CORRELATION BETWEEN SOME ANTHROPOMETRICAL PARAMETERS OF THE FETAL HEAD

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ABSTRACT

The aim of this study is to show the highest level of positive correlation between some anthropometrical parameters of the fetal head with gestational age.

The total number of fetuses (n=300), according to gestational age, was divided in five groups. Anthropological measurements were done using the methodology of the International Biological Programme with standard technique of the measurements.

Some anthropometrical parameters of the fetal head were analyzed: head circumference, biparietal diameter, transversal cerebellar diameter, head length, head spread, head height and body weight.

Results showed positive correlation with anthropometrical parameters of the fetal head with gestational age and crown-rump length. The highest level of positive correlation with crown-rump length showed the length of the head (r=0.92) and with gestational age (r=0.88); biparietal diameter (r=0.89) and (r=0.85); body weight (r=0.95) and (r=0.89); transversal cerebellar diameter showed high correlation with crown-rump length (r=0.81) and with gestational age (p=0.76).

The dynamic of some anthropometrical parameters of the fetal head was changed with gestational age especially between the 23rd and 25th week of gestation. The need for using measurements of some anthropometrical parameters of the fetal head are imposed as sensitive, safe and simple, and above all compelling in routine practice.

Key words: fetus, anthropometrical parameters, gestational age (week).

Introduction

The cognition of the fetal growth is necessary for the creation of appropriate anthropometric criteria, limited in terms of space and time.

We know that different parts of the fetus grow and develop in a different way during the fetal period. The distribution of the dimension obtained with anthropometric measurements enables their correlation, which can be used to determine the period when certain

parts of the fetus dominate with their growth and development.

The fetal head is considered an important part of the body which can help in the assessment of the fetal growth. (1) Measurements of the head parameters such as head circumference, head length, head height and head spread, biparietal diameter (BPD) and their correlation with the other measured parameters such as transversal and longitudinal parameters, allow us to assess the gestational age and problems which occur during its growth. (2)

The crown-rump length is one of the most accurate parameters used in the first trimester to assess the fetal growth, and is considered more appropriate than gestational age.

With the correlation between the anthropometric parameters and gestational age we can obtain standard values of the appropriate parameters for each gestational week by means of statistical data processing.

Fetal anthropometry is a quick, easy, non-invasive applicative method used in midwifery.

The aim of this study is to show the correlation of individual anthropometric parameters of the fetal head with gestational age.

Material and method

The study included 300 fetuses (150 male and 150 female) obtain with artificial abortions divided in 5 age groups: first group (11 -13 g.w); second group (14-16 g.w); third group (17-19

g.w); forth group (20-22 g.w) and fifth group (23- 25 g.w). This group classification was done by gestational age, and each group was divided in subgroups according to the sex criterion. Gestational age and fetuses without anatomic macroscopic malformations served as criteria.

The following anthropometric parameters were measured: body weight, body length, crown-rump length, head circumference (HC), head length, head height and head spread, biparietal diameter (BPD) and transversal cerebellar diameter (TCD).

Anthropometric measurements were done following the International Biological Programme with appropriate equipment and measurement technique.

Descriptive statistics was used, SD, X, MED, MIN, MAX. The correlation between certain anthropometric parameters was determined with regressive analysis and correlating coefficients.

Results

The results of all the measured fetuses showed a high correlation at almost all anthropometric parameters of the fetus head with the gestational age and the crown- rump length. The highest correlation with the gestational age showed the body weight r= 0.89, and with the crown- rump length r= 0.95. The correlation with the body length was r= 0.90. and with the crown-rump lenght r= 0.99.

Of the head parameters the following anthropometric parameters showed the highest level of positive correlation in all examined groups: the head circumference with the gestational age showed r= 0.52, and with the crown-rump length r= 0.53. The head length showed r= 0.88, and r= 0.92; head height r= 0.84 and r= 0.90; and head spread r= 0.84 and r= 0.89. The biparietal diameter showed high correlation with the gestational age r= 0.85, and with the crown-rump length r= 0.89; whereas the transversal cerebellar diameter showed r= 0.76 with the gestational age, and with the crown-rump length r= 0.81. These results are shown in Table 1, and the values of the descriptive statistics of the anthropometric parameters of the total number of fetuses are shown in Table 2.

