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COMPARATION OF KINESITHERAPY AND POWERPLATE IN PATIENTS WITH CERVICOARTHROSIS

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Abstract: Osteoarthritis is a chronic disease of the musculoskeletal system, in which degeneration of the affected tissues is observed. Modern living conditions and immobility create favorable conditions for the spread of the disease.

The cervical region of the spine is subjected to significant dynamic and static loads, which often leads to pain and limited mobility. Diagnosing cervical arthrosis at an early stage opens up opportunities for effective and timely complex treatment. Such treatment includes not only medicinal approaches, but also various physical therapies, balneotherapy, as well as massage and kinesitherapy. Improving and maintaining the functional status of patients with cervical arthrosis is essential for their quality of life. This disease is characterized by destruction of articular cartilage, in which the formation of new tissue at the edges of bones and tendons is observed. It has a progressive course and affects a significant part of the population. These changes are part of the aging process of the body and the musculoskeletal system. The patented technology of Power Plate is designed to trigger the body's innate reflexive reaction to precise vibrations, stimulating muscles in a consistent and regulated fashion, thereby expediting the benefits of training. Power Plate's efficacy has been substantiated through numerous medical and scientific investigations, alongside practical application in clinical recovery and wellness establishments, sports enhancement hubs, and widespread adoption by a multitude of professional and collegiate sports organizations in the United States, as well as numerous others globally. Vibration is defined as an oscillatory motion involving mechanical forces. Its intensity is influenced by biomechanical parameters such as amplitude, frequency, and the scale of the oscillations. Specifically, amplitude refers to the peak-to-peak displacement measured in millimeters, frequency relates to the rate at which oscillation cycles repeat and is measured in Hertz (Hz), and acceleration reflects the scale of the vibrations.

This study aims to compare the efficacy of two therapeutic interventions, kinesitherapy (analytical exercises) and power plate, in enhancing muscle strength and improving cervical range of motion. Eighteen patients were divided into experimental (n=10) and control (n=8) groups. The control group received physical medicine and kinesitherapy, while the experimental group underwent physical medicine and power plate therapy, both for 21 days. Clinical assessments were conducted pre- and post-therapy. Results indicated symptom improvement in both groups, with better outcomes observed in the control group. Furthermore, the control group exhibited more significant improvements in range of motion compared to the experimental group. Kinesitherapy demonstrated greater efficacy than power plate therapy, likely due to its targeted muscle exercises and isotonic/isometric contraction combination, as opposed to the rapid and numerous contractions induced by the power plate. These findings highlight the importance of tailored therapeutic approaches in enhancing muscle strength and cervical spine mobility.

Key words: kinesitherapy, powerplate, cervicoarthrosis
Field: Medical sciences and Health

1. INTRODUCTION

Neck pain develops in 30 to 50% of adults every year, and in 50 to 85% of these individuals, the pain does not regress completely and becomes chronic (Aydoğmuş, H., et al (2022)).

Degenerative changes of the spine are a common disease and represent a serious medical-social problem that requires a complex program for treatment, rehabilitation and prevention. Degenerative changes of the spine are in the first place among degenerative joint diseases.(Ставрев, П., Атанасав, А., (2004)). Chronic neck pain has the potential to change the cervical region biomechanics by adversely affecting the muscle imbalance and head-neck posture. Forward head posture problems are commonly seen in persons with neck pain. (Hazal Gumuscu, B., et al.(2023)) Various exercise types are used in the rehabilitation of chronic neck pain and are suggested as potentially beneficial, although the evidence for these effects is low and results are inconsistent (Rasmussen-Barr, E., et al., (2023)).

Whole body vibration (WBV) therapy involves subjecting the entire body to mechanical oscillations while the patient either stands or sits on a vibrating platform. Initially utilized

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in the late 19th century by Charcot, this method aimed to alleviate gait abnormalities in neurological patients, notably those with Parkinson's disease.(Goetz, CG.,(2009)) The concept of employing vibrations as a form of exercise intervention emerged more recently. Russian researchers pioneered the use of vibration in exercise regimes, discovering its benefits in boosting strength among well-trained individuals. Further investigations have explored the impact of vibration training through various treatment protocols after both acute and long-term exposure. (Cardinale, M., Bosco C.(2003)) Over the past decade, WBV has gained traction as a favored exercise technique among both athletes and patients. Whole body vibration (WBV) is employed as a training method in both prophylactic and medical rehabilitation settings, as well as in conventional strength training routines.(Nordlund, MM., et al., (2007)) WBV exercises are conducted on a motorized oscillating platform. This platform is distinct from other vibrating platforms that feature vertical displacements alternating from the left to the right side, where the plate moves uniformly upwards and downwards. The application of mechanical vibration to muscles and tendons during WBV sessions involves a repetitive pattern of eccentric and concentric muscle contractions, prompting a neuromuscular response.(Cardinale, M., et al (2005)) Acutely, WBV exercises enhance neuromuscular patterns through a physiological process known as the "tonic vibration reflex" (TVR). This reflex involves the activation of muscle spindle reflexes that facilitate the stimulation of Ia-motoneurons, resulting in muscle contractions.(Rauch F, et al., (2010)).

