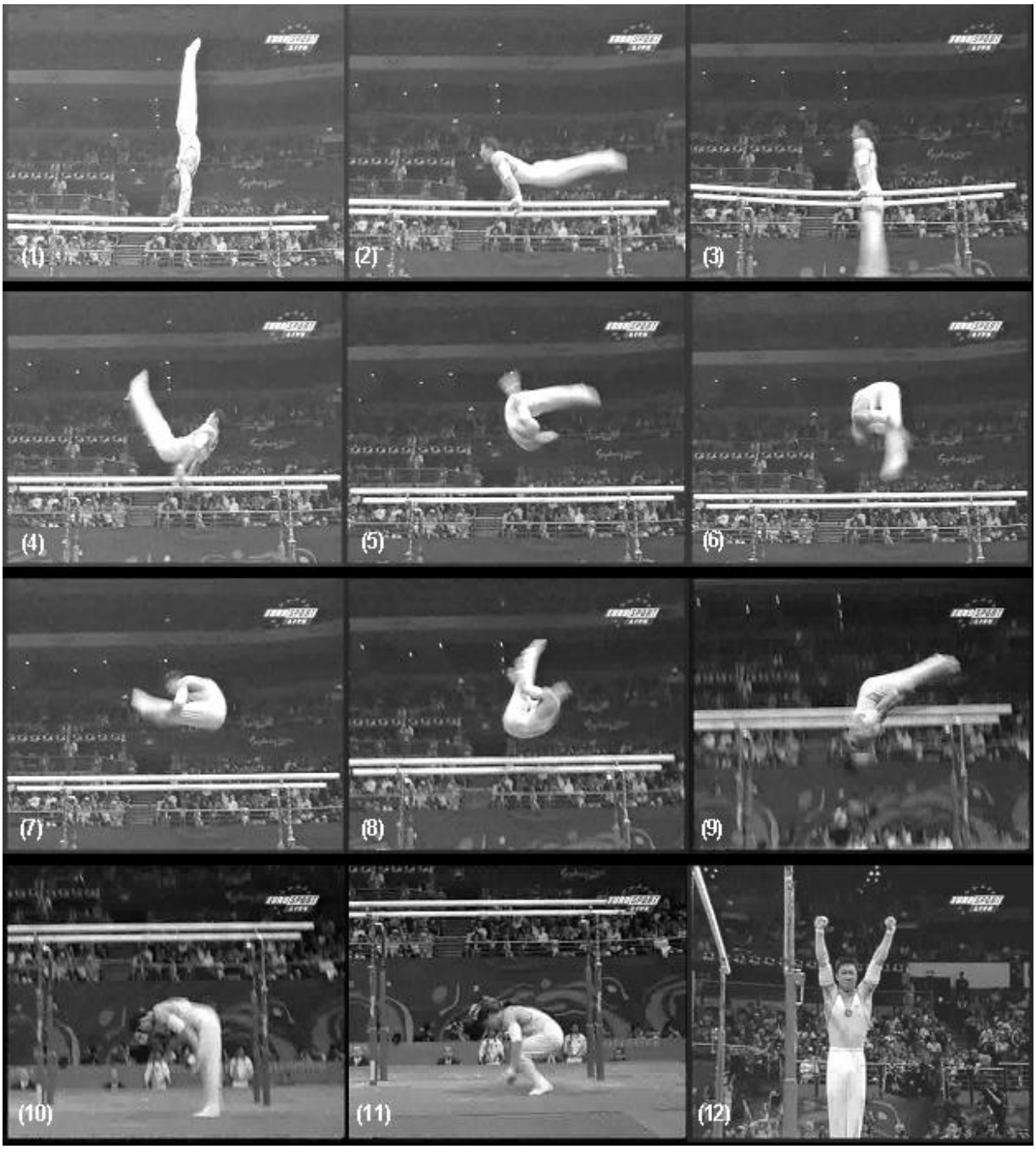

Fig. 1. Typical moments of the gymnast's movement in the execution of dismount - double salto backward picked on the parallel bars

RESULTS AND DISCUSSION

Swinging phase

In the swinging forward phase the gymnast must generate an optimum level of kinetic energy (translational and rotational) and prepare the separation of body upward from the bars.

Typically, the gymnast gains kinetic energy swinging down from a handstand position. Some of this energy is transferred to the flexible bars as they bend in response to the gymnast's actions. As the gymnast passes the bottom position and performs the upswing, he gets most of the elastic energy back when the bars act on his hands and arms to give him a lift. The resulting linear and angular momentum of the gymnast then allows to release the dismount.

The trajectory of the center of mass (CM) of the body of gymnastics in this phase is shown on the diagram stick figures (Fig. 2).

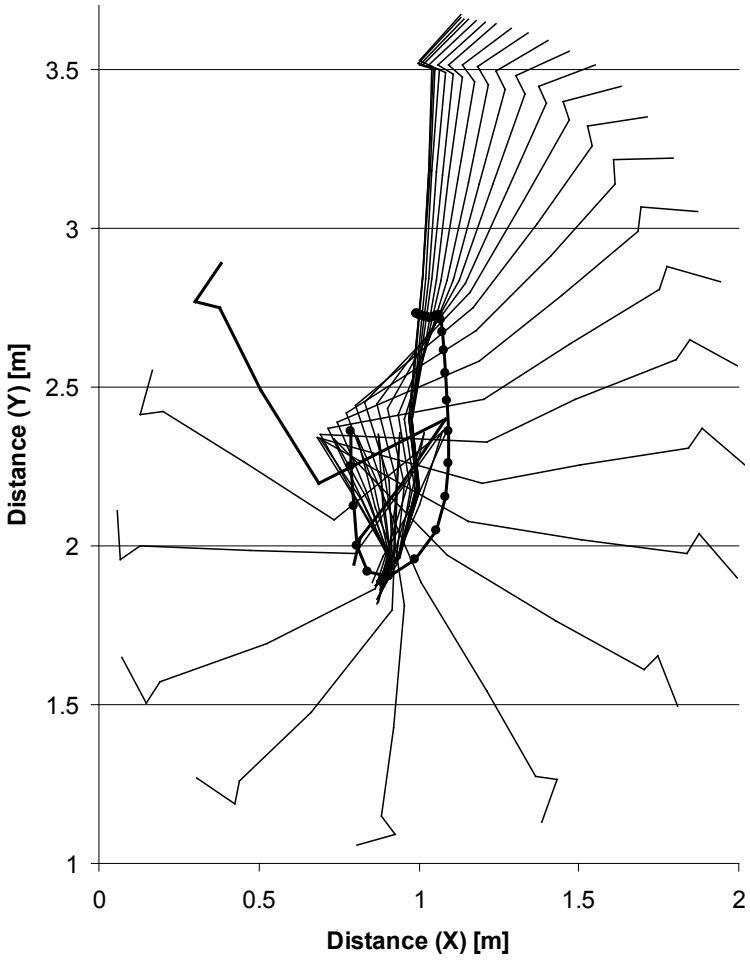

Fig. 2. Stick figures in swinging forward phase and trajectory of the center of mass (CM)

As can be seen in the trajectory downward and upward, for the most part is almost vertical.

Thus achieves stable control of the movement and torque compared to the CM as in downward direction the average distance between CM and the footprint of the hands on the bars is about 20 cm.

Upon upward movement at the moment of separation of the bars the CM projection is located on the supporting surface of the arms, whereby the projectile angle in vertical direction is a few degrees.

This ensures maximum height at a given initial velocity and rotations of the body near his CM which minimizes moment of inertia and creates conditions for higher angular velocity during the next phase of the movement.

This trajectory of the CM is provided by displacement of the shoulder area of the body in the horizontal direction, as the maximum angle between the mechanical axis „shoulder - wrist“ from the vertical is 31 degrees when moving down (see Fig. 1 (2)) and 32 degrees at the time of separation of the bars (Fig. 1 (4)). At this point, the angle of the hip joint is 95 degrees, which also affects the location of the CM and the value of the moment of inertia of the body.

The duration of the acceleration portion of this phase in this case is about 0.72 seconds and the linear velocity of the CM at the time of separation of the bars is 3.08 m/s.

Flight phase

After separation of the bars the goal of the athlete is to continue rotating movement by making a turnover and three-quarters and landing away from the apparatus.

During this phase on the body of the gymnastics not acting other forces except gravity and movement of the CM is determined by the magnitude and direction of the linear velocity at the beginning of the phase. The results obtained for the trajectory of the CM are presented in Figure 3.

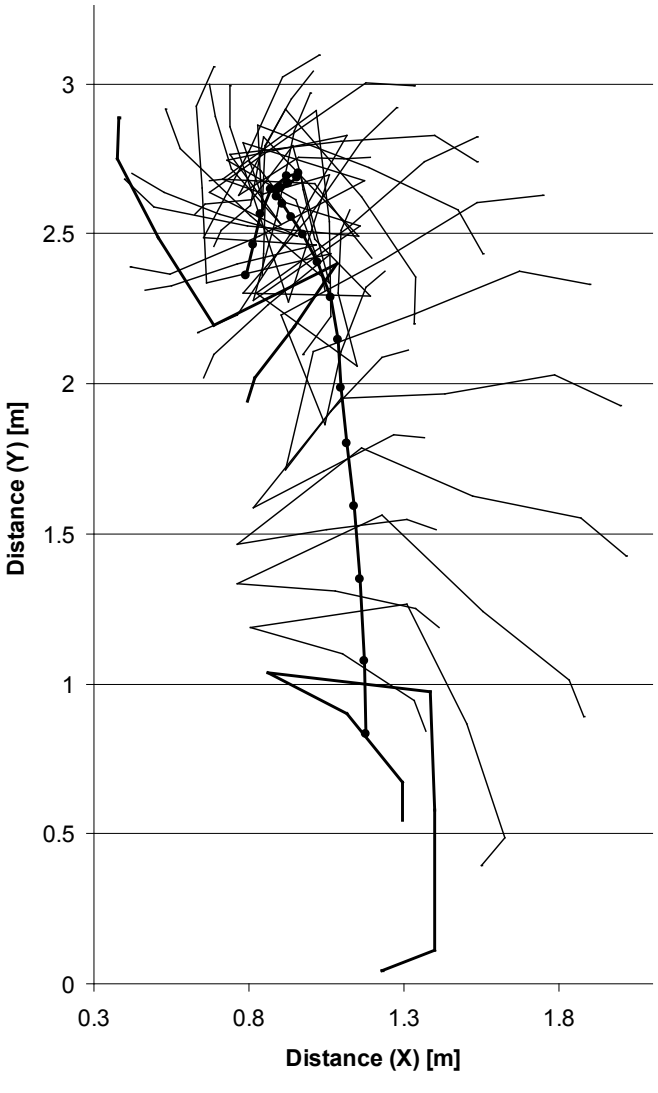

Fig. 3. Stick figures in flight phase and trajectory of the center of mass (CM)

According to the law of conservation of the momentum of motion, however, the competitor can adjust the rotational velocity by changing its moment of inertia by grouping the parts of the body towards the axis of rotation. Figure 4 shows the results of the angular velocity of the lower limbs during the first two phases.

To avoid asymmetric landings, gymnasts need to develop enough height; they need higher angular momentum around the transverse and longitudinal axis and they need to better control angular velocity in the longitudinal axis.

Landing is characterized by high landing vertical forces and usually with the double salto backward

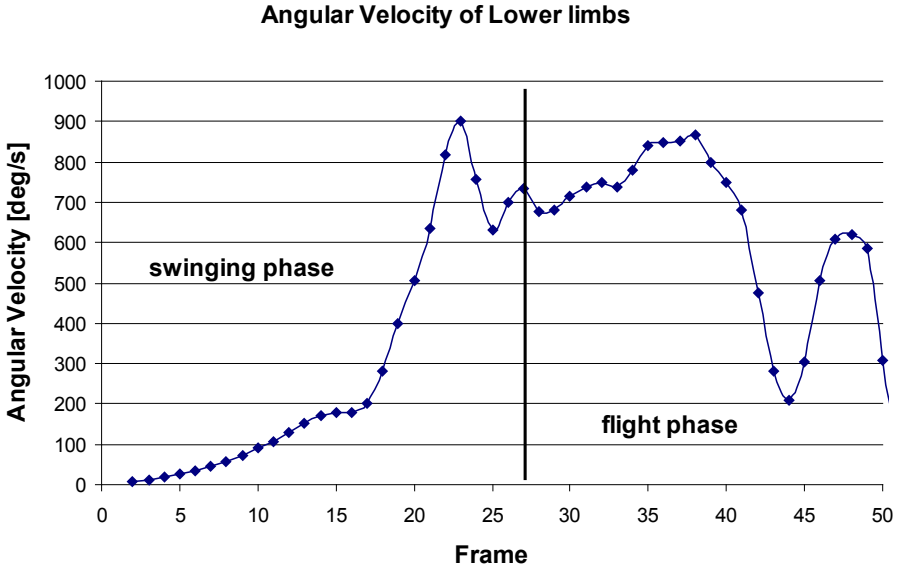

Fig. 4. Angular velocity of the lower limbs during the swinging and flight phases

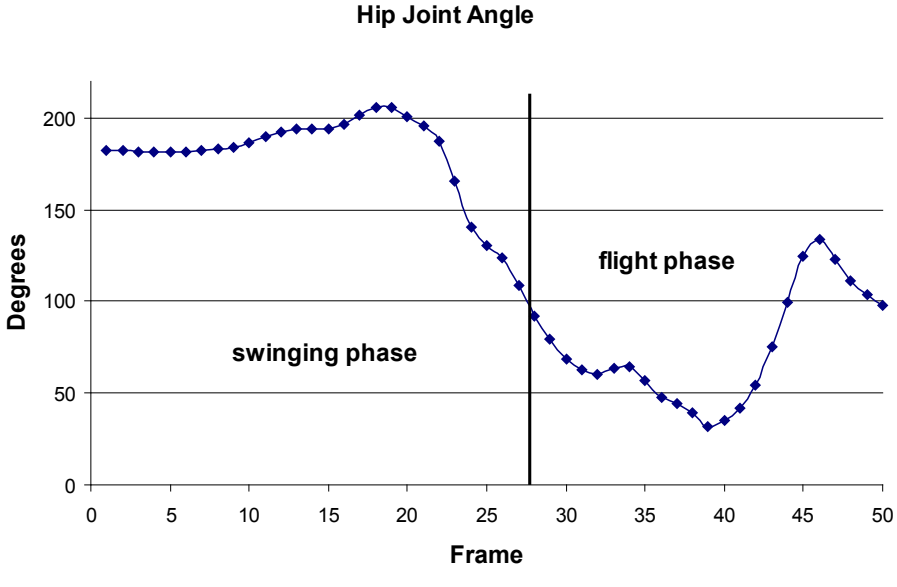

Fig. 5. Hip joint angle during the swinging and flight phases

The highest angular velocity of lower limbs 901 deg/s is reached during the swinging phase at the lowest position of the CM and in the flight phase 866 deg/s.

Closely related to these data are the results of the hip joint angle (Fig. 5).

The lowest hip joint angle of 32 degrees is reached during the flight phase.

Landing

The quality of landing depends on subjective (e.g. biomechanical) and objective (e.g. mechanical characteristics of landing area) factors.

tucked vertical landing force is more than 10 times the bodyweight.

Also, wile landing gymnast must be amortize significant angular velocities.

The results for the trajectory of the CM are presented in Figure 6.

Successful landing is performed with high body stiffness in the first part of landing (from the first contact to the maximum force). The stiffness is mostly changed with ankle and knee angle, which is in accordance with maximum external forces and angular accelerations of trunk, thigh and shank. Only active change of knee and ankle angle lowers external forces. Appropriate limb angles at the moment of touch down raise muscles' ability to absorb energy.

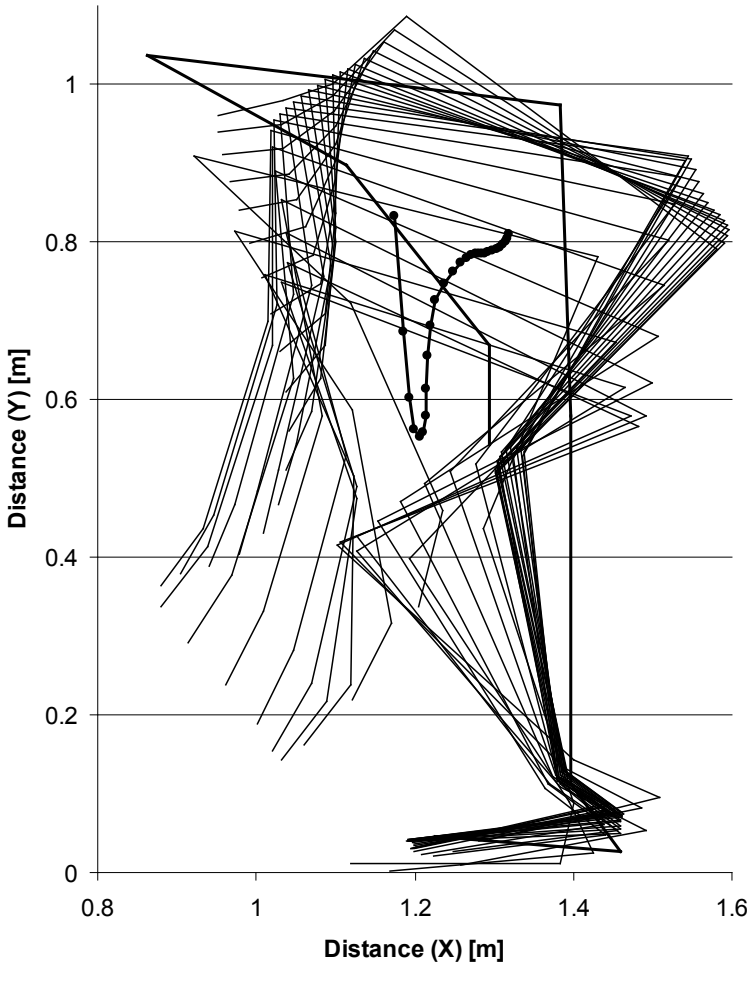

Fig. 6. Stick figures in landing phase and trajectory of the center of mass (CM)

CONCLUSION

Improving the training process involves a modeling of the performance of the world's elite athletes. Namely revealing their "secrets" through biomechanical analysis of peak attainment is one of the possible ways to answering some important issues of technical and physical training of athletes.

One can be noted some important features observed in the performance of this exercise:

1) When gymnastics moves downwards during swinging phase the trajectory of the CM in its lowest position passes the level of grip.
2) The duration of the swinging and flying phases is almost equal - approximately 1 sec.
3) The flexing angles of the hip joint at the beginning and at the end of flying phase are almost the same - about 95 degrees.