Taking into account that there are differences in the factors which influence the weight of the fetus, such as the economic and social structure of the population, the geographic circumstances, etc. the growth curve changes in different surroundings. Because of those reasons, at a recommendation of WHO, other more stable parameters are introduced in classification, such as gestational age, crown-rump length, head circumference, limbs circumference.

These recommendations opened new phases in the thought of using other anthropometric parameters which form a high correlation with the gestation and the crown-rump length and their use increases the precision in determining the regular development of the fetus.

Table 1. Correlation of the anthropometric parameters

Correlation of some anthropometric parameters with gestational age and crown-rump lenght (r)		
	gestational age	crown-rump lenght
Body weight	0.89	0.95
Body height	0.90	0.99
Head circumference	0.52	0.53
Head lenght	0.88	0.92
Head spread	0.84	0.89
Head height	0.84	0.90
Biparietal diameter	0.85	0.89
Transversal cerebellar diameter	0.76	0.81

Table 2. Values of the anthropometric parameters

n=300	Body weight (gr)	Body Height (cm)	Head circumference (cm)	Head lenght (cm)	Head height (cm)	Head spread (cm)	BPD (cm)	TCD (cm)
X	315.9	23.26	16.30	5.58	3.68	4.45	4.41	2.33
SD	216.3	5.41	6.36	1.43	1.02	1.18	1.17	0.60
MRD	230	22	15	5.2	3.5	4.3	4.1	2.2
MIN	55	14.1	9.7	2.3	1.5	2.5	1.5	1
MAX	940	35.2	102	9	6.8	85	8	4.1

Discussion

The fact that the body length showed the highest level of correlation with the crown-rump and the gestational age is not surprising because the results of a number of anthropometric studies confirm that the body length is on of the most significant markers for determining the regular development of the fetus.

Davis RO et all (3) confirm these results and in their study they proved that the body weight showed the highest level of positive correlation with gestational age, where (r= 0.92), and with the crown-rump lenght (r= 0.90). Measuring the body weight along with the body length is

a necessary parameter in almost all anthropometric studies. Its correlation with gestational age and crown-rump length showed positive correlation (r= 0.89; r= 0.95). In his study Schild (4) notes that male fetuses in average have a bigger weight than female fetuses, which was also proved in our study, and which confirms that these two anthropometric parameters are reliable, quick and precise in the assessment of fetal growth. Examinations show that the accuracy of the assessment of fetal growth is also increased by measuring certain fetal parameters such as biparietal diameter, head circumference, abdomen circumference and femur length (5).

The head, analyzed as a whole, grows and develops much faster than any other body part. Following the dynamics of the growth of certain dimensions of the head in the intrauterine period shows that head length increases faster than head spread.

One of the cephalometry parameters is also body height. The correlation coefficient of this parameter with crown-rump length was (r= 0.90), whereas M. Honavar (6) found slightly lower values among the population in Iran (r= 0.88), and in the Chinese population the correlation factor is even lower (r= 0.84).

The next anthropometric parameter which also showed high correlation with gestational age and crown- rump is head spread where (r= 0.89 and r= 0.84). Head length, a parameter known for a long time, highly correlates CRL (r= 0.92) and with GA (r= 0.88). In Turgut's i Gokhan's studies (7,8) the values were (r= 0.94) for CRL and (r= 0.84) for GA. Biparietal diameter, which is routinely measured during the entire fetal growth, and has proved to be successful highly sensitive in the assessment of the regular development of the fetal head, highly correlates with gestational age and crown-rump lenght (r= 0.85 and r= 0.89). Our examinations didn't show any major differences compared with other studies (9).

Transversal cerebellar diameter, as a newer parameter used in the assessment of the regular development of the fetal head, especially in detecting structural abnormalities in the central nervous system, depends on gestational age in the second trimester of the intrauterine growth and showed a slightly lower correlation with crown-rump length (r= 0.81),(10).

Conclusion

Many authors consider that the measurement of fetuses can also be an additional method which will give information for the fetal growth as well as for the changes which can occur during its growth and development. The crown-rump length and gestational age, as stable / reliable fetal

parameters, are considered to play a part in the assessment of the fetal growth and development, as well as in diagnosing early intrauterine malformations. The information about the values of these anthropometric parameters of the fetal head has a great importance in the perinatal medicine, considering the fact that they are also parameters which are measured with ultrasound during the entire intrauterine development.

Our results can be used for developing certain anthropometric criteria which are used in the assessment of the fetal growth.

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