Isometric exercises increase the intramuscular coordination by enhancing motor unit activation, synchronisation and/or firing rate within a given muscle. The isometric contraction generates high tension in the muscle than concentric contraction(Hungund, A., et al., (2020)). Several exercise programs have been prescribed for chronic neck pain patients to relieve pain and improve proprioceptive acuity. Arami et al. examined the effects of specific proprioceptive training versus endurance training on pain, muscle strength, and neck proprioception in people with chronic non-specific neck pain (CNNP) (Rahman, L and al.(2023)).

2. PURPOSE

Our goal is to compare the effectiveness of the kinesitherapy method (analytical exercises) and power plate as they act on muscle strength, and thus the improvement of the range of motion in the cervical part.

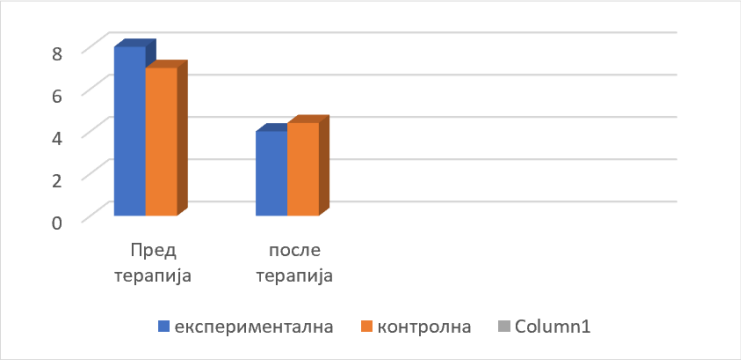
3. METHODS AND MATERIALS

The subject of the study were 18 patients, divided into two experimental (10) and control (8) groups. The control group was prescribed physical medicine and kinesitherapy (analytical exercises), while the experimental group was prescribed physical medicine and power plate. For both, the duration of therapy was 21 days. Clinical trials were conducted before and after 21 days of therapy.

4. ANALYSIS OF THE RESULTS

The results show an improvement in the patients' symptoms, which refer to the relief of pain in the cervical part in both groups (VAS - fig.1), but we have better results in the control group. The range of motion (Fig. 2,3,4,5,6,7) was also more significant in the control group. The kinesitherapy procedure proved to be more effective than the powerplate, which can be seen from the results shown in the graphs.

Figure 1. Evaluation of pain intensity (visual analog scale 0-10)



Source: Authors

Figure 2. Flexion in the cervical part

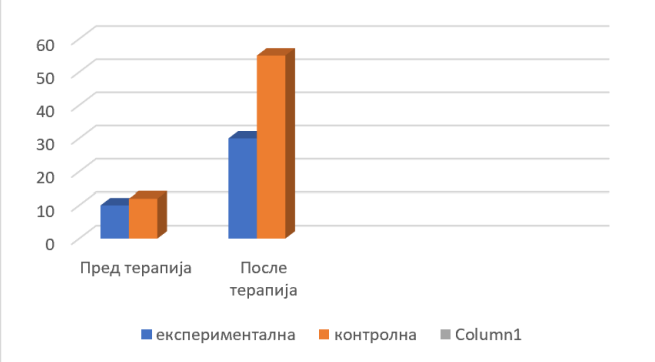


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Figure 3. Extension in the cervical part

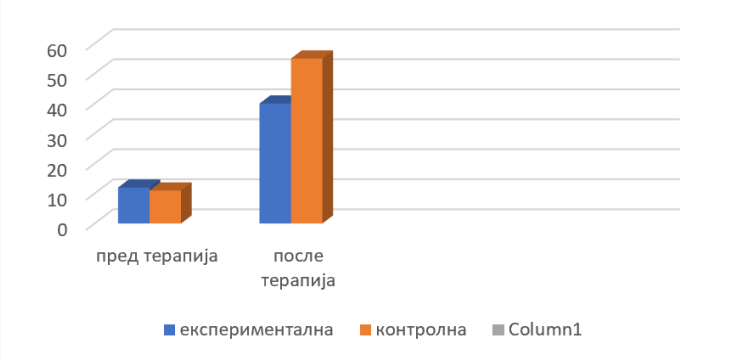

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Figure 4. Lateral flexion to the left in the cervical region