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RELIABILITY OF ASSESSMENT OF GAME PERFORMANCE IN FRISBEE ULTIMATE

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Key words: frisbee ultimate, game performance, GPAI, reliability

INTRODUCTION

Game performance is a special type of sport performance which can be understood at the level of the individual game performance and the game performance of the team (Přidal, 2012). Peráček (2004) defines it as performed individual and team acting of the players during the match, characterised by the level of fulfilment of game tasks. Game performance has a multi-factorial character and it is very complex. Its complexness is expressed by specific signs (Táborský, 2009).

Methods of assessment (evaluation) of the game performance could be divided into subjective and objective ones. Methods of subjective assessment of the game performance are expertise assessment, mutual comparison of the players and method of scaling. In the objective assessment there is method of critical cases and objective assessment of the quality of game activities of the individual (Zapletalová, 2014).

Basic method, through which game performance can be assessed, is observing. From the time point of view we distinguish direct and indirect one. In the direct observing the observer assesses selected indicators directly during the match. In the indirect observing they use recording technologies and the performance is assessed after the match (Přidal, 2012).

However, quantitative expression of the game skills performance does not affect significant side of game performance – tactical acting. Certain solution is provided by the method GPAI (Game Performance Assessment Instrument). GPAI is a flexible, authentic tool of game performance assessment which is easily used and adjusted to the issue being taught and learnt (Mitchell, Oslin, 1999). Flexible means that the teachers can adjust it to the different sport games according to game classification (invasive, i.e. sport games with direct contact with the opponent, net sport games, etc.) but also for a particular sport game (basketball, soccer, etc.) (Mitchell et al, 2003). Another advantage is that it can "evaluate" not only activities with the ball but also without the ball, defence as well as offence (Mitchell et al, 2006). General model of GPAI consists of 7 components of the game performance. Not all components are suitable for each sport game. The teacher or the coach can choose what he will monitor. 7 components (decision making, skill execution, adjust, cover, support, mark, base) represent wild definition of game performance which carries much more than only quality of game skills (Oslin et al, 1998).

But by recommending this method general informations about its reliability, i.e. stability and objectivity are missing. For these reasons and for the need of further research, we set the aim of our paper construct a method for evaluation of the game performance in frisbee ultimate based on GPAI and verify its reliability based on the concordance of evaluation of three experts.

METHODS

Research group created 15 students of Faculty of Physical Education and Sports in Bratislava who took part in Academic Championship of Bratislava in frisbee ultimate. Their ages ranged from 18-24 years. They were all amateur athletes. Game performance evaluated 3 experts (two teachers and one player of frisbee ultimate). Before the evaluation experts passed instruction and testing evaluated one match. Overall, they evaluated individually 15 players in 4 matches recorded on video. They used tally system for recording various game skills (components of game performance).

Constructed

Suggested method of evaluation of game performance in frisbee ultimate

Method of evaluation of game performance in frisbee ultimate based on GPAI consisted of 5 components:

1. Decision making : who to pass, where in the final zone to pass

Assessment: suitable – a pass to a free team-mate, resp. the team-mate who cooperates actively – releases and offers himself for the pass

unsuitable – a pass to an occupied team-mate who is being closely defended and who is not releasing for the pass

2. Skill execution: pass, final pass and disc catching

Pass

Assessment: successful – a processable pass, that is directed to the area of the trunk or the head, it is possible to catch it easily; it is assessed as successful even if it is not caught

unsuccessful - an unprocessable pass, that is directed either high or low, out of the area of the trunk; it is assessed as unsuccessful even if it is caught

Final pass

Assessment: successful – caught pass in the final zone

unsuccessful – not caught pass, caught or struck to the ground by the defender

Disc catching

Assessment successful – catching of the disc, possibility to continue in the offence

unsuccessful – the forward touched the disc, but he managed it badly and he/she did not catch the disc or dropped it, the players cannot continue in their offence, they are becoming defenders

3. Adjust:

Assessment: yes – the player reacts to the change of disc holding – when the team gains the disc, the player runs immediately to offence, when the team losses the disc, the player starts defending immediately

no – the player does not react to the change of disc holding – when the team gains the disc, the player still defends, or is passive, when the team losses the disc, the player still runs for offence or is passive

4. Support: cooperation in the offensive phase of the game

Assessment: yes – offering activities (running in the free space), releasing, active movement

no – passivity in offence, the player does not release himself for the pass, does not offer himself, moves little

5. Mark: effort to gain the disc, to block the opponents´ players

Assessment: yes - active game with effort to occupy the player with the disc or without the disc, the player tries to gain the disc, he gains the disc

no – passive game of the player without effort to occupy the player with the disc or with-

out the disc, the player is not trying to gain the disc

Total game performance

Game performance was evaluated with the help of the index of success.

Is = (positive actions - negative actions) / all evaluated actions

Methods of data processing and data assessment

Reliability of the game performance assessment method GPAI was evaluated by Kendall´s coefficient of concordance. The level of the statistical importance was set at 5%. In assessing the acceptability of concordance experts was based on the assessment of reliability by Čelikovský (1967).

Results

The results are focused on the concordance of experts in the evaluation of individual components of game performance (Table 1) as well as in the evaluation of the total game performance - W = 0.86 (Table. 1). In all cases, the concordance of experts showed the statistically significant ($p < 0.05$). High concordance of experts (W = 0.99 to 0.93) was found mainly in the evaluation of skills execution (the success of the pass, catching the disc and the final pass). Slightly lower, but enough high concordance of experts are confirmed in the evaluation of adjust and mark (W = 0.97 to 0.91). In terms of concordance of experts critical components are support and decision making (W = 0.98 to 0.64). Problems in the evaluation was mainly negative solution of these game situations. When assessing a player did not support, concordance of experts was W = 0.79, and the assessment of inappropriate decision making even W = 0.64. On the other hand experts surprisingly high consensused in the judgment appropriate decision making (W = 0.98) as well as performed support (W = 0.97). The problem of these two components could be inaccurate characteristic or different understanding of the negative solutions of these game situation (components). These two components are closely linked and it is therefore important to put precisely their definitions.

Tab. 1. Concordance of experts in the evaluation of the components of game performance GPAI (W) and total game performance (W)

Decision making		**Pass**		**Final pass**		**Disc catching**	
+	-	+	-	+	-	+	-
0.98	0.64	0.99	0.95	0.97	0.93	0.99	0.95
	Adjust		Support		Mark		
	yes	no	yes	no	yes	no	
	0.97	0.91	0.97	0.79	0.97	0.95	
Total game performance = 0.86							

DISCUSSIONS AND CONCLUSIONS

If we try to apply the results of our evaluation of the reliability of the motor tests, respectively methods by Čelikovský (1967) which considered the stability coefficient r = 0.99 to 0.90 for very high, r = .89 to .80 for good, at the height of r = 0.79 to 0.70 for critical of the proposed tests, respectively, method and the values of r = 0.69 to 0.60 for acceptable only under certain conditions, then experts in evaluating the success of the pass, final pass, catching the disc, adjust and mark has achieved very high concordance (W = 0.99-0.91), the evaluation of total game performance good concordance (W = 0.86).

We have to take a critical stand on a reliability of evaluated game performance component support due to a low level of an agreement of assessing experts (W=0.79). Evaluation of other components like decision making concerning passes and a final pass showed even lower level of experts' agreement (W=0.64) what can't be consider as satisfactory.

Based on the results, it can be concluded that there is an acceptable reliability of the evaluation total

game performance, as well as its selected components skills execution (pass, catching the disc, the final pass), adjust and mark. Review and refinement requires the evaluation of components support and decision making. Experts were able to accurately to assess game skills as some aspects of the tactical page of game performance.

The method is proved to be sufficiently reliable for evaluating the total game performance and skills execution, adjust and mark. Further refinement and verification requires evaluation of decision making and support. To evaluate these two components of the proposed methods has some limitations and cannot be considered as fully suitable for the evaluation of game performance in frisbee ultimate.

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BALLISTIC STRETCHING: A NEW WAY TO TRAIN EXPLOSIVE STRENGTH
Correlation Between Ballistic Stretching and Conditional Capacity: Explosive Strength Training in Young Athletes Practicing Karate.

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Key words: Joint mobility, Youth training, Flexibility, Explosive strength.

INTRODUCTION

Analyzing the performance of the karateka we can identify as key points the balance, the technique, the control, the power and the speed.

From the combination of these two capacities we easily deduce the importance of the explosive power, as well essential but, at the same time, it's difficult to train in younger without the risk to compromise the structures in growth phase. Often manuals are suggesting to train explosive power with plyometric exercise or "salto in basso/jump down", this type of activity has, however, a very high impact on the spine and joints, with the risk to bring permanent damage on weak physique [4].

With this in mind many coaches then decided to avoid this type of strength to prevent damage on their students [3] but, as we know, graduating in sport is becoming more and more untimely and then without thinking to train the explosive power on young promising athletes can be restrictive.

How, then, can we preserve our athletes while continuing working towards the achievement of a good performance model? The study that we wanted to carry out in this direction was to analyze the improvements of the explosive power of two groups of athletes pre-competitives between 7 and 12 years; a group continued to train with traditional methods (warming-up, static stretching and technique) and the other group has carried out a workout based on innovative ballistic stretching protocols to replace the static method.

METHODLOGY

Our study was based on the ballistic stretching or stretching "with rebounds," by which we think to stress the tendons in order to promote their strength and improving their action, as it happens in plyometrics exercises, but without the risk to cause serious damage in a growth phase structure so delicate. The exercises are inspired on artistic gymnastic, as the characteristics of the gymnast (control, balance, mobility, technical ...) are much more similar to the performance model of the karateka than we used to think.

Before the work starts the boys are observed with jump tests (such as the squat jump, the counter movement jump and a series of consecutive high jump, standing long jump and alternate triple jump) to have a objective guideline about their ability to push and test of joint mobility (sit and reach and goniometer), which is also likely to be changed by our teaching offer.

A first protocol was kept for two months, followed by a rest period of a month and, as a result of this, it was given a new protocol similar to the first for content and methods. We decided to change the exercises, to make the work more relevant for the skills achieved by the children, and to fix any physiological adaptations to the exercise suggested.

In both cases, the exercises have been carried out as a result of the warm-up, before the body of the lesson and for both weekly training sessions in which the karate class participating and involved mainly the muscles used to perform the basic techniques.

Examples of exercises

Exercise 1 Foot kept on the back of the chair held by the weight of a mate (leg bent), run eight pelvis springing alternate by eight seconds on hold static position. The foot of the fixed leg is turn forward and the knee remains stretched. Repeat twice per leg (Fig. 1, 2).

Exercise 2 Heel kept on the shoulder of his mate, limb stretched, run eight chest forward springing holding the stretching position for and then return. Repeat twice per leg (Fig. 3, 4).

Fig. 1, 2: Lateral and posterior vision of exercise 1

Fig 3, 4: Lateral vision of exercise 2

Fig. 5, 6: Lateral vision of exercise

Exercise 3 Heel kept on the shoulder of his mate, straight leg. External rotation of the supporting foot with open hip while keeping the leg straight and back, perform eight repetitions, twice per leg (Fig. 5, 6).

Exercise 4 In the free body position, bent leg to the chest with the help of the hands, back straight, external rotate of the support foot opening in an explosive way, fix the position for a second and return to starting position. Repeat four times per leg trying to never place your foot on the ground (Fig. 7, 8).

Exercise 4 of the "fish": lie down on your back, arms at your sides, legs together and straight. Spread the legs by lifting your upper body off the ground, slide forward up to the prone position, legs together. Return to the starting position (supine) always passing by the front split. Repeat four times (Fig. 9, 10, 11).

Fig. 7: Demonstration of exercise 4 – first part

Fig. 8: Demonstration of exercise 4 – second part

Fig. 9, 10, 11: First phase of exercise 5

In the first exercise the aim is, wit the leg kept on the ground, to stretch the psoas muscle and the iliacus muscle, both flexor of the femur in light abduction and external rotation. These muscles are highly developed in the karateka and are essential for fast frontal loading of the knee, the preparatory act for the execution of all kick techniques. At the same time it goes to stimulate the hamstring of leg kept on the chair, even their function of flexion on the thigh is important in loading the technique of kick.

The exercise number two wants to offer a clean approach to the movement of athletes by teaching them the control of the position of the back, which in this exercise should be as flat and stretched, especially in the lumbar area. The work suggested here intensifies the stress on the back of the leg in particular involving the hamstring muscles, and in person particularly stiff, of the lower back.

The third exercise wants to refer the movement of external rotation on the supported foot combined with external rotation of the hip in the execution of technical kick, going to force the height of the lifted leg due to the support on the mate shoulder. The fourth exercise is not a pure stretching exercise because it goes to involve the balance of the executor; the height is forced by the knee loaded to the chest, thereby inviting hamstring.

Opening the hip you stretch the anterior portion of the thigh flexor muscles and you activate the gluteal muscles. The reference position is functional to increase the difficulty to make sure that the athletes are then facilitated in a real situation of the race.

The final exercise of this protocol is the most challenging in the joints, so we decided to offer it again as a result of others, to increase the segment interested. The muscles most affected are the gracilis and adductor magnus, whose training is crucial to prevent strains, common during the exercises in forced abduction [2].

RESULTS

Starting from the idea of testing the efficiency of a new type of explosive strength training in young athletes practicing karate we came to develop protocols that focus on functional training exercises designed on ballistic stretching exercises to stimulate predominantly the muscles that they seemed more involved in the execution of different basic techniques analyzed to mark the performance model of karateka, also following the Aschieri performance model (2000).

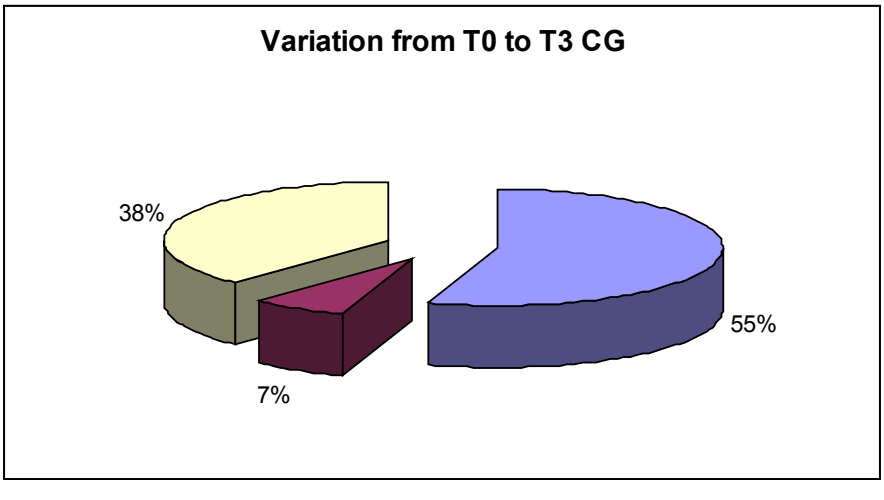

Fig. 12. 38% improved 55% gone worse 7% no variation

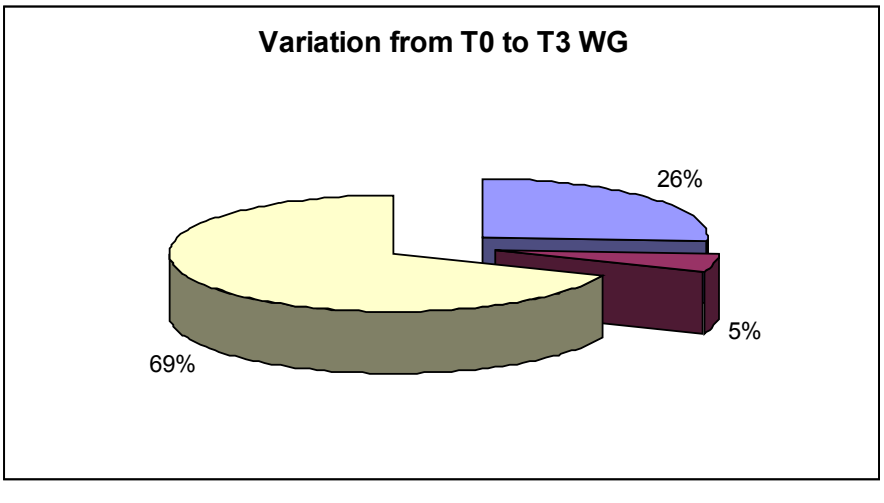

Fig. 13. 69% improved 26% gone worse 5% no variation

We noticed from the first test session how has been obvious the improve in all the tests which showed involved internal coordination and intramuscular and the elastic ability of reaction of the miotendon complex.

To perform the statistic analysis on the information collected related to the current sample, we used the data analysis program "Prism-Graphpad" by setting a non-parametric calculation on the examination because our sample is to be considered a "small sample". To compare the working group and the control group we used the Mann-Whitney U test therefore considers two independent samples. As regards the comparison of the same group in different test sessions (T_0, T_1, T_2, ...) has been used the Wilcoxon test; in this case the two samples considered are not independent. In both cases, the difference between the information taken are studied according to a significative parameter called "P value", that is positive in the case is <0.05.

According to this parameter, we can see that the working group is higher than the control group in all the tests, and six out of seven tests, this difference is significant in advantage for GL from a statistical point of view: in the first test (P = 0.0062) in the second test (P = 0.0158), in the fourth (P = 0.0022), in the fifth (P = 0.004), in the sixth (P = 0.0144) and seventh (P = 0.0149), while there haven't been significant improvements on sit and reach.

Following the period of application of the two protocols, the two groups of athletes were re-evaluated in the same jump test proposed at the beginning, with very satisfactory results regarding the increasing performance of the group which it has been proposed the ballistic stretching protocol. As for the group that has worked with traditional stretching the results are from the first assessment (T_0) to the final assessment (T_3), quite baffling as it not only many athletes didn't get improvements, but half of the group has got worse. It can be assumed that this decrease in performance is due to their no training. The pie chart easily guess how much "potential" we risk to lose in our athletes if we don't request correctly their ability.

Regarding the related information of the group that worked with the experimental protocol they are hoping well, with a small percentage of guys whose performance was almost unchanged but the 69% of the assessments has found a positive acknowledgement.

DISCUSSION AND CONCLUSIONS

Tudor Bompa (2001) stands as first fundamental strength training law is to develop the joint mobility as most of the exercises for the muscle development uses the maximum ROM of the ankles, knees and hips. Good flexibility is also a preventive factor against sprains, joint pain and damage from stress [1]. The second Bompa (2001) fundamental strength training law is the strengthening of the tendons that are stimulated by ballistic stretching [1].

Bompa (2001) emphasizes how the muscle strength improves quickly than the strength of tendons and ligaments, and this difference is often underestimated with the risk of experiencing an accident due to the lack of anatomical adaptation. Training the tendons and ligaments means getting a diameter increase, by raising the capacity of strength and tear opposition [1].

We can say that applying designed ballistic stretching protocols ad hoc to replace static stretching exercises in training youth karate groups we can achieve not only results from the point of view of mobility but also big improvements for the explosive strength and ability to repay the elastic miotendons complex.

For the success of the experiment is very important the active participation of the instructors, who judgment on the usefulness goes through, going to affect the commitment of young athletes and, therefore, the success of the work. In the first phase the instructors were always side by side with the athletes to perform their working protocols, so you can better correct all athletes during performances and helping them understanding the usefulness of a certain method of working.

The high percentage of improvement obtained from T_0 to the final evaluation, in addition to achieving the object of the study, which results were significant from the statistic point of view, the commitment and seriousness of the athletes in applying a job often repetitive is not always well accepted. We can

therefore say that applying ballistic stretching protocols designed ad hoc to replace static stretching exercises on training youth karate groups the results can be achieved not only from the point of view of joint mobility but also big improvements on explosive power and the capability of elastic restitution of the miotendons complex.

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MUSIC-TO-MOVEMENT TRAINING IN RHYTHMIC GYMNASTICS: GYMNASTS AGED 6-8

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***Key words**: rhythmic gymnastics, music, movement-to-music training*

INTRODUCTION

As with all sporting disciplines, the initial training in rhythmic gymnastics is a crucial stage for the preparation of athletes. Multiple tasks corresponding to this preparation stage require their optimum combination in time. Underestimation or delayed completion of just one task can pose in the future major (impossible) difficulties for the successful career of gymnasts.

In the first years of training of young gymnasts, priority is given to the technical preparation for manipulation of apparatus and free performance. Music-to-movement training of athletes is highly underestimated or missing from the initial training.

The requirements of the 2001-2004 Competition Rules of the FIG Rhythmic Gymnastics Technical Committee (RG/TC) lead to an extreme increase in difficulty of the gymnastic routines (gymnasts had to execute up to 28-30 difficult exercises (1,2)). The rules for combining difficult exercises required partial work with separate body parts, and that made rhythmic gymnastics a very traumatic sport for a short period of time (2001-2004 Rules). Based on medical conclusions on the sport traumatism (3,4) and under the pressure of coaches and gymnasts, RG/TC reviewed its vision of the evolution trends of rhythmic gymnastics, and included dance elements as a basic requirement to the technical content of compositions in the 2013-2016 Rules.

In practice, due to economic reasons, sport clubs do not use live music interpreted by a musician for the training of beginner gymnasts.

Music-to-movement training, as an important part of the training process and the development of basic skills and habits in the beginner gymnasts, is missing. The harmonic combination of basic components in the complete preparation of gymnasts is underestimated in modern rhythmic gymnastics.

Aim: The development of an appropriate system of movement-to-music training for rhythmic gymnasts aged 6-8.

Objectives:

1. To choose specific exercises for movement-to-music training.
2. To distribute those exercises in the weekly training cycle.

METHODS

The research was carried out from March, 10 to May, 10 2014. The experimental group included 10 gymnasts aged 6-8.

Indicators:

The number of mistakes in the routines (lack of connection between music and movements) when performing elements of the choreography.

METHODS:

1. Performing exercises to a given musical accompaniment:
   - Raising and lowering the heels while supported on gymnastic wall bars (two or three eight-beat cycles of different time alternating)

- Clapping hands at strong beats.
- Marching on the spot or in motion.
- Running a predetermined, short distance
- Jumping with both feet (the length of jumps will depend on the melody of musical accompaniment)
- Exercises with apparatus - (clubs – knocking, ball - bouncing)
- Recreation of a story according to the musical accompaniment (one eight-beat cycle)

2. Number of repetitions per training session. Specific exercises were used after the preparation part of a training session for a period of 15-20 minutes.

RESULTS AND DISCUSSION

The group of exercises was aimed at improving the rhythmic execution of individual exercises and small combinations in line with the musical accompaniment provided, according to the age of gymnasts.

Results were counted as the number of errors in the beginning and at the end of the research using the expert assessment methodology, and displayed for each individual gymnast. Errors were counted for inaccurate execution of movements relative to time, rhythm and melody of the musical accompaniment.

1st parameter: Raising and lowering the heels while supported on gymnastic wall bars – improvements in score were noted (fig. 1, 2). Although this improvement is higher in gymnast №2, the overall result is still unsatisfactory.

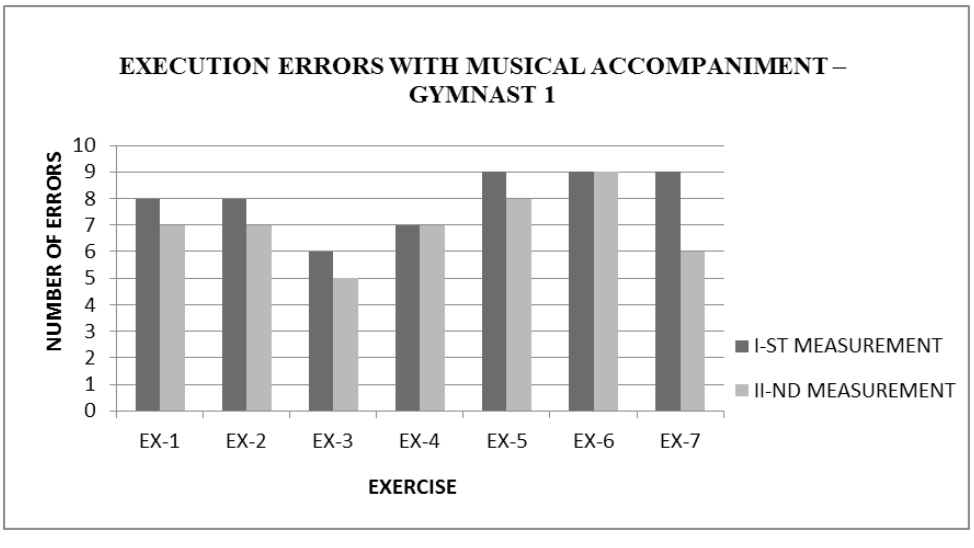

Fig. 1

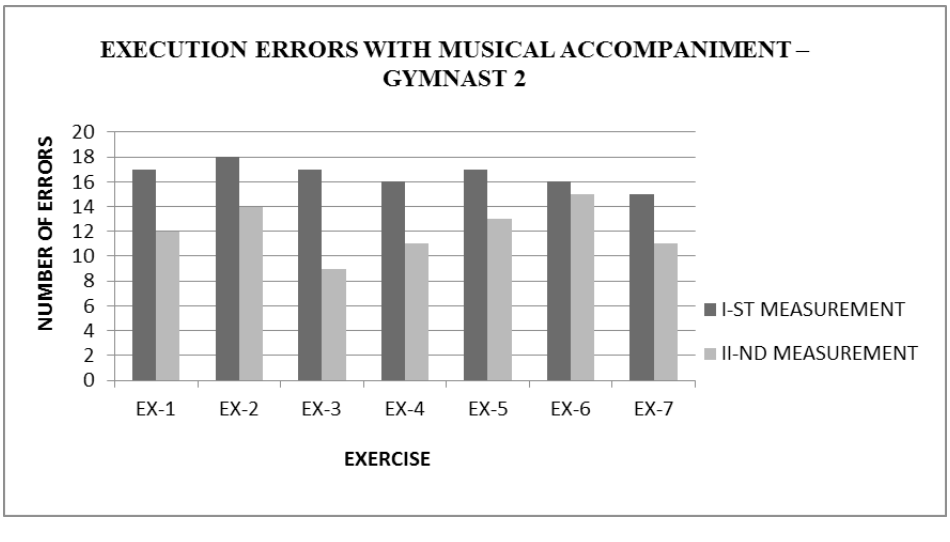

Fig. 2

2nd parameter: Clapping hands at strong beats – insignificant improvement seen in both gymnasts' scores.

3rd parameter: Marching on the spot or in motion – gymnast №2 showed a better score. Generally, children tend to react more emotionally while performing this exercise. Marking the time with the feet seems to be more practicable than using the hands in this age group.

4th parameter: Running a predetermined, short distance – The score of gymnast №1 remained unchanged at the second measurement, while that of gymnast №2 was improved. This task, which may seem quite easy to do as it involves natural movements of the human body, was difficult for the research subjects. The gymnasts focused on how to cover up the distance in a competitive manner. The essence of this task remained aside, and it was almost impossible for gymnasts to concentrate on the musical accompaniment.

5th parameter: Jumping with both feet – both gymnasts improved their scores. It is suggested to introduce a game element in this exercise, i.e. gymnasts may be instructed to jump 'as a rabbit', or 'as a lion', depending on their age, to achieve a certain frequency of the jumps, and then focus children's attention toward an execution in accordance with the musical accompaniment.

6th parameter: Exercises with apparatuses – The gymnasts of the research age group do not manipulate the rhythmic gymnastics apparatuses, and requiring them to recreate the rhythm of a musical accompaniment proves impossible for them.

7th parameter: Recreation of a story – this is the task that appealed to the research subjects. The execution is to a certain extent unconscious, however gymnasts are free from following the rules and freely express their emotions evoked by the music.

CONCLUSION

In the absence of live music during the preparation of beginner gymnasts, the exercise complex proposed can be successfully used for music-to-movement training.

The progressively increasing difficulty of the music-to-movement training task in rhythmic gymnastics yields good initial results. The requirements for exercise execution need to be modified, taking into strict consideration age specifics of the athletes.

The exercise complex is efficient if regularly used at each training session with gymnasts aged 6-8 years.

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INVESTIGATION OF PHYSICAL PREPARATION OF 14–18 YEARS OLD JUNIORS IN KAYAKING

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Keywords: testing, general phisical training, special training

Introduction

In canoe-kayak sport is especially pronounced close relationship between sport results and integrated development of the motor skills of the competitor. To pass the rowing distance with race speed all physical skills occurs simultaneously. Therefore a high level of physical preparation of athletes will always be necessary to achieve.

Physical preparation of athletes in kayaking has a complex character. Leading it are factors related to power and endurance. This defines the development of a single nature foundation on which to build the tops of sport skills. With increasing age and increasing sports mastery specialized physical training is emphasized. Physical fitness of canoe-kayak paddlers is a object of study of many bulgarian and foreign autors. (V. Bachev & M. Spasov, 1989, V. Bachev, 1989, Al. Tzvetkov, D. Damjanov, 1989, C. Szanto, 2004, J. Lenz, 2011 et al.)

In this connection, regardless of big numbers of publications, there are also a number of open issues such as establishing the level of general and special training of Bulgarian juniors in kayaking, to whose research we focused our creative pursuits.

The purpose of this study was to determine the level of general and special physical training at 14-18 years old athletes in kayaking in the stage of special preparation.

METHODOLOGY

The object of this research is the physical capacity of juniors in kayaking.

Contingents of the study were 79 juniors, students in Bulgarian sports schools with special sport kayak.

In our study we used the following methods:

- Method of information research;
- Sports testing;
- Method of analysis of variance for statistical processing of the results;
- Theoretical analysis and synthesis.

To determine the level of physical preparation of athletes in kayaking was applied test battery that included the following parameters (Table 1)

Testing was conducted at the end of preperation period in 2012 within two days in the city of Sofia, Plovdiv, Rouse and Varna from students from the National Sports Academy "Vasil Levski" Sofia.

Results

Testing results of the juniors are shown in Table 2.

Due to the fact that in different age groups, the test of bench press and bench pull was made with different weight – 30 kg and 40 kg the results in the analysis of these two strength exercises will not be compared.

Average results of the test „60 m sprint" surveyed juniors are presented in Figure 1.

The results of the speed test in adolescents improve with increasing age, as only 18 years old have some slippage. This can be explained by the fact that some of the subjects stopped train systematically entering a senior age.

Table 1. List of investigated parameters

№	Indicator	Unit	Accuracy measuring	Direction growth
1	60 m sprint	Sec.	0,01	–
2	1500 m running	Min.; sec.	0,01	–
3	Pull ups	Rep.	1	+
4	Bench pull with 30 kg, 40 kg	Rep. per 90 sec.	1	+
5	Bench press with 30 kg, 40 kg	Rep. per 90 sec.	1	+
6	Kayaking K1-1000 m	Min.; sec.	0,01	-
7	Kayak ergometer 1000 m	Min.; sec.	0,01	-

Tests 1 to 5 define the general physical preparation and tests 6 and 7 define the special training.

Table 2. Variation analysis of the results of testing at juniors

	Juniors 14 years old					Juniors 15 years old					Juniors 16 years old					Juniors 17 years old					Juniors 18 years old				
Test	**N**	**X_{min}**	**X_{max}**	**$\overline{X}$**	**S**	**N**	**X_{min}**	**X_{max}**	**$\overline{X}$**	**S**	**N**	**X_{min}**	**X_{max}**	**$\overline{X}$**	**S**	**N**	**X_{min}**	**X_{max}**	**$\overline{X}$**	**S**	**N**	**X_{min}**	**X_{max}**	**$\overline{X}$**	**S**
60 m sprint	8	9:00	10:50	9:69	0.51	16	8:00	10:20	9:02	0.51	21	6:50	9:70	8:62	0:68	14	8:10	9:00	8:41	0:27	10	7:20	9:00	8:26	0.53
800 m running	8	2:39	4:05	3:15	0.28	16	5:12	8:12	6:21	0.53	21	5:10	8:12	6:09	0:50	14	4:46	6:51	5:51	00:34	10	5:10	6:45	5:40	00:31
Pull ups	8	2	30	16.88	10.11	16	12	50	26.56	11.33	21	11	35	21.14	5.72	14	15	48	28.14	9.56	10	15	48	30.50	9.38
Bench pull	8	38	65	53.88	9.19	16	38	139	82.13	27.75	21	46	120	74.86	16.61	14	42	110	70.29	22.19	10	50	100	72.50	17.67
Bench press	8	25	58	46.25	12.02	16	38	101	66.44	21.53	21	40	100	66.67	14.79	14	44	88	57.57	15.02	10	29	92	63.30	19.36
Kayaking 1000 m	8	4:35	5:40	5:04	0.25	16	4:15	5:04	4:39	0.17	21	4:01	5:20	4:41	00:23	14	3:57	4:55	4:21	00:18	10	4:15	4:58	4:33	0:16
Ergo 1000 m	8	4:40	5:49	5:11	0.26	16	4:25	5:27	4:56	0.18	21	4:08	5:38	4:57	00:21	14	4:13	5:05	4:37	00:16	10	4:43	5:18	4:56	0:13

Average test results raise a denial of the respondents are present in Figure 2.

The results achieved in tests in general preparation „pull ups" in adolescents show improvement of achievement in test switch to a higher age group.

Test results at the test „1500 m running" for junior are presented in Figure 3.

Average performance in adolescents showed improvement with increasing age.

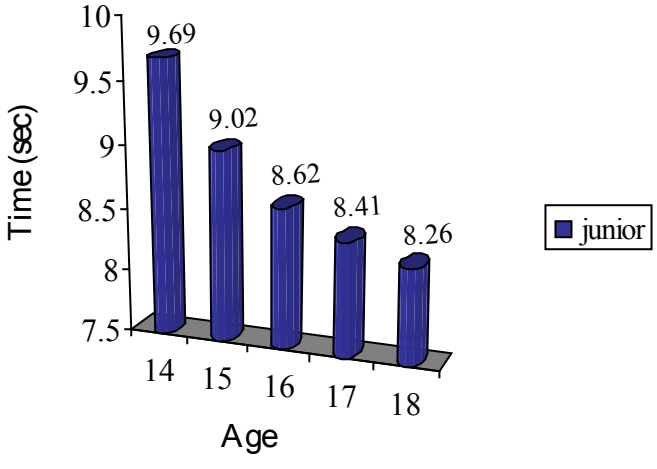

Figure 1. Average values of the achievement in the test „60 m sprint"

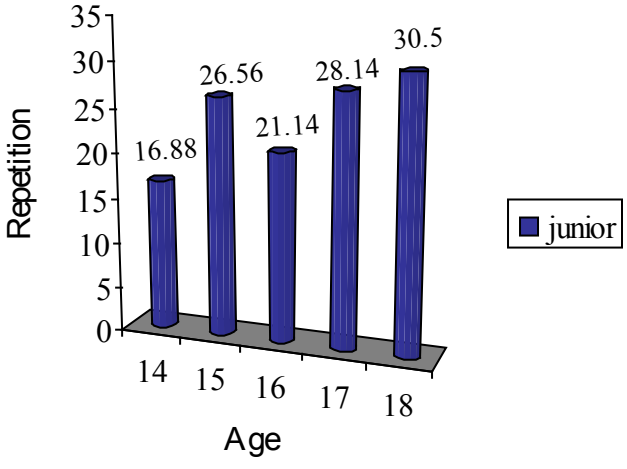

Figure 2. Average values of the achievement in the test „pull ups"

Table 3. Corelation analysis between different parameters at juniors

	Class	Sprint 60 m	Running 1500 m	Pulls ups	Bench pull	Bench press	Kayaking K1	Ergo
Sprint 60 m	-.679	1						
Running 1500 m	.554	**-.453**	1					
Pull ups	.538	**-.529**	**.275**	1				
Bench pull	.488	**-.444**	**.370**	**.442**	1			
Bench press	.207	**-.316**	.111	**.315**	**.754**	1		
Kayaking K1	-.479	**.390**	-.186	**-.558**	**-.445**	**-.527**	1	
Ergo	-.429	**.294**	.003	**-.464**	**-.500**	**-.554**	**.889**	1

Average sports achievements in kayaking and ergometer at 1000 meters distance at juniors are presented in Figure 4.

As shown in the figure 4 to enhance sport performance in special training occurred with the transition to a higher age group. Negligible degradation of performance was observed in 18 year old juniors, but the tendency is persisted.

A correlation analysis shows that the performance at 1000 m in adolescents moderately correlated (r = –0,39, α <0,05) with achievement in the test „60 m sprint". Sports achievement in kayaking moderately correlated (r = –0,445, α = 0,05) with results in the test „bench pull". Demonstrated significant correlation (r = 0,558, α = 0,05) between achievement in rowing and averages results in the test pull ups. The same level of correlation (r = –0,583, α <0,05) we find between sport achievement at kayaking K1-1000 m and results in the test „bench press". We observed a high level of correlation (r = 0,889, α <0,05) between sport results in K1-1000 m and kayak ergometer.