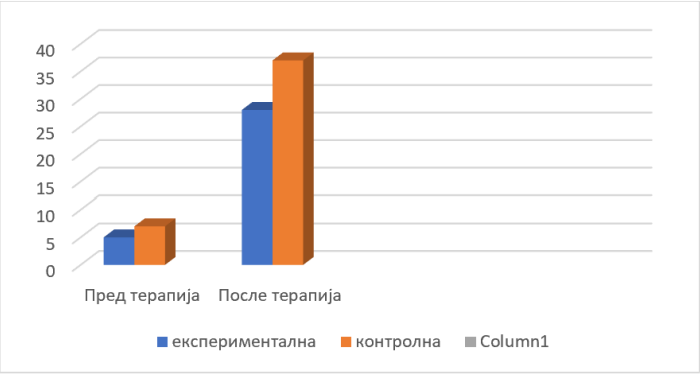

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Figure 5. Lateral flexion to the right in the cervical part

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Figure 6. Rotation to the right in the cervical part

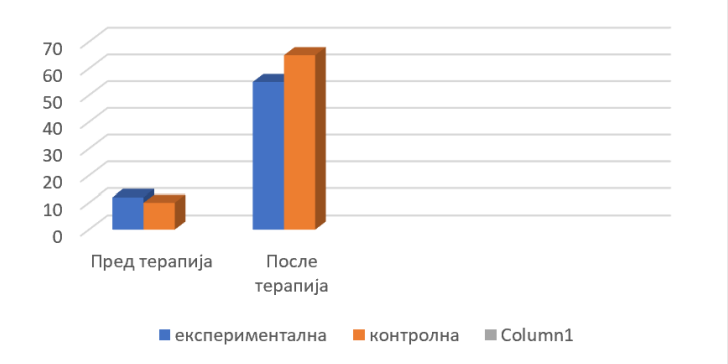

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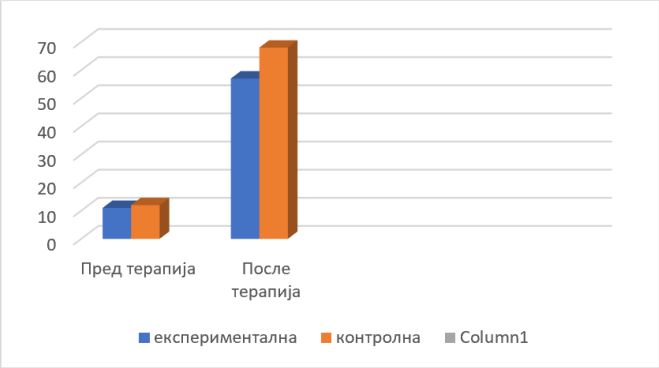
Figure 7. Rotation to the left in the cervical part



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5. CONCLUSION

Better targeting of the exercises of the weakened muscles when performing the analytical exercises, the dominant type of contraction is an isotonic and isometric combination, while with the powerplate the contractions are very fast and numerous, which causes an increase in the general tone of the muscles but does not affect the increase in muscle strength much, and from there and on the amount of movement in the cervical part of the spine which is shown in the graphs.

REFERENCES

Aydoğmuş, H., et al (2022)., Investigation of the effectiveness of neck stabilization exercises in patients with chronic neck pain: A randomized, single-blind clinical, controlled study. 2023, Turk J Phys Med Rehab 2022;68(3):364-371 DOI: 10.5606/tftrd.2022.8481

Ставрев, П., Атанасав, А., (2004) Ортопедия и травматология. Пловдив.

Hazal Gumuscu, B., et al.(2023), Comparison of three different exercise trainings in patients with chronic neck pain: a randomized controlled study. Korean J Pain. 2023 Apr 1; 36(2): 242–252

Rasmussen-Barr, E., et al., (2023) Summarizing the effects of different exercise types in chronic neck pain – a systematic review and meta-analysis of systematic reviews. 2023 BMC Musculoskeletal Disorders volume 24, Article number: 806 (2023)

Goetz, CG.,(2009) Jean-martin charcot and his vibratorychair for Parkinson disease. Neurology. (2009) 73:475–8. doi: 10.1212/WNL.0b013e3181b1640b

Cardinale, M., Bosco C.(2003) The use of vibration as an exercise intervention. Exerc Sport Sci Rev. 2003;31(1):3-7. 10.1097/00003677-200301000-00002 ISI:000180596000002. - DOI - PubMed

Nordlund, MM., et al., (2007) Med Sci Sports. 2007 Feb; 17(1):12-7.

Cardinale, M., et al (2005) Sports Med. 2005 Sep; 39(9):585-9; discussion 589.

Rauch F, et al., (2010) International Society of Musculoskeletal and Neuronal Interactions. J Musculoskelet Neuronal Interact. 2010 Sep; 10(3):193-8

Hungund, A., et al., (2020) Effect of myokinetic stretching technique and spinal mobilisation with arm movement in subjects with cervical radiculopathy: A randomized clinical trial. Indian J Phys Ther Res. 2020;2:134-40

Rahman, L and al.(2023) Effects of Two Exercise Programs on Neck Proprioception in Patients with Chronic Neck Pain: A Preliminary Randomized Clinical Trial 2023 Med. Sci. 10.3390/medsci11030056