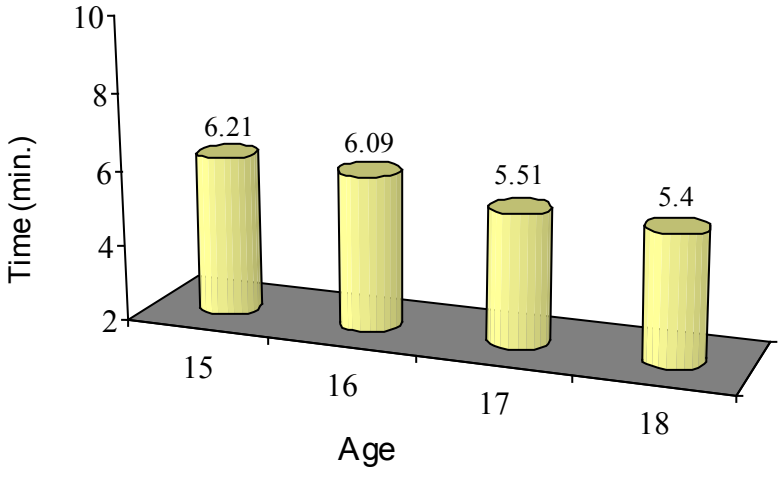

Figure 3. Average values of the achievement at the test „1500 m running" at juniors

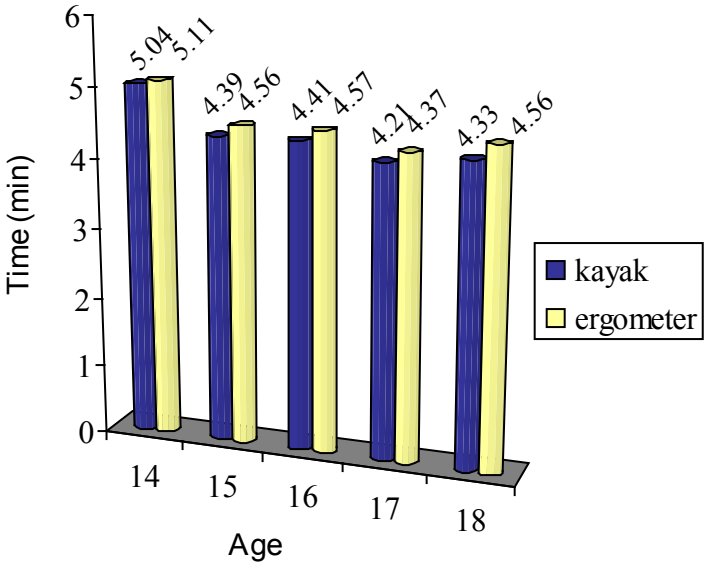

Figure 4. Average values of the achievement in kayaking and ergometer at juniors

DISCUSSION AND CONCLUSIONS

The results achieved in tests of general preparation in adolescents show improvement of sports performance with the transition from one age to the next.

The results achieved in tests of special training of juniors showed an improvement with increasing age. Priority development of junior kayaking can be achieved only through a systematic selection and high quality of training process. The modern methodical approach for sports preparation, must be based on complex-oriented test, which simultaneously estimate and develop the motor and technical skills of the competitors in kayaking.

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INTERRELATION BETWEEN SPEED ABILITY AND SPEED STRENGTH ABILITIES AND SPEED ENDURANCE OF 13-14 YEARS FOOTBALL PLAYERS

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Keyword: youth football, speed endurance, interrelations, non specific conditional training

INTRODUCTION

In general football can be referred to sports with intermittent character [3, 4, 7, 8]. Game's situations are related with great demands of mobility of the football players during the game [1, 4, 6, 7, 10]. Data from World cup in Brazil 2014 shows that the actual playing time increases with approximately 4 minutes and also that the players were developed maximal speed between 19.8 km/h and 33.8 km/h. It is obvious that the game intensification grows up together with the non specific conditional training. This placed on the agenda the guidelines for phased development of specific motor skills and abilities of the football players from early childhood that was elaborated and proposed in "synergistic conceptual model" of non specific conditional training in youth football [7].

In this relation the **purpose** of our study is connected with optimization of non specific conditional training via disclosing interrelations of the abilities for display of the speed endurance with speed abilities and speed-strength abilities in youth soccer.

In order to realize the purpose of the study we point out following **tasks:**

Study of variability of the indicators of speed endurance, speed and speed-strength motor abilities of 13-14 years football players.

Determination of their structural interrelations.

METHODS

In order to achieve our tasks we used following methods: chronometry, tensiometry, sports' pedagogical testing, stain gauges and mathematical statistics methods (Analysis of variance (ANOVA) and correlation analysis). Tests that characterized studied special motor abilities and presence of performance we present in (Table 1).

Table 1. Tests that characterized studied special motor abilities and presence of performance

Forms of performance on motor abilities	Test that characterized special motor abilities	Measurement Units	Precision
Sprint acceleration abilities	20 m running from standing position	sec.	0,01
Maximal speed abilities	Flying 20 m running	sec.	0,01
Speed-strength (power) abilities with explosive character	Coefficient of explosiveness	sm/sec	0,001
Ability of performance on speed endurance	Repeated sprint 3 x 50 m from standing position	sec.	0,01

When we studied speed abilities and the resulting from them forms of display, we used the following tests – 20 m running from standing position and flying 20 m running. We use standard requirements for this kind of study.

Testing the level of speed-strength (power) abilities with explosive character we realized by coefficient of explosiveness ($C_{exp.}$) from digital jump counter (DJC-2). Indications (C exp.) for the lower limbs were collected automatically by the formula $C_{exp.} = h_m/t_m$. The equipment for measuring the explosiveness in vertical direction includes: digital jump counter (DJC-2), which consist of microprocessor system with printer; tensiometric platform with rubber rings where the jumps are made which is connected with DJC-2. The algorithm for the operations is set with keyboard by prior prescription.

The level of development of the speed endurance which is one of the forms of display of the specific endurance we tested by repeated sprints of 3x50 m from standing position. The test is made after measurement and labeling section with two cones (the first one at the start line and the second one at the finish line). Every subject must pass them three times. Methodical instructions include maximal running and touch the cone with upper limb at the end of the section with fast turning and change of the running direction. The time is measured till 0.01 sec. with digital chronometer "Casio".

Contingent of the following study are 54 football player of age from 13 to 14 years.

DISCUSSION

The data from the ANOVA are presented at table 2. There we can see that for all of the studied indicators coefficient of variability is in the limits of 3.88% to13.02%. This means that the contingent of the following study is highly homogenous. This is a basis and expectation for proper conclusions.

Table 2. Variability of the indicators that characterized the motor abilities of 13-14 years old football players

Statistical indicators	Indicators that characterized basic motor abilities			
	20 m running from standing position	**Flying 20 m running**	**Coefficient for explosiveness**	**Repeated sprints 3x50m from standing position**
	(s)	(s)	(cm/s)	(s)
X	3,35	2,88	1,68	26,77
m_x	0,02	0,02	0,03	0,16
Me	3,34	2,90	1,69	26,53
Mo	3,37	3,05	#N/A	25,39
S	0,13	0,16	0,22	1,16
As	-0,50	0,22	-0,90	0,26
Es	0,03	-0,09	0,11	0,80
R	0,52	0,78	0,83	5,19
x_{min}	3,05	2,52	1,32	24,98
x_{max}	3,57	3,30	2,15	30,17
V %	3,88	5,56	13,02	4,33

On the basis of the gathered results from the variable analyses, we disclosed correlative interrelations between studied indicators. Their values are shown at (table 3). From the same one we see that the interrelation between special acceleration abilities and ability for speed endurance is directly proportional and significant by level of significance (r=0.663). In the same time interrelation between maximal speed abilities and ability for display of speed endurance directly proportional and high by significance (r=0.817).

Directly proportional interrelation shows that when we increase the level of maximal speed abilities of the subjects this affects to the level of speed endurance. From the correlative matrix we can see that this indicator has the biggest affection on display of the speed endurance.

Coefficient of correlation between ability of display of speed endurance and speed-strength abilities with explosive character e r= -0.543. This coefficient determines that the interrelation is significant by

significance and inverse. This means that bigger values of the coefficient for explosiveness ($C_{exp.}$) will cooperate for achieving increasing the level of speed endurance.

Table 3. Correlative interrelations between indicators characterized motor abilities

The analysis of the values of the coefficient ($C_{exp.}$) with the two indicators that reflect speed abilities shows that interrelation for them is significant and inversed. The means of start accelerative abilities and maximal speed abilities are respectively r= -0.508 and r= -0.561. It is obvious that this interrelation affects indirectly to the speed endurance via influence over level of development of maximal speed and start acceleration [2, 5].

It was disclosed significant by significance and directly proportional correlative interrelation between special speed abilities and specific start acceleration abilities (r=0.623) shows that this two forms of speed performance are affected each other. It is obvious that the studied two forms of speed performance are essential for development of the ability of performance of speed endurance and non specific conditional training as a whole in this period of development.

CONCLUSIONS

The data from the study are basis for the following conclusions which are connected with the ability of display of the speed endurance for 13-14 years old football players.

- The level of speed endurance greatly depends of the level of development of the individual forms of speed abilities
- Speed-strength abilities with explosive character affects indirectly display of the speed endurance with increasing the level of speed abilities.

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THE EFFECTS OF FATIGUE ON THE DIFFERENT PHASES OF THE JUMP IN YOUNG TENNIS PLAYERS

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Key words: *Tennis, Strength, Countermovement Jump, Fatigue, Training Specificity*

INTRODUCTION

From an analysis of the scientific literature regarding the topics relevant to tennis training, we can observe that the large majority of publications regard the level of performance in top-level tennis, while a much smaller number are concerned with performance models in youth tennis. However, examination of the (relatively few) data available relative to juvenile tennis players [4] confirm that the functional and physiological model applicable to juvenile tennis is generally the same as that for top-level tennis During a match, a young tennis player will execute 300-500 explosive movements, 80% of which are executed within a range of 2.5 metres from the ready position and15% of which are performed between 2.5 and 5 meters [9]. During a point, a player is usually required to play at sub-maximal effort (at times maximal), with the continual execution of lateral and diagonal movements (rarely forward movements) that involve sequences of acceleration, deceleration and sliding, fast running and changes of direction (an average of four changes in direction per point) [3]. The duration of a match progresses from under an hour for youth tennis to more than three hours in professional tennis, and even exceeding four hours in the men's matches of Grand Slam tournaments or the Davis Cup. Considering the range in effective playing time, approximately 17% on fast surfaces and up to 30% on grass or clay courts, as well as variety of the surfaces played upon, it becomes clear that player assessment and the use of specific training programmes aimed at developing strength in pre-pubescent children can be advantageous for young athletes on the short, medium and long term [13]. In light of the great wealth of literature emphasising that strength training holds is as importance as the practice of technical and coordination skills, the organisations responsible for juvenile tennis in a number of countries, including Italy, are taking steps to fill the gap in our knowledge regarding what aspects of strength need to be focussed on and what loads are most appropriate for 10-, 12-, 14- and 16-year-old athletes, using assessment tests the validity and reliability of which are widely recognised. In tennis, evaluation of the different phases of the jump by means of the countermovement jump (CMJ) and dynamometric force platforms allows us to: i) reproduce all the neuromuscular activation patterns involved in movements, such as sprinting, direction changes, and different types of jump, which characterise different sporting activities [2]; ii) to investigate the neuromuscular characteristics that, in adolescents, appear incapable of producing high values of eccentric force. The use of the force platforms allows us to evaluate not only the height of the vertical jump, but also a variety of qualitative and quantitative parameters of the movement useful for understanding the strategies put into use by the athlete.

The objective of the present study was to analyse the effects of fatigue upon the different jump phases after performing repeated countermovement jumps (CMJ) in a group of young tennis players.

METHODS

The sample was composed of 12 young tennis players: F=4 and M=8; aged 11±0.8 years; average weight 37±8.9 kg; average height 155±11.4 cm. The participants were advised about the potential risks involved and all subjects and parents signed an informed consent form before participation. In the pre-fatigue phase, which followed a 20 minute warm-up period consisting of 10 min slow running, 5 min

lower-limb stretching and 5 min skipping or skipping with a rope, each young tennis player executed N=2 CMJ on two dynamometric force platforms (Twin Plates, Globus Italia); of these 2 test jumps, the best jump in terms of height was assessed and the following variables recorded for each of the lower-limbs: duration of the overstretching phase (sec), duration of isometric stability (sec), peak coupling force (N), peak concentric force (N), and the ground reaction force (N); immediately afterwards, the same young tennis player performed N=10 series of 10 consecutive CMJ (total of 100 jumps), with a recovery period of 20 sec between each series. Once the last series was completed, the player was asked to perform yet another 2 CMJ (post-fatigue phase) on the dynamometric force platforms and the same data recorded for both lower-limbs as in the pre-fatigue phase.

The mean value and standard deviation (SD) for each variable assessed for each of the lower-limbs was calculated for the group (N=12 participants). Student's t tests were used to compare the pre- vs. post-fatigue data recorded by the two platforms for each variable. Differences were considered statistically significant when P≤0.05. The statistical analyses were performed using SPSS version 12.0 (SPSS Inc., Chicago, Ill).

RESULTS

The descriptive statistics (M±SD) and Student's t test statistics (platform 1 – left leg; platform 2 – right leg) are reported in tables 1 and 2, respectively.

Tab. 1. Descriptive statistics and Student's t tests: platform 1 – left leg

Variable	Pre-fatigue M±SD	Post-fatigue M±SD	df	t	P value	P
Duration of overstretching phase (sec)	0.11±0.16	0.20±0.2	11	-1.847	0.092	NS
Duration of isometric stability (sec)	1.06±0	1.37±0.2	11	-4.549	0.001	P<0.01***
Peak coupling force (N)	372.64±124.71	304.99.± 108.88	11	2.925	0.014	P<0.05*
Peak concentric force (N)	439.75±74.35	378.61 ±76.82	11	2.181	0.052	NS
Ground reaction force (N)	700.98±162.4	748.± 235.99	11	1.866	0.089	NS

Table 2. Variability of the indicators that characterized the motor abilities of 13-14 years old football players

Variable	Pre-fatigue M±SD	Post-fatigue M±SD	df	t	P value	P
Duration of overstretching phase (sec)	0.19±0.1	0.25±0.1	11	-1.029	0.325	NS
Duration of isometric stability (sec)	1.08±0	1.36±0.1	11	-6.276	0.000	P<0.0005****
Peak coupling force (N)	391.1±108.64	360.62±136.72	11	2.166	0.053	NS
Peak concentric force (N)	452.83±89.88	366.96±121.84	11	4.799	0.001	P<0.01**
Ground reaction force (N)	835.15±243.65	729.07±239.43	11	1.379	0.195	NS

For the post- vs. pre-fatigue CMJ comparisons in relation to platform 1, significant differences emerged in the duration of isometric stability (p< 0.001) and in the peak coupling force (p<0.05). In the post- vs. pre-fatigue CMJ comparisons for platform 2, significant differences emerged in the duration of isometric stability (p< 0.001) and in the peak concentric force (p<0.01).

Discussion and conclusions

Statistically significant results emerged from the analysis of the data obtained from platform 1 for the group in relation to two of the variables examined, specifically the duration of isometric stability and the peak coupling force. The duration of the overstretching phase showed the tendency to increase in the post-fatigue test compared to the pre-fatigue test (p=0.092); there was also a strong trend for the peak concentric force to diminish (P=0.052) and a tendency for the ground reaction force to increase (p=0.089). Although statistical significance was not quite obtained for this sample of 12 subjects

The results from platform 2 showed statistically significant differences in the duration of isometric stability and in the peak concentric force. Once again, the duration of the overstretching phase was increased in the post- vs. pre-fatigue test, while the peak coupling force and the ground reaction force were diminished.

According to some researches, a fatigue-induced decrease in performance may result from: (a) a change in coordination capacity (i.e. a change in the neural input), (b) a change in the functional capacity of the muscles to produce force (i.e. without modifying neural input), or (c) a combination of both of these factors. In the first case, a decrease in coordination may result from variations in muscle activation or kinematics; in the second case, the variation may be characterised by a stable neural input, but a change a kinematic output [12]. The Authors highlight the need for further studies into the possibility that fatigue-related changes in performance may in fact reflect the neuromuscular system adopting a new coordination strategy that takes into account local muscle fatigue.

Previously, the same Authors studied the effects of fatigue on vertical jump coordination and they suggested a model that did not depend on the force generating properties of the muscles [11]. Even though the amplitude of the activation of the knee extensor and flexor muscles increases towards the end of the task involving a series of jumps performed under fatigue, the electromyography profile remains similar to that observed under non fatigue conditions; thus the subjects perform the movement benefitting from a robust template of muscle activation that guides the movement execution the enhanced access to muscle force. They highlight that during the execution of maximal vertical jumps, a common drive exists that controls the activity of the agonist-antagonist muscle pair as a single functional entity [10].

The authors explain that modulation of this common action occurs when performing jumps under both fatigued and non fatigued conditions, but it only influences the peak joint angular velocity and the maximal power around the knee joint during the propulsion phase of the movement. Studies directed at understanding to what extent this occurs during a jump performed under conditions of fatigue must nevertheless be considered in light of our understanding of the increase in force capacity that occurs during adolescence. The results of the present study are in line with those described by others that show that if during the first developmental period, between 6 years and 9-10 years, the area of the transverse section of the quadriceps femoris is equal to 45% of the average values for adult subjects, after 12 years of age, the subsequent increase in this muscle area becomes even more pronounced [14]. In agreement with this developmental picture, studies describing the changes in muscle strength during puberty show that significantly higher values start to occur at the age of 12-13 years, as shown, for example, using the countermovement jump test [5, 14]. These variations do not seem to depend on the increase in cross-section muscle area, but they instead appear to be connected with the maturation of mechanisms linked to the recruitment of motor units and to improved intermuscular coordination between agonists and antagonists [8, 14].

The effects of fatigue observed in these young tennis players are in line with those found by other similar studies conducted in this same age range, in which an increase in hypertrophy of the quadriceps equal to 50% occurs between the ages of 11 and 13 years [6].

The relative stability in the duration of the overstretching phase leads us to hypothesise that the peak eccentric force is essentially guaranteed by a better recruitment of the motor units, rather than by factors linked to the muscle morphology [1].

The functional links between force capacity and sprint performance with a change of direction appear to be most well defined around the age of 14 years when the correlation between peak eccentric force

and time obtained in the Foran test achieve an r value equal to 0.95 ($p<0.001$); of particular interest is the inverse correlation obtained between the duration of the overstretching phase and the time achieved in the Foran test ($r=-0,75$ in the under 10's, $p>0.01$, and $r=-0.28$ in the under 12's and in the under 14's) that shows how a slight increase in loading would not be functionally appropriate for the purposes of a change in running direction in the test in question. The result can be explained considering our knowledge about muscle contractions that make use of the stretch shortening cycle (SSC) – a phase of stretching that allows the muscle to accumulate elastic energy (in a metabolically free manner), subsequently releasing it and summing it to the energy produced in the successive concentric phase [2,7]. A shorter duration of this phase of stretching equates to a lower capacity to store elastic energy in the muscle.

An unsolved problem remains regarding whether a shorter phase of eccentric contraction is associated with the specific training methods employed in tennis training, whether it is linked to a reduced capacity of the sarcomere to be stretched in a biomechanically advantageous way, or, as is commonly hypothesised, whether it reflects a protective role of the central nervous system safeguarding the musculoskeletal system that is still too immature to endure significant loading forces in the form of eccentric contraction [7].

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ENDURANCE DEVELOPMENT DURING THE PREPARATORY PERIOD IN 17-18 YEAR-OLD FOOTBALLERS

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Keywords: *endurance, aerobic, anaerobic, preparatory period*

Preparation of the footballers is a complex, dynamic, educational process.

Analysis of the fundamental studies in sport's theory and methodology show that the main purpose of athletes' preparation is to achieve a high score/ outcome in sports competitions, which is possible only when there is an adequate level of preparedness.

In recent years, in football, a steady upward trend has been observed in training and competitive workload. In the meantime, according to modern perceptions, in the near future, the volume and intensity of workload in football will no longer undergo significant changes. This is the reason why many experts stay distant regarding the increase of efficiency of competitive activity in the optimization of the means and methods of training, rational distribution of different types of physical activity in different structural formations in the annual cycle of preparation.

Existing theory of football teams preparation do not meet the new requirements that coaches face in practice. It should be noted, that the classical formulation, whereby in the base of periodization lies the phase nature of development of the sport shape, has not lost its principal importance, but in the technology of its modeling qualitative changes have occurred.

In modern sport, different methodological approaches to construct annual training are used.

Complex-parallel approach of training periodization has showed a number of negative trends. In the traditional model of the annual cycle of preparation, complex usage of training workload with different impact was used.

Unlike the traditional model, providing a complex parallel development of many qualities, alternative concept implies sequentially concentrated impact of few physical properties (usually not more than two). Exactly, this high concentration of the training imact is the nature of a block scheme.

In recent years, the content of existing concepts for planning the training process have changed significantly.

One of the areas to solve the problem of preparation optimization is the method of modeling in the construction of the annual macrocycles. The modeling is considered "new" method in theory of sports training involving study and constructive expression of the fundamental nature of the form of construction of the training process.

Typical characteristic in football is the performance of a wide complex of motor actions, requiring high level of development of the abilities to manifest explosive efforts. Besides, football is characterized by high level of development of the ability to resist fatigue without reducing the effectiveness of the technical and tactical actions of the players. Also, it is necessary to have a high level of development of maximal anaerobic power, which is the basis of speed-power preparedness and anaerobic glycolytic capability that provides specific speed endurance. For the energy supply of the workout the importance of aerobic processes have increased, securing numerous iteration during play of periods with high activity.

The physical characteristic endurance is determined by the power and capacity of aerobic and anaerobic processes.The aerobic energy system is highly taxed/ effective in most of the game. The anaerobic energy system is highly effective during certain periods of the game.During recovery (walking and slow

jogging) the oxygen system pays debt at phosphates level (ATP recovery and KrP). Aerobic endurance is an acyclic system of production and releasing of energy.

The factors that determine the performance of players and teams in football are:

- Better (quality) football action
- Maintain good (quality) football action for a long time
- More action per minute
- Maintain more football action for a long time

Football fitness aims to achieve:

- Maximum explosive football action
- Maintain maximum explosive football action for a long time
- Faster recovery between the football action
- Maintaining a faster recovery for a long time

In the traditional approach of football fitness, aerobic capacity and power and anaerobic capacity and power are developing through non-football conditioning exercises: incline and decline running; sprint 20, 30, 40 meters, etc.; pace running 400 meters; running 5 kilometres and other. The main problem in the use of these exercises is that there is no analysis of football game. Thus, in the world of football you enter through an athletic recommendation.

In athletic sprint, the focus is 100% on the speed. There is starting block, starting signal, maximum sprint, running lane. Football sprint is football is action. There is a different starting position, speed, time and direction of the action. Football is a game of perception and decision making, that could be learnt only if we play football.

Better (quality) football actions in football performance, in football fitness means performing of explosive actions. In practice, this is achieved using football exercises that include football sprints with maximum rest between repetitions.

Maintaining good (quality) football actions for a long time for the presentation in football, for the football fitness means maintaining the maximum explosive football actions for a long time. In practice, this is achieved using football exercises that include football sprints with minimal rest between repetitions.

More football action per minute for the presentation in football, for the football fitness means faster recovery between the football actionc. In practice, this is achieved by using conditional football games: 4x4, 3x3, 2x2, 1x1.

Maintaining more football action for a long time for the presentation in football, for the football fitness means maintaining a faster recovery for a long time. In practice this is achieved by using conditionals football games: 11h11, 10x10, 9x9, 8x8 and 7x7, 6x6, 5x5.

Football is an interval sport. Football coaches need to improve football actions rather than energy systems. All four football fitness features have their own physiological process and training effect.

It is known that one way to improve the training process is the determination of rational ratios of the means of training:

• Passing exercises

Extensive passing exercises (EPE)

Large volume; Low intensity; Long distances; low repetitions

Intensive passing exercises (IPE)

Small volume; High intensity, short distances; many repetitions

• Possession games

1. Extensive possession games (EPG) - at least 7 opponents – 4x3min / 1.5min rest P
2. Extensive possession games (EPG) - 4-6 opponents – 4x2min / 1min rest
3. Intensive possession games (IPG) - up to 3 opponents – 4x1min / 30 seconds rest

- Explosivity preparation exercises (EPE)
- Football sprint with maximum rest (FS max. rest.)
- Football sprint with minimum rest (FS min. rest.)
- Football-conditioning games 11x11 up to 8x8 (FCG)
- Football-conditioning games 7x7 up to 5x5 (FCG)
- Football-conditioning games 4x4 up to 1x1 (FCG)
- Football exercises for speed endurance (SE)

Our research aims at searching and scientific substantiation of effective technologies for construction and implementation of educational and training process during the preparatory period of 17-18 years old football players.

Our working hypothesis is that the created model of training during the preparatory period by using football games with a ball through the block method, contributes to faster development of special preparedness (physical and functional) to provide them with adaptation for training activities during the competition period.

Aim of the present study was to analyze the effectiveness of the invented six week training program for the development of aerobic and anaerobic abilities.

We have completed the following football conditioning training (FCT):

Day	Cycle 1/ Week 1
Monday	Conditioning test
Tuesday	Tactical training
Wednesday	***AM;FCT: EPE - (7x50m; 70%; 50``rest; 5m stop) /*** ***IPE /*** ***FCG 11x11....8x8 (2x15` with 2`rest)***
Thursday	Tactical training
Friday	Tactical training
Saturday	***PM; FCT: EPE - (8x40m; 80%; 40``rest; 4m stop) /*** ***IPE +shoot /*** ***FCG 11x11….8x8 (3x11` with 2`rest)***
Sunday	Day off

Day	Cycle 1/ Week 3
Monday	***EPE - (10x20m; 100%; 20``rest; 2m stop) /*** Tactical training
Tuesday	***AM;Group 1: FCT: IPE /*** ***SE (2x4x12``work with 1`15`` rest; 4`series rest/*** ***FCG*** 7x7....5x5 (4x4` ***with 2`rest)*** ***PM; Group 2: Friendly game (2x45`)***
Wednesday	Recovery training
Thursday	Tactical training
Friday	***AM;Group 2: FCT: IPE /*** ***SE (2x4x12``work with 1`15`` rest; 4`series rest/*** ***FCG*** 7x7....5x5 (4x4` ***with 2`rest)*** ***PM; Group 1: Friendly game (2x45`)***
Saturday	Recovery training
Sunday	Day off

Day	Cycle 1/ Week 4
Monday	Tactical training
Tuesday	***PM; FCT: IPE +shoot /*** ***FS with minimum rest (2x6x15m with 10`` rest; 4`series rest)/*** ***FCG*** 7x7....5x5 (4x4.5`***with 2`rest)***
Wednesday	Recovery training
Thursday	Tactical training
Friday	***Friendly game (2x45`)***
Saturday	***AM; Recovery training (First team)*** ***AM; FCT: IPE /*** ***FCG*** 7x7....5x5 (4x5`***with 2`rest - Subs)***
Sunday	Day off

Day	Cycle 1/ Week 5
Monday	Tactical training
Tuesday	***PM; FCT: IPE +shoot/*** ***FS with maximum rest (6x5m with 30``rest + 4x15m with 45``rest + 2x25m with 45``rest; 4`series rest)/*** ***FCG*** 4x4***....*** 3x3 (2x6x1`***work with 3`rest)***
Wednesday	Tactical training
Thursday	Tactical training
Friday	***Friendly game (2x45`)***
Saturday	***AM; Recovery training (First team)*** ***AM; FCT: IPE /*** ***FCG*** 4x4***....*** 3x3 (2x6x1`***work with 3`rest- Subs)***
Sunday	Day off

Day	Cycle 1/ Week 6
Monday	Tactical training
Tuesday	Tactical training
Wednesday	***PM; FCT: IPE +shoot /*** ***FS with maximum rest (7x5m with 30``rest + 4x15m with 45``rest + 2x25m with 45``rest; 4`series rest) /*** ***FCG*** 4x4***....*** 3x3 (2x6x1`***work with 2.5`rest)***
Thursday	Tactical training
Friday	Tactical training
Saturday	***League game 1***
Sunday	***AM; Recovery training (First team)*** ***AM; FCT: IPE /*** ***FCG*** 4x4***....*** 3x3 (2x6x1`***work with 2.5`rest-Subs)***

Before and after the experiment complex functional tests were conducted with the players from our youth national team under 19 years old. We have analyzed the following features:

Maximum speed (Smax- km/h)

Maximum oxygen consumption (VO2max- ml)

Maximum oxygen consumption/weight (VO2max/kg,- ml/kg)

Body fat (BF- %)

The results were analyzed through the IBM SPSS Statistics 19 programme (Tables 1-7)

Table 1.Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BF % 1-vo	,169	16	,200*	,968	16	,804
Smax 1-vo	,186	16	,140	,915	16	,140
VO2max 1-vo	,147	16	,200*	,951	16	,511
VO2maxkg 1-vo	,142	16	,200*	,932	16	,261

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.

Table 2. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	**Sig.**	Statistic	df	Sig.
BF % 2-ro	,147	16	**,200***	,966	16	,763
Smax 2-ro	,314	16	**,000**	,771	16	,001
VO2max 2-ro	,187	16	**,137**	,958	16	,621
Vo2maxkg 2-ro	,094	16	**,200***	,989	16	,999

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.

Table 3. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BF % 1-vo	10,9688	16	1,61027	,40257
	BF % 2-ro	10,0750	16	1,43968	,35992
Pair 2	Smax 1-vo	16,6500	16	,97022	,24256
	Smax 2-ro	17,4375	16	,71262	,17816
Pair 3	VO2max 1-vo	3487,5000	16	229,85503	57,46376
	VO2max 2-ro	3578,1250	16	245,60724	61,40181
Pair 4	Vo2maxkg 1-vo	50,1756	16	3,02726	,75682
	Vo2maxkg 2-ro	51,2569	16	2,67073	,66768

Table 4. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	BF % 1-vo & 2-ro	16	,931	,000
Pair 2	Smax 1-vo & 2-ro	16	,564	,023
Pair 3	VO2max 1-vo & 2-ro	16	,883	,000
Pair 4	Vo2maxkg 1-vo & 2-ro	16	,800	,000

Table 5. Paired Samples Test

		Paired Differences		
		Mean	Std. Deviation	Std. Error Mean
Pair 1	BF % 1-vo - 2-ro	,89375	,59044	,14761
Pair 2	Smax 1-vo - 2-ro	-,78750	,81803	,20451
Pair 3	VO2max 1-vo - 2-ro	-90,62500	115,78536	28,94634
Pair 4	Vo2maxkg 1-vo - 2-ro	-1,08125	1,83242	,45811

Table 6. Paired Samples Test

		Paired Differences		
		95% Confidence Interval of the Difference		
		Lower	Upper	t
Pair 1	BF % 1-vo - 2-ro	,57912	1,20838	6,055
Pair 2	Smax 1-vo - 2-ro	-1,22340	-,35160	-3,851
Pair 3	VO2max 1-vo - 2-ro	-152,32266	-28,92734	-3,131
Pair 4	Vo2maxkg 1-vo - 2-ro	-2,05768	-,10482	-2,360

Table 7. Paired Samples Test

		df	Sig. (2-tailed)
Pair 1	BF % 1-vo - 2-ro	15	,000
Pair 2	Smax 1-vo - 2-ro	15	,002
Pair 3	VO2max 1-vo - 2-ro	15	,007
Pair 4	Vo2maxkg 1-vo - 2-ro	15	,032

Analysis of research results on our youth national team at the beginning and at the end of the experiment showed increase of the results of tested indicators. The statistical methods used (t - Stewdent criterion) give us reason to conclude that this increase is due to the proposed model for aerobic and anaerobic exercise of 17-18 year-old football players during the preparatory period.

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HEART RATE ANALYSIS OF YOUTH FIELD HOCKEY PLAYERS DURING THE GAME

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***Key words**: hockey, intensity, heart rate*

INTRODUCTION

Field hockey is an exciting and diverse team sport, which characterizes by high dynamics level and variety of constantly changing game situations. The aim of the games is to enter the 14,63 m semi – circle in front of the goal and score. To achieve this you must possess individual tactical thinking and team spirit actions in constantly changing attack and defense actions. The contemporary look of the game requires a high level of physical, technical, intellectual, moral and volitional qualities for players practicing the sport. The specific low body position of the players with knees half bend and sudden changes of direction and speed further aggravate the movement of hockey players during match [1]. Study of Lothian and Farrally show that between 17% and 30% of the total playing time in hockey players work with high intensity and are in contact with the ball [2]. Therefore, the best hockey players must have a high level of aerobic and anaerobic capacity, good agility and strength [3, 7].

Studying the work intensity during match will contribute to the gradual and systematic planning of sports training in 16-year-old hockey players. Intensity of physical load can be expressed with the help of several indexes. One of the easiest ways for doing this is to measure the heart rate [4, 5]. There are many different technologies and instruments for measuring. Most commonly used in sports practice are pulse testers (heart rate monitors).

The aim of the study is to trace physical load by analyzing heart rate and energy consumption during competition.

METHODS

The study conducted in 2013 during the European Championships for Juniors U18. Contingent of the study were 18 players part of the national team U16 observed in five matches during the Championship. The match duration was two half times of 35 minute with 10 minutes brake between them. For achieving the aim of our study we used Suunto Ambit belt attached to players chests (see photo 1). The obtained data was analyzed by player positions on the field: forwards, midfielders and defender (both in the two half times). Physical load of the players was divided by four zones of energy providing (showed in Table 1).

Picture 1

Table 1. Energy systems zones

Energy systems	Heart rate (beats/min)
First zone (aerobic energy system)	120-140
Second zone (aerobic – anaerobic energy system)	140-165
Third zone (anaerobic – aerobic energy system)	165-180
Fourth zone (anaerobic –glycolytic energy system)	180-195

RESULTS

Table 2 presents the results from the heart rate data. The average heart rate value during the official hockey matches is 156 beats per minute and the average maximum value values is 191 beats per minute. During the first half, the average measured pulse was 160 beats per minute and during the second half, it was 156 beats per minute. The average value of the maximum heart rate value is 190 and during the second half, it was 188 beats per minute. The average energy consumption was 910 kcal.

Table 2. Heart rate and energy consumption

Heart rate (beats/min)							
	1st half		**2nd half**		**Average**		**Energy consumption (kcal)**
	X	**Max**	***X***	**Max**	***X***	**Max**	
Forwards	156	195	149	192	152	196	784
Midfielders	163	187	163	185	159	188	978
Defenders	160	192	152	189	155	192	904
Average	160	190	156	188	156	191	910

Table 3 presents the results of the distance covered by the players distributed to the four energy zones. Greatest distance (2800 meters or 47% of the total distance) was covered in energy zone 3, 2040 m or 34% was covered in zone 4, 920 m or 15% was covered in zone 2 and only 250 m or 4% was covered in energy zone 1.

Table 3. Distance covered (m) in the four energy zones.

	1st half		2nd half		Average	
	Meters	% of total distance	Meters	% of total distance	Meters	% of total distance
Zone 1 (120-140 beats/min)	100	3%	150	5%	250	4%
Zone 2 (140-165 beats/min)	440	15%	480	16%	920	15%
Zone 3 (165-180 beast/min)	1310	44%	1490	49%	2800	47%
Zone 4 (180-195 beats/min)	1120	38%	920	30%	2040	34%

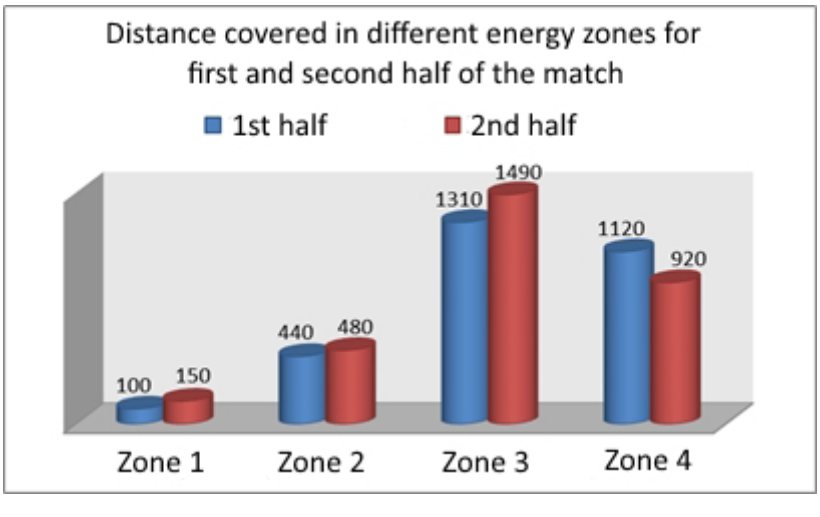

Figure 1

The distance covered in the divided four energy zones for the first and second half are visible on Figure 1. It is clear that during the second half of the match players covered greater distance in energy zones 1, 2 and 3. Greater distance was covered in energy zone 4 during the first half.

Physical load mode of examined players in the four energy zones are visible on Figure 2. From it is apparent that 47% of the distance covered by the 16 year old players is in anaerobic – aerobic energy supply zone (heart rate vary between 165 – 180 beats per minute). 34% of the total distance is covered in anaerobic – glycoses energy supply zone (180 – 195 beats per minute), 15% in aerobic – anaerobic energy supply zone (140 – 165 beats per minute) and 4% in aerobic energy supply zone (120 – 140 beats per minute).

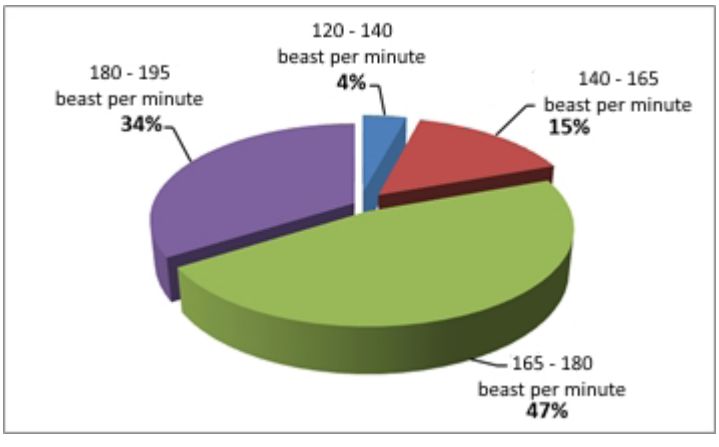

Figure 2

DISCUSSION

It is clear from the heart rate data analysis that the physical loads during official matches is high. Astrand and Rodahl classify physical load as high when the average heart rate value is 150 bps [6]. In our study, the average heat rate is 156 beats/min and the maximum values is up to 191 beats/min. This fact indicates a high level of physical load. We should keep this in mind when working for players' physical preparation. Energy consumption is an average of 910 kcal.

- Physical load in the four energy zones is as follows:
- anaerobic – aerobic energy supply zone (165 – 180 beats per minute) – 47%;
- anaerobic – glycolytic energy supply zone (180 – 195 beats per minute) – 34%;
- aerobic – anaerobic energy supply zone (140 – 165 beats per minute) – 15%;
- aerobic energy supply zone (120 – 140 beats per minute) – 4%.

We must take in mind that 16 years old hockey players' physical intensity load is mainly in anaerobic – aerobic energy supply zone. The annual training plans should comply with field hockey physical load characteristics.

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OPTIMIZATION OF THE PROCESS FOR LEARNING OF ADULT BEGINNERS

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Everyone found their reasons to playing tennis. The coach must first create an environment that stimulates and make beginners to participate. Then you have to add an emotional and intellectual reason to arouse motivation. At one point, the motivation must pass external (from the coach, friends, etc.) to internal (the player himself wants to participate). The engagement is the last step and can only be reached by an individual.

Ways to achieve success in training with beginners

Beginners often find it difficult the game of full court with a normal ball because of the court size, the speed of the ball, the height of the bounce and the lack of permanent skills for control of the ball. The main objective of the approach based on game (ITF, 2005), emphasize on the following factors contributing to the simplification of the game:

- The type of ball used
- The magnitude of the court
- The choice of cooperative or competitive element in training

If beginners can not serve and played points, a soft ball can be used. This gives the player more time for reception of the ball, and facilitate the technique as rebound is smaller.

HYPOTHESIS: Our hypothesis is that by using the method "Tennis-express" for adult education, adult beginners much faster will start playing tennis and their shots will be more effective than the shots of adult beginners who are trained in the classical method "single program""- prepared in last 80 years.

The aim of this paper is to optimize the training of adults dealing with tennis.

Tasks that follow the purpose of the work are:

1. Teaching tennis using classic method of single tennis program for control group.
2. To explore and test methodology of ITF for training adults.
3. To compare the effectiveness of the two methods for training and performance through tests for monitoring and evaluation

Object of study 20 Adults divided into two groups by 10

The study focused on the characteristics of game parameters characterized tennis sport, by exploring the following indicators:

- The time to absorb major strokes in tennis.
- Basic learning of forehand stroke
- Basic learning of backhand stroke
- Basic learning of volleys
- Basic learning of serve

Tests of the training evaluation include:

1 / Forehand - Implementation of the forehand in motion from baseline - (16 strokes), 4 sets x 4 strokes. Perform consecutively four forehands as testing starts from the right angle passes through the middle of the court, move to the left corner of the court and returned for the next series.

2 / Backhand - Implementation of the backhand in motion from baseline - (16 strokes), 4 sets x 4 strokes. Perform consecutively four backhands as testing starts from the right angle passes through the middle of the court, move to the left corner of the court and returned for the next series.

3 / Volley - Implementation forehand and backhand volleys in motion 2 meters from the net - (16 strokes) – 2 sets x 4 strokes going to with the forehand and 2 series x 4 strokes return back with a backhand. Perform consecutively four forehands, the competitor starts from right corner, passes through the middle of the service line, as it moves towards left corner, after reaching the left corner of the court returns with backhand volley.

4 / Service - Implementation of serve from the baseline in order by 10 - in diagonal - 10 serve from the right field and 10 serve from the left field.

PRIMARY EDUCATION PROGRAMME OF TENNIS EXPRESS

For the purposes of this course, adult beginners are defined:

- beginners (played few times) or never played tennis before;
- have knowledge of the game with a trainer, but never played a game outside coaching environment;
- beginners who have not played for a long time.

COURSE OVERVIEW

LESSON	HOURS	LESSON OBJECTIVES
1	1hrs - 1.5hrs	Course welcome, introduction and objectives Slower balls and game situations Learn to rally - basic techniques for developing consistency from the baseline (red ball) Developing a basic serve and return (red ball) Learning and playing with tie break scoring (red ball)
2	1.5hrs -3hrs	Consistency from the baseline (red/orange ball) Moving the opponent from the baseline and maintaining good position (red/orange ball) Serve and return (red/orange ball) Playing with tie break scoring (red/orange ball)
3	3hrs -4.5hrs	Moving the opponent using a basic serve and return (red/orange ball) Understanding court positioning in singles Playing from the baseline in singles and doubles Learning to score in a set/match
4	4.5hrs -6hrs	Learning to play from the net in singles (orange/green ball) Combining different game situations in singles (orange and green ball) Learning to play basic doubles as a team /doubles court positioning (orange/green ball) Basic doubles formation - “one up, one back” (orange or green ball) Serve and return in doubles (orange ball)
5	6hrs - 7.5hrs	Learning to play from the net in doubles (orange/green ball) Playing singles and doubles with tennis scoring (orange or green ball)
6	7.5hrs – 9hrs	Playing a singles and doubles competition using different game situations and game styles (orange/green) Signposting - opportunities for play, competition and coaching at the club

ANALYSIS OF TEST RESULTS

On figure № 1 and № 2. are shown the output data, and the average percentage obtained by testing both groups.

The analysis of the results includes comparative final data from the study of technical indicators graphi-

cally presented in Fig. 1 -4.

The first parameter studied in both treatment groups was the time in which adults start to play tennis. After a pedagogical monitoring found that:

1. In the first group adults begin to play after two weeks of regular exercise - 3 times a week.

We explain this by the fact that the 10 steps in training adults are easier when players begin to play with smaller court and softer balls.

2 In the second group of adults come to play after the first month, conducted activities - 3 times a week.

The second groups are trained in the techniques initially playing court normal size with normal balls. Then go into the tactics of the game and only then start to play points.

Each assayed perform 16 forehand strokes. This makes 160 strokes for the whole group.

In the first group, 72.50% of forehand fall within the field, which is depicted in Figure № 1, while the second group the successful hits are 40%. This strongly suggests that the experimental group not only earlier start to pass the ball, but also quickly absorbed the technique of forehand. In the second group the right shots are 40% which shows that will take more time to achieve higher percentage.

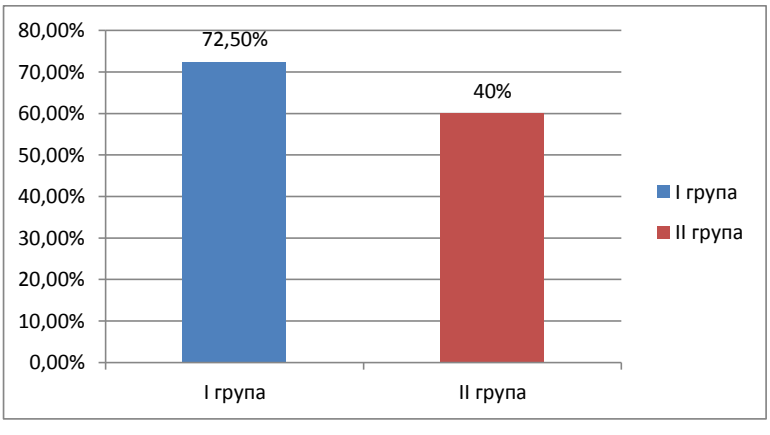

Fig. 1. Average forehand at the end of training in both groups

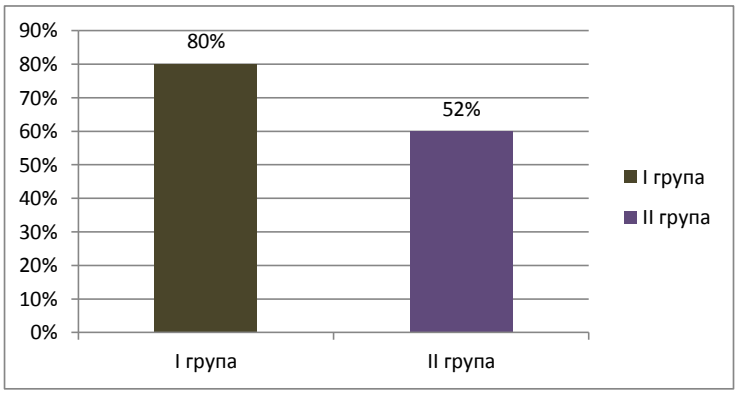

Fig. 2. Average backhand at the end of training in both groups

We believe is the advantage to train adults with gaming method, where the main goal is beginners start playing as soon as possible to like it and stay in tennis. This is achieved through the application of the tests in a gaming environment. The recent test shows that the forehand easily executed by beginners. This may be due to the fact that most of the time the sessions starts with forehand and it is always included in the training process.

By testing the second stroke - backhand, averages result on the first group is 80%. It is considerably higher than those achieved in forehand. This is due to the fact that adult easily absorb this stroke,

because most of them use both hands. Arm movement on the second hand is helping the beginners, making the stroke more easily implemented and higher result are achieved.

Mean values of the backhand testing of the second group are only 52%, which are significantly lower than those obtained in the first group. This is explained by the fact that most of the group hit the stroke with one hand and very often in the game situation people prefer to perform forehand (Figure 2). Play one hand is generally difficult to achieve, but the beginners choose performances with one hand because they have greater freedom of movement, which is important in training.

In the third test run down the success rate in the volley- Fig. 3, we got the following results in the first group - 70% and second group - 53%, which is significantly lower. But in general, the two groups have high rate, because during the volley the players cover smaller part of the court. In carrying out this stroke most players make mistakes in the standby position (they hold the head of the racket lower than necessary, and thereby violate the synergy in the implementation) (Figure 3).

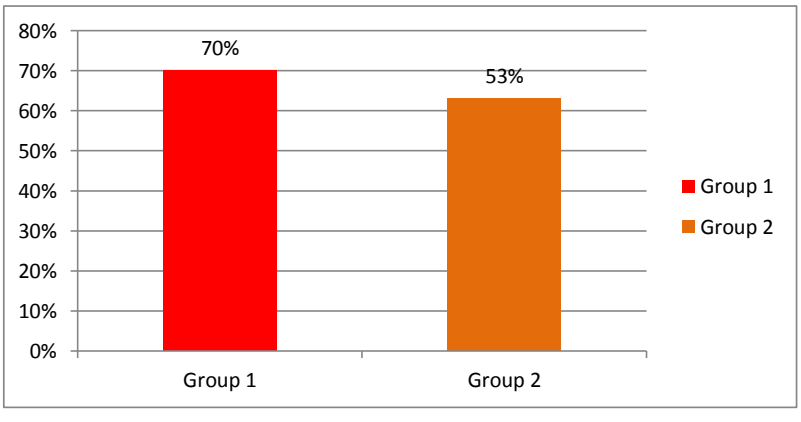

Fig. 3. Average volley after training in both groups

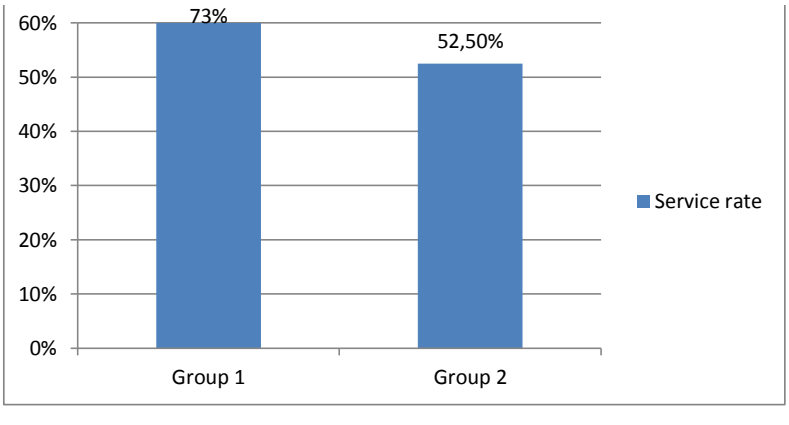

Fig. 4. Average serve at the end of the experiment in both groups

In the research of the last indicator - serve Fig.4 the values obtained in the first group - 73%, which is slightly higher than the second group and it is explain with the light circumstances which runs serve from service line in both groups. The values of the second group are - 53%, showing a good performance. Although the serve is with a complex coordination, the divided method of learning and the fact that is hit by the site contributes to the best values in both groups

CONCLUSIONS

1. The methodology “Tennis Express” is suitable for training adults, and the applications for initial training modules are very well structured.
2. The implemented methodology honed technique, the feeling for the ball, the movement and help to increase desire for development in the process of further activities and training.

3. Peoples of the experimental group began to play after the second week and their peers from the second group after the first 5 weeks.
4. The used methodology gives very good results, since it exclusively used gaming method. Service in both groups are in good rates, which is explained by the fact that this stroke is performed under favorable conditions from the baseline and from a place, because of its complexity and specificity.

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SPECIFIC WORKABILITY OF THE STUDENTS-BASKETBALL PLAYERS FROM THE HIGH SCHOOLS IN TURKEY

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Key words: *high schools, students-basketball players, specific workability*

The ***aim*** of the study is the level of the preparation of the students from the basketball teams of Turkish high schools to be grown by analysis of the parameters of their physical and technical-tactical preparedness.

METHODS

The ***subject*** of the study is the physical education and sport in the high schools in Turkey.

The ***object*** of the study is the parameters of the physical and technical-tactical preparedness of the students from the basketball teams of Turkish high schools.

Contingent of the study is 24 higher students (12 men and 12 women) playing basketball.

The following ***methods of research*** are applied for solving the objective and the tasks of the study: *review study and sport-pedagogical testing*.

For the needs of the study data for 14 indicators are registered:

for physical preparedness – 6 tests;

for technical-tactical preparedness – 8 tests.

The results of the study are processes mathematically and statistically by: *variation analysis, comparative analysis (by t-criterion of Student*) *and method of indexes.*

RESULTS AND DISCUSSION

As mentioned in the Methodology, 6 tests have been applied for establishing the level of the physical preparedness. The results from the variation processing of the men higher students' initial data are presented in **table 1**.

Table 1. Average and variability of the indicators of the special physical preparedness - men

№	Indicators	X	S	V	min	max
1.	Sprint 20 m	2,88	0,14	4,95	3,20	2,68
2.	Running between obstacles	19,80	1,37	6,92	22,57	18,12
3.	Hop (step and jump)	7,05	0,60	8,52	6,03	7,80
4.	Throwing compact ball - forward	12,69	1,86	14,69	8,50	15,93
5.	Abdomen presses	31,83	5,34	16,77	25	41
6.	Shuttle running	63,44	2,89	4,56	68,08	59,07

It is seen from the table that the men higher students practicing basketball within the frame of the higher school in Turkey, run 20 m for average of 2,88 s. According to us this is a serious achievement which is a sign of high level development of the sprint abilities of the Turkish students-basketball players. Comparing this result with the results from analogical studies of Bulgarian students-basketball players (Tsankova, J., 2008, Tsarova – Vasileva, A., 2012) we see they run the distance for hardly 3.62 s. The application of the comparative t-criterion of Student provides the reason with high guarantee prob-

ability ($P_t \geq 95$ %) to reject the zero hypotheses and accept as true the alternative according to which the Turkish students-basketball players considerably excel the Bulgarian ones in relation to the level of the special speed development for moving along the playing ground. A proof about that is the value of t (8,51), which is higher than the critical one ($t_{tabl.} = 1,98$). Similar situation is also observed in relation to the level of development of the lower limbs explosive strength at horizontal efforts in coordination complicated exercises (indicator 3 – triple jump, $t_3 = 2,44$) and the explosive strength of the abdominal muscles (indicator 5 – abdominal presses - $t_5 = 7,58$).

What is the level of the Turkish women higher students practicing basketball? The analysis of **table 2** shows that their achievements are lower than those of the men. We consider this fully logical.

Table 2. Average and variability of the indicators of the special physical preparedness - women

№	Indicators	X	S	V	min	max
1.	Sprint 20 m	3,36	0,24	7,25	3,80	3,10
2.	Running between obstacles	22,01	1,23	5,60	23,37	20
3.	Hop (step and jump)	5,61	0,52	9,31	4,70	6,30
4.	Throwing compact ball - forward	7,30	0,85	11,58	5,90	8,90
5.	Abdomen presses	28,50	6,45	22,62	18	36
6.	Shuttle running	71,88	3,05	4,25	79,09	68,08

That fact anyway does not provide a reason for making serious conclusions. That is the reason why the comparative t-criterion of Student is applied for proving the importance of the observed differences (**fig. 1**).

The analysis of **fig. 1** shows that for the greater part of the indicators, the values of the comparative criterion are between 4,17 (for indicator 2 – "dribbling between obstacles") and 9,14 (for indicator 4 – "throwing compact ball"). That allows to reject the zero hypothesis in relation to the symptoms about which these indicators bear information and to accept for true the alternative according to which the men teams excel the women teams in relation to the development level of the greater part of the symptoms of the physical preparedness. Indicator 5 ("abdominal press") is the only exception here; it

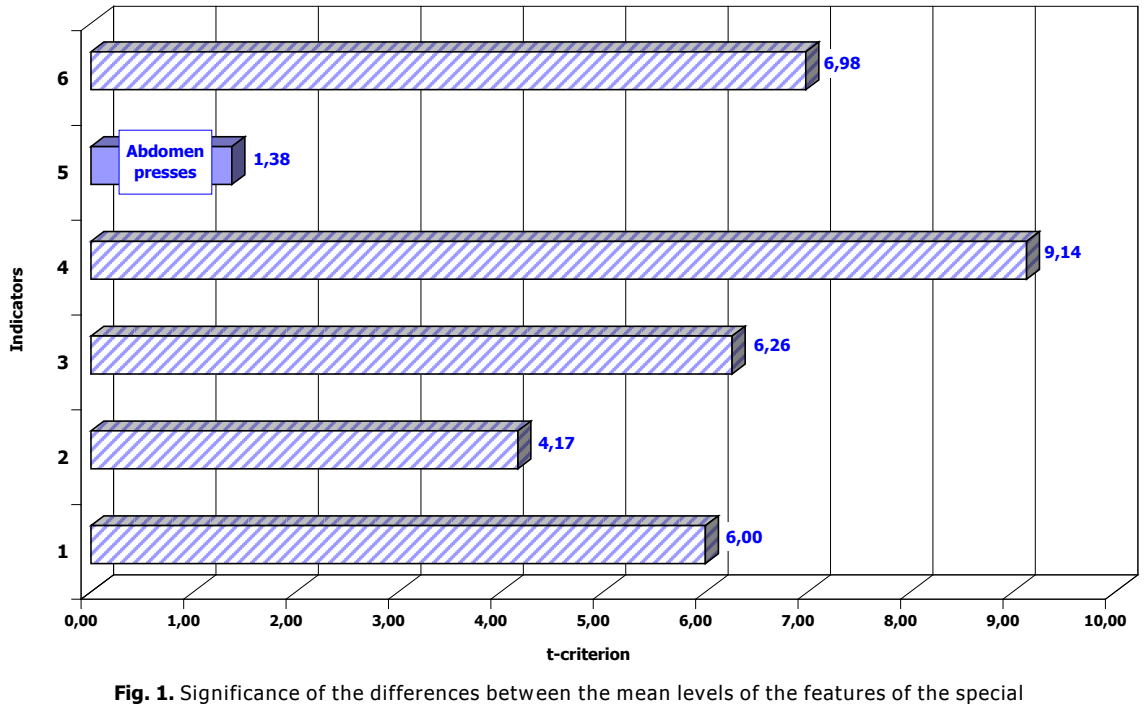

Fig. 1. Significance of the differences between the mean levels of the features of the special physical preparedness

bears information about development level of the explosive strength of the abdominal muscles. The analysis show that the difference in the achievements of the men higher students and the women higher students is not sufficiently great in order to be considered as important and consequently, the advantage of men in relation to the explosive strength of the abdominal muscles can be explained by occasional reasons.

The second group of symptoms under study bears information about the development of the technical-tactical skills of the men higher students-basketball players (**table 3**).

Table 3. Average and variability of the indicators of the , specific technical-tactical preparedness - men

№	Indicators	X	S	V	min	max
7.	Possession of the ball	60,50	10,48	17,33	40	72
8.	Dribbling between obstacles	20,31	1,48	7,31	23,30	18,35
9.	Dribbling index	0,51	0,35	68,66	1,10	-0,18
10.	Moving in defense	8,10	0,86	10,56	9,59	7,05
11.	Move shooting - t	33,09	2,44	7,37	38,18	30,15
12.	Move shooting – coefficient	6,92	2,25	32,51	12,04	5,09
13.	Shooting with a feeder	19,42	3,60	18,56	16	27
14.	Foul shot	15,67	1,97	12,57	12	19

The analysis of **table 3** shows that as a whole the level of the specific basketball preparedness of the Turkish basketball players is comparatively high. A proof about that is for instance the low index of leading the ball (indicator 9, X_9 = 0,51 s), which speaks that they have the skill to go along the playing ground by leading the ball at high speed. Similar conclusion can be made for the skill of the players to move in defense posture (indicator 10).

The last two indicators in **table 3** bear important information as well. Their analysis show that men are more effective in shooting the basket while jumping after they have received the ball by a partner (indicator 13 – 64,73% which is a result of 19,42 shots in the basket from 30 trials) and by performing free throws (indicator 14 - 78,35 %, 15,67 successful shots from 20 free throws). For comparison, J. Tsankova's studies (2008) show that the average effectiveness of the Bulgarian higher students-basketball players for shooting the basket is 56,09%. The difference between the results of the Turkish and Bulgarian high students is considerable (t_{14} = 5,00).

The comparative analysis of the technical-tactical preparedness of the men higher students (**table 3**) and the women higher students (**table 4**) show that as a whole the level of the men's specific basketball skills is higher than that of the women's skills.

Table 4. Average and variability of the indicators of the specific technical-tactical preparedness - women

№	Indicators	X	S	V	min	max
7.	Possession of the ball	55,67	5,12	9,20	48	64
8.	Dribbling between obstacles	23,16	1,60	6,92	25,40	20,33
9.	Dribbling index	1,15	0,85	73,48	3,07	0,25
10.	Moving in defense	9,13	0,98	10,73	11,11	8,16
11.	Move shooting - t	35,06	1,56	4,45	36,89	31,89
12.	Move shooting – coefficient	7,57	1,34	17,76	9,22	5,54
13.	Shooting with a feeder	19,17	3,86	20,13	12	26
14.	Foul shot	13,83	2,17	15,67	10	17

From **fig. 2** is anyway seen that for three of the symptoms under study from this group (indicators 7, 12 and 13) the values of the comparative t-criterion are lower than the critical one (2,07).

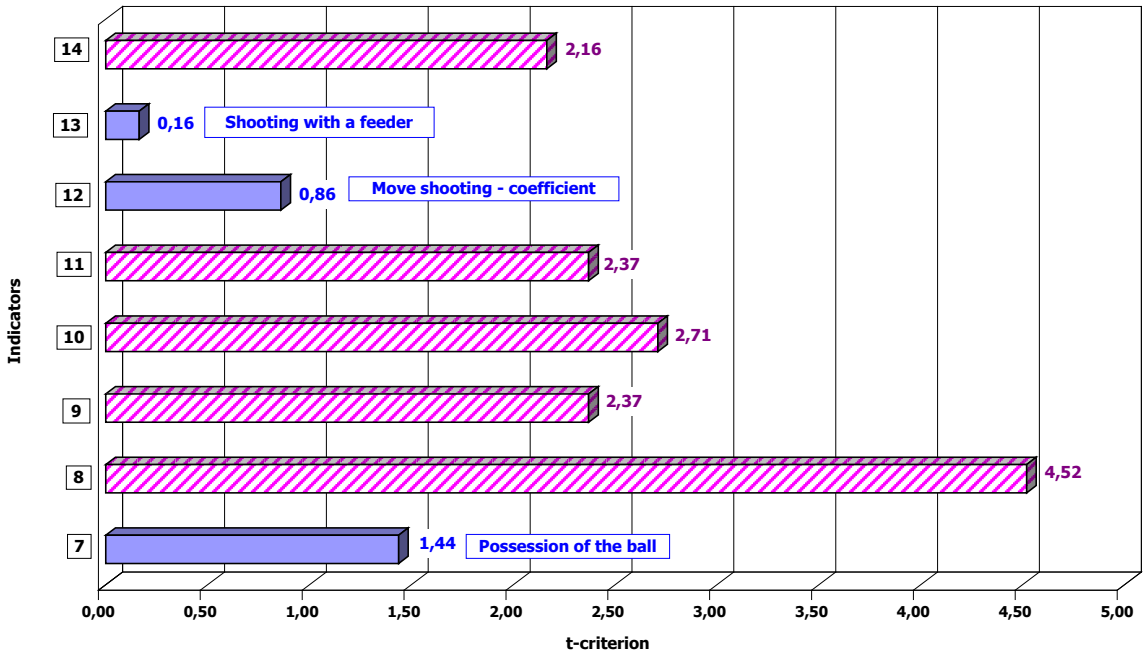

Fig. 2. Significance of the differences between the mean levels of the features of the specific technical-tactical preparedness

That provides the reason, with high guarantee probability ($P_t \geq 95$ %), to accept as true the zero hypothesis in relation to the importance of the differences under study between the average levels of the two totalities under study as far as the three indicators mentioned hereinabove are concerned. Consequently, men's advantage in relation to their skill for masterly treating the ball and the effectiveness of shooting while moving and while jumping following a pass is insignificant and can be explained by occasional reasons.

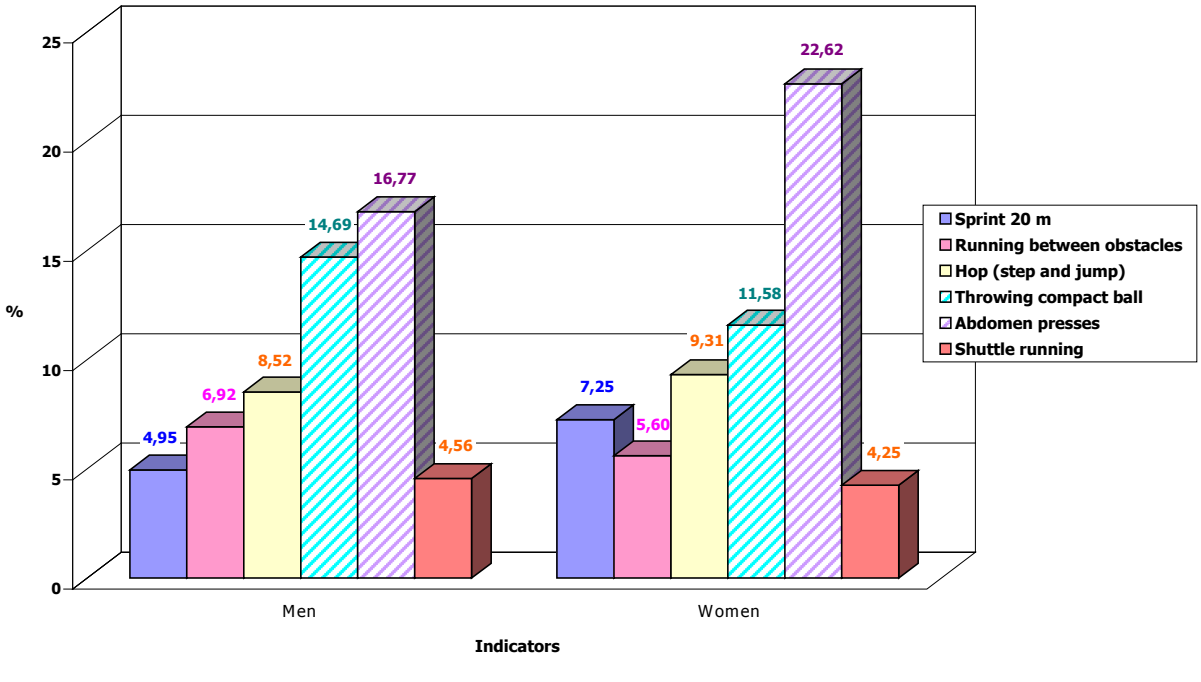

Fig. 3. Variability of the features of the special physical preparedness

The comparative analysis of the variety shows that as a whole both totalities under study is homogeneous in relation to the physical preparedness symptoms under study (**fig. 3**). Exception is observed for indicators 4 and 5, which gives the reason to consider that in relation to the explosive strength both of the upper limbs and the shoulders and the abdominal muscles, the groups under study are relatively homogeneous.

The analysis of **fig. 4** shows that the symptoms of the technical and tactical preparedness are more unstable.

This instability is most underlined for indicator 9 ("leading the ball index"). That proves that both groups under study are not homogeneous in relation to the skill of the students to move along the court by leading the ball at high speed. (V_9 is respectively 68,66 % for the men and 73,48 % - for the women). Non homogeneity is observed for the men in relation to the effectiveness of the speed shooting while moving (indicator 12, V_{12} = 32,51 %) too.

It is seen from the figure as well that most stable are indicators 8 and 11 for the men and 7, 8 and 11 for the women. That provides reason to consider that the non homogeneity of the groups in relation to the skill to move along the playing ground with a ball at high speed for some of the basketball players is due to the lower level of the special speed development and for other – to the lower developed skill for treating the ball. That fact should obligatory be recorded by the leading lecturers during future training sessions.

The rest of the specific technical-tactical preparedness indicators under study are relatively stable while the totalities under study are relatively homogeneous in relation to the symptoms about which these indicators bear information. The values of the variation coefficient for them are between 10 % and 30 %.

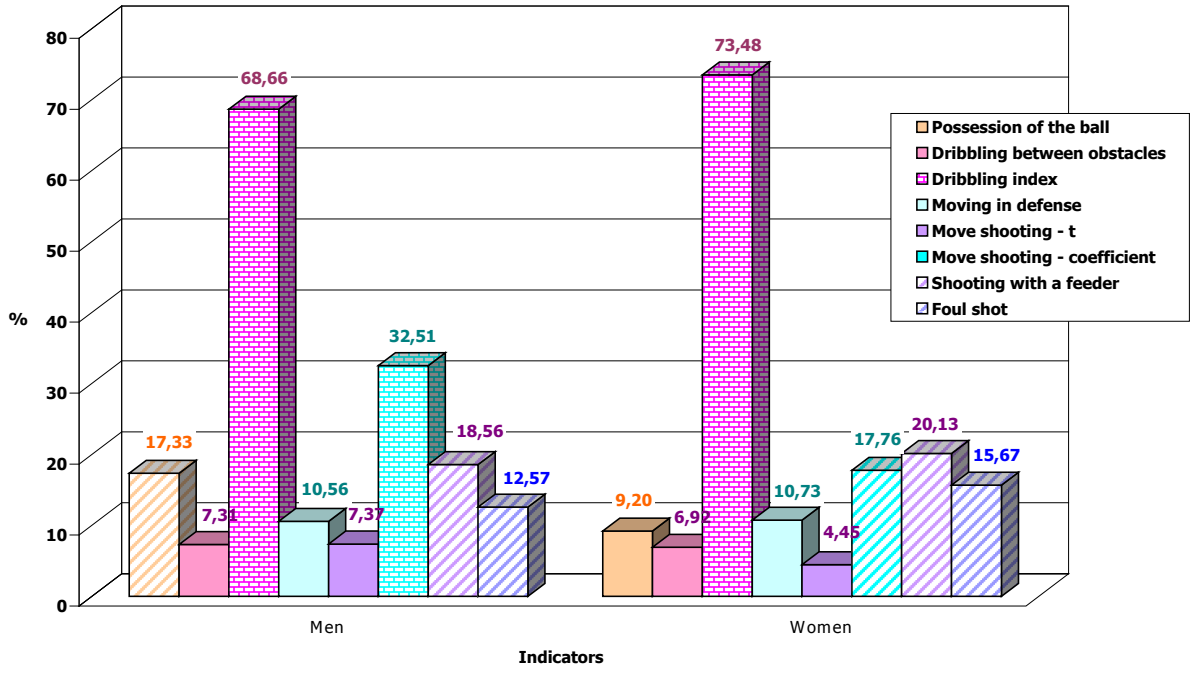

Fig. 4. Variability of the features of the specific technical-tactical preparedness

CONCLUSIONS

1. As a whole, the Turkish higher students entered into the basketball teams of the higher school under study have comparatively high level of physical and technical-tactical preparedness.
2. For the greater part of the symptoms under study, the men higher students have important advantage in comparison with the women higher students.

3. The advantage of the men's team in relation to the explosive strength of the abdominal muscles, the skill of masterly treatment of the ball and the effectiveness of shooting while moving and by a jump after a pass is insignificant and can be explained by occasional reasons.
4. As a whole, the indicators under study for both sexes are stable and relatively stable while the totalities under study are homogeneous and relatively homogeneous in relation to the symptoms about which these indicators bear information.
5. Non homogeneity is observed in relation to the skill of the higher students under study – men and women to move along the court by leading the ball at high speed as well as in relation to the effectiveness of the men for speed shooting while moving.

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IMROVEMENT OF THE TECHNICAL AND TACTICAL TRAINING OF YOUNG FOOTBALL GOALKEEPERS IN COMPETITION PERIOD

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Key words: football, young goalkeepers, program, micro-cycle

Integrating scientific achievements and information technologies into sports practice, commercialization and professionalization brought development changes in the football game globally. [1, 4]

Goalkeepers are the team players who need to improve themselves in multiple ways. Although their main task is defense they are also required to initiate fast attacks for their team. According to present-day requirements goalkeepers, as well as field players, need a specific weekly training program to be able to perform well and confidently during competitions. [5]

High or insufficient volume in young football goalkeeper training, complexity of this training, including various technical-tactical material and also the high requirements related to physical preparation, are imposing diversity of training tools and methods, their specific alignment, avoiding overtraining and sorting them in a way to be covered in a short period of time. This could be achieved by using microcycles to accomplish rhythmic training and the wave-like load distribution contributes for quickly achievement and maintenance of a sports form. [2]

The microcycle is aggregation of several training activities which differentiate a completed fragment of the training process. Its duration is usually around 4-10 days. Practically the hardest variety is the weekly one and difficulty comes from the unceasing intensification of present-day training process and aggregated impact of numerous factors influencing the activity of athletes. [3]

The objective of this scientific report is to prepare a microcycle in a competition period for improving the technical-tactical training of young football goalkeepers.

To accomplish this objective we have set up the following **tasks**:

Research and analysis of specialized literature.

Development of a weekly training program for technical-tactical training improvement of young football goalkeepers.

Illustration of training tools by specific software program.

Training indicators	Microcycle
General training indicators	
1.Number of training sessions	5
*High load	1
*Average load	2
* Low load	2
2. Number of hours	4,5
3. Technical-tactical training	2,5
4.Technical training	1
5. Complex training	1
6. Competitions	1
Basic training indicators	

Tuesday

Two goalkeepers are standing face to face. One is at the goal and the other is 3-4 steps away from him. Each of them has a ball. The keeper at the goal moves along its width, catches and returns the ball to his partner. (2 min.) – rolling, middle high and high flying ball – 10 min.

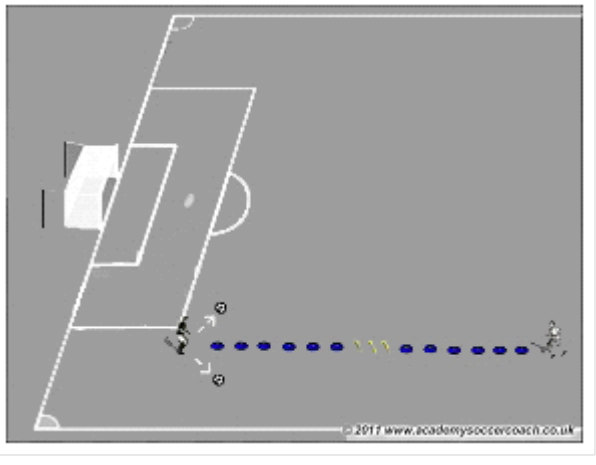

Figure 1

The goalkeeper overcomes the hats finely with a leading right shoulder, followed by 3 jumps over hurdles and then again finely with leading left shoulder. The coach throws a ball upward and the keeper catches the falling ball. (2 repeats, during the second one the coach shoots the ball with inside kick left and right) – 10 min. (Fig. 1)

The keeper overcomes hurdles sideward and by a plunge catches the ball thrown by the coach - first rolling then middle high (should be done both sides). – 10 min.

Square – with two touches, with one touch, volleyball style – 10 min.

Wednesday

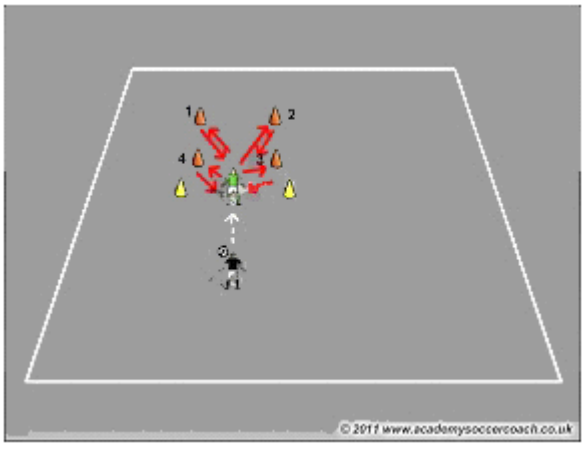

Figure 2

Option 1 – from starting position, goalkeeper moves and touches the cone specified by the coach (1, 2, 3, 4), after that he turns back in starting position and saves the ball kicked by the coach. (7-8 min.) – Figure 2.

Option 2 – similar to option 1 but the coach points out 2 cones at the same time. For example 2 and 3 (7-8 min.) – Figure 2.

Figure 3

Option 1 – from starting position the goalkeeper stands in the middle of the rhomb, after coach's signal the goalkeeper touches the cone, goes back to starting position and then saves the ball kicked by the coach. (7-8 min.) – Figure 3.

Option 2 – similar to option 1, but this time the goalkeeper knocks the ball away. (7-8 min.) – Figure 3.

Thursday

The goalkeeper starts from goalpost, he blocks three rolling balls by plunging (should be done on both sides) – 10 min

The goalkeeper cuts first rolling ball, stands up fast and cuts the other high flying ball to the opposite corner – 10 min.

The goalkeeper stands in starting position behind the goal. The coach throws the ball above the cross-beam, the goalkeeper bursts out the ball with one hand, moves sideward and catches the middle high flying ball by plunging (should be done both sides). – 10 min.

Blocking the shots frontally from different starting positions – lying, sitting, facing towards and away from the coach – 15 min.

Friday

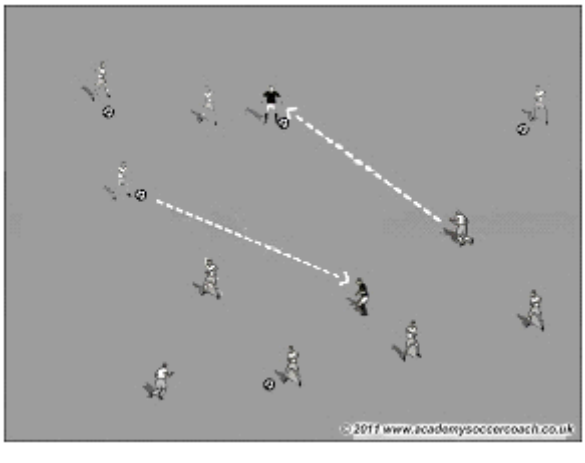

Figure 4

Players move while passing the ball, goalkeepers move without playing with their legs. The coach gives a signal to two of the players with balls so they shoot with a specific kick to the nearest keeper (could be to a faraway keeper, but it should be specified in advance which player passes to which keeper), and the goalie tries to catch the ball and then gives it back. (7-8 min.) – Figure 4.

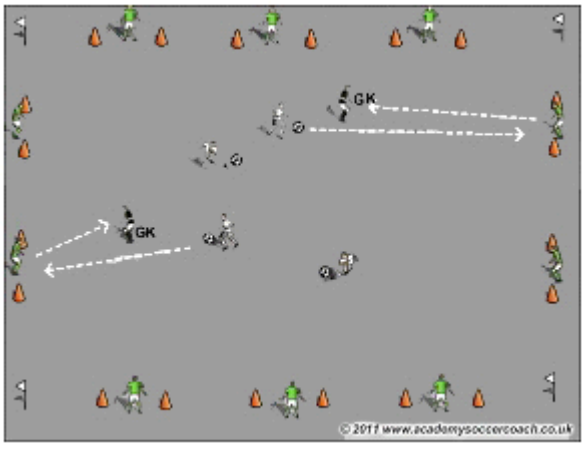

Figure 5

The inside group of players dribble and after a signal do a precise pass to players between the cones (2 m.) Those between the cones pass the ball with one kick to the goalkeepers situated between the cones. Afterward, the accurate passers and shooters change places. In the inside space there could be one on one situation after the coach's signal. (7-8 min.) – Figure 5.

Saturday

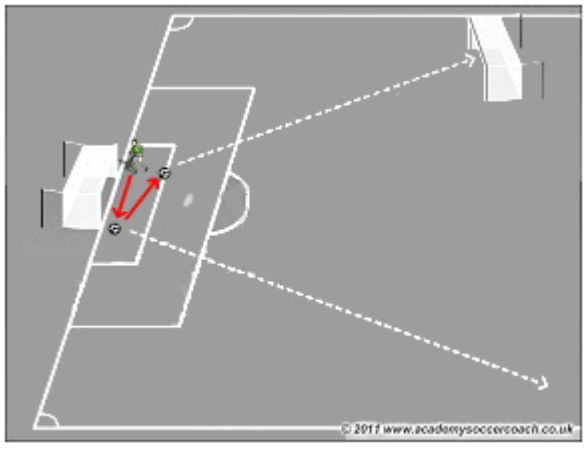

Figure 6

Passes with inside part with one or two touches – 10 min.

Caching balls falling from above (with two balls) – 5 min.

The goalkeeper is in starting position next to the right post of the goal and after a signal runs to the left post and kicks the ball to his partner**,** then runs to the other ball on the goal line and throws it with one hand into the small goal (should be done on both sides) – 15 min. (fig. 6)

CONCLUSION

All technical methods used by goalkeepers – catch, plunge, block, getting the ball into play with hands and legs, etc., technical actions and movements from own point of view and other team players' point of view, require scientifically determined, modern and appropriate tools to help increase the efficiency of goalkeeper training.

During the weekly microcycle we suggest five training exercises focused on different tasks. Training sessions on Tuesday and Wednesday are designed for improving physical skills and their development. Training on Thursday and Friday is technical-tactical, and on Friday we have included exercises for goalkeepers' integration with other team players. Training on Saturday is entirely tactical and includes exer-

cises for passing the ball with hands and legs to specific zones on field. On Sunday keepers participate in a competition and Monday is a rest day.

In the weekly program, designed to improve technical-tactical training of young goalkeepers, training methods are suggested which could be entirely used in the basic part of their training. That's why we recommend the preparation phase to consist of a dynamic warm-up of at least 15 min., including light running + exercises for general development, running exercises, exercises for flexibility and stretching, for agility with ball in hands, for movement with ball using legs or hands.

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ANALYSIS OF MIDDLE DISTANCE RUNNING (800M, 1200M) AND COORDINATION VALUES OF STUDENTS TAKING SPORTS HIGH SCHOOL ENTRANCE EXAM ACCORDING TO SPORTS BRANCHES

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Key Words: *Sports high school, running, coordination*

INTRODUCTION

Sports is a combination of competitive or noncompetitive, natural, entertaining and scientific movements which activate people's body and mind collaboratively, and provide the development of physical, mental, psychological, social, cultural, economic, anthropological, educational, political, technological, moral, and artistic structures in various ways [1].

Sport is a competitive activity with strict rules which is embodied in different branches as a result of the privitization of physical education activities, and it requires some physiological, psychological, aesthetic and technical qualifications when performed in a high level [2]. Being an integral part of education, physical education and sports is a significant factor which provides the youth with being good individuals in the society, revealing their abilities and being improved and trained as successful sportsmen by contributing to their physical and mental development [3]. In this respect, establishing "sports high schools" within secondary education institutions is an important step.

Based on Ministry of National Education Sports High School Regulations published in 2005, sports high schools were opened in Turkey [4]. As a result of the studies conducted by the Ministry of National Education to pass to a structure based on program diversity instead of school diversity in secondary schools considering development plans and government programs, a circular was issued in 2009 and these high schools continued education under the name of Fine Arts and Sports High School [5]. In the 18th National Education Council, recommendation was accepted suggesting that fine arts and sports high schools have different understanding of discipline and they shall continue their activities under two separate names. As a result, a circular was issued in 2013 to separate the schools [6]. Sports high schools were established to; raise successful sportsmen in line with their abilities by gaining them related basic knowledge and skills in their field, provide them with internalizing sports discipline and sportsmenship, gain them the habit of working in cooperation and solidarity, lead them to get prepared for higher education programs on physical education and sports, encourage them to do research about sports, and help them to be raised with necessary capability to be able to do applications in accordance with their abilities in the field [7].

Coordination is the ability to learn difficult movements in a short time and react quickly and expediently in different situations [8, 9]. Coordination skill is one of the main criteria to determine the winners in sports high school entrance exams. Even if the candidates are raced under the same conditions, coordination degrees may vary depending on the physical conditions (number of stations and the distance difference between stations) when the test is done. Therefore, branch and gender discrimination is a necessary practice during the evaluation process [10].

Located between sprints and long distance running, middle distance running is a race which necessitates both speed and power elements [3]. As it mostly provides equality aerobically and anaerobically, it is evaluated as aerobic-anaerobic sport as well [11]. Unlike other secondary education institutions,

sports high schools are the institutions where skilled young people are directed to sports. According to the research, the number of studies found in the literature regarding these high schools which were started to be established in 2005 in Turkey are limited. In the study, short and middle distance running and coordination degrees of male and female students are examined in terms of change in years and branches in the light of data obtained.

METHODOLOGY

In a 3-year period comprising the years 2010, 2011 and 2012 in Sarıçam Fine Arts and Sports High School in Adana, test values of 803 students involving 639 male and 164 female students taking sports high school entrance exam at the age of 14 on average were analyzed.

800 and 1200 m tests were run in groups. Time evaluation was made through photocell. Each student stopped the time for themselves while crossing the ending photocell. Coordination test consists of; passing the hurdles from the top and bottom, flat rolling, running between slalom bars, hitting the wall with a handball, leaping over the hurdles double foot switch, and sprint. The candidate starts the test with the start command by passing through the photocell range, and finishes by passing through the finishing photocell. Every candidate has only 1 (one) right for each test.

In the study, (SPSS 21.0) package program was used. For statistical analysis, one-way analysis of variance (One-Way ANOVA) and LSD (Least Significant Difference) being one of the multiple comparison tests were made.

RESULTS

Table 1. Comparison of male candidates who took 3 year examinations.

Running	Years	N	Mean	Sd	Min.	Max.	F
1200 meter (s)	2010	201	283.68	2.45	220.78	368.35	0,19
	2011	237	285.55	2.32	220.78	372.85	
	2012	201	283.93	2.48	220.78	372.85	
	Total	639	284.45	1.39	220.78	372.85	
Coordination (s)	2010	201	59.36	0.42	46.73	73.35	0,53
	2011	237	58.86	0.38	46.73	73.35	
	2012	201	59.36	0.42	46.73	73.35	
	Total	639	59.18	0.23	46.73	73.35	

Table 2: Comparison of change in male candidates according to branches.

Running	Branches	N	Mean	Sd	Min.	Max.	F/LSD
1200 meter (sec)	Athletics (1)	39	273.42	6.11	233.33	356.82	1,99* 1<5,6,8 4<5,8
	Basketball (2)	64	280.76	4.96	220.78	372.85	
	Volleyball (3)	83	282.84	3.54	237.31	368.35	
	Handball (4)	67	276.43	3.92	220.78	354.91	
	Soccer (5)	285	287.08	2.13	232.67	372.85	
	Judo (6)	65	287.62	3.84	232.67	344.68	
	Gymnastics (7)	17	293.17	9.00	249.13	357.99	
	Wrestling (8)	19	296.78	6.56	244.80	356.82	
	Total	639	284.45	1.39	220.78	372.85	
Coordination (sec)	Athletics (1)	39	61.08	1.00	47.94	72.27	4,80** 1>3,4,7,8 2>4,7 3,4<5,6 7<5,6
	Basketball (2)	64	59.57	0.68	47.80	71.34	
	Volleyball (3)	83	57.73	0.63	46.73	73.35	
	Handball (4)	67	57.02	0.65	47.27	71.94	
	Soccer (5)	285	59.88	0.35	46.73	73.35	
	Judo (6)	65	60.17	0.75	50.58	72.59	
	Gymnastics (7)	17	55.55	0.86	50.49	60.98	
	Wrestling (8)	19	57.23	1.43	47.80	67.66	
	Total	639	59.18	0.23	46.73	73.35	

While obtaining a statistically significant difference in the running values of male children, the candidates who took the tests in the region of Adana, change along 3 years duration, there were no significant differences in their 1200 meters running and coordination values (p>0,05).

There was a significant difference in 1200 meter running and coordination values of 14 year male children according to branches (p<0,05 and p<0,001).

Table 3. Comparison of female candidates who took 3 year examinations

Running	Years	N	Mean	Sd	Min.	Max.	F
800 meter (s)	2010	51	207.41	2.81	175.11	255.98	0,10
	2011	62	205.93	2.43	175.11	255.98	
	2012	51	205.78	3.01	175.11	255.98	
	Total	164	206.34	1.57	175.11	255.98	
Coordination (s)	2010	51	69.75	1.06	55.14	83.24	0,05
	2011	62	69.39	0.90	55.14	83.24	
	2012	51	69.75	1.06	55.14	83.24	
	Total	164	69.61	0.57	55.14	83.24	

While obtaining a statistically significant difference in the running values of female children, the candidates who took the tests in the region of Adana, change along 3 years duration, (p<0,05) there were no significant differences in their 1200 meters running and coordination values (p>0,05).

Table 4: Comparison of change in female candidates according to branches.

Running	Branches	N	Mean	Sd	Min.	Max.	F
800 meter (s)	Athletics (1)	33	205.61	3.82	176.21	255.98	0,62
	Basketball (2)	20	208.29	3.48	175.53	232.66	
	Volleyball (3)	31	209.39	3.50	180.28	245.38	
	Handball (4)	16	203.02	5.50	175.11	251.89	
	Soccer (5)	21	210.49	4.69	175.11	236.68	
	Judo (6)	33	202.08	3.26	178.38	235.82	
	Gymnastics (7)	10	206.13	7.45	178.38	255.98	
	Total	164	206.34	1.57	175.11	255.98	
Coordination (s)	Athletics (1)	33	70.19	1.40	55.14	83.24	0,56
	Basketball (2)	20	69.86	1.38	56.53	79.12	
	Volleyball (3)	31	68.83	1.36	56.53	83.24	
	Handball (4)	16	69.63	1.81	58.99	81.87	
	Soccer (5)	21	69.42	1.51	58.99	79.12	
	Judo (6)	33	70.74	1.26	55.14	83.09	
	Gymnastics (7)	10	66.28	2.63	55.14	75.88	
	Total	164	69.61	0.57	55.14	83.24	

There was no any statistically significant difference in 100, 800 meters running values and coordination values of 14 year female children according to branches (p>0,05).

DISCUSSION AND CONCLUSION

In his study, Karabulut (2004) took 800 m running degrees of female students aged 13-14 who take physical education course after getting them to do physical activity for 14 weeks. In the study, 800 m degree average for female students was found 271.76 sec which is similar to the running average of 208.54 sec

belonging to the students who took sports high school entrance exam [12]. Average degree of 208.54 sec in 800 m running presented in the study of Albayrak et al (2014) regarding sports high school entrance exams shows parallelism with current study. The difference between Karabulut's (2004) study and the studies about the students being prepared for sports high school entrance exams can originate from the fact that the students being prepared for sports high school entrance exams are more trained [12, 13]. The reason why no significant difference occured when female students were evaluated according to the branches could be because of inability to have enough branch directed improvement.

As 1200 m running is not performed in international competitions, enough data was not found in the literature. In a study conducted by Zsidegh et al. (2007), running values for 1200 m in a male student group aged 14 on average was obtained as 316.59 sec [14]. As to the study of Albayrak et al (2014), running values of male students at the age of 14 on average has been found as 285.44 sec for 1200 m [13]. Better running values of male students having joined ability tests than the ones in the study of Zsidegh et al (2007) may originate from interindividual difference or positive motivation of students for passing the test [13, 14]. In the current study, the lowest degrees in 1200 m running were obtained from the candidates who entered the exam in wrestling branch. According to the result, it can be stated that wrestling is not a branch of sports which is directed to the discipline being necessary for middle distance running. Candidates taking track and field test achieved top degrees in 1200 m running. It can be said that branch-based training has made it more advantageous for track and field students compared to other branches.

Coordination is a complicated motor skill. It has a determinant role in technical and tactical applications [15]. In aptitude tests, coordination test consisting of different tracks is one of the most important candidate selection criteria. In the study by Çebi et al. (2013), coordination degree of male candidates who took sports high school entrance exam was found 70.85 sec and that of female students was found 82,51 sec on average [10]. The degrees found in the current study as 59.50 sec for male candidates and 69.76 sec for female candidates on average are different from the degrees in the mentioned study. As a result of the differentiation of coordination test tracks, the results in the literature and the ones obtained in this study disagree with each other. In the study, it is seen that male students taking the test in track and field branch obtained the best degrees both in 100 m and coordination tracks. Therefore, it can be concluded that the one with better speed has better coordination as well. In the study, it has been seen that male students taking track and field test achieved the best degree as 273.42 sec on average in 1200 m running, and the worst degree as 61.08 sec on average in coordination. Male students in track and field branch are fast but have the lowest coordination capacity, which shows that being fast does not mean having good coordination values.

Sports high schools are one of the most important steps of raising sportsmen. Works to be done in the area is crucial in terms of raising awareness and directing more individuals to sports high schools.

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