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The Achieved Growth of Basic Anthropometrical Features and Their Proportionality in Newborn Infants Compared to Respective Data in Adults

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The aim of the study is to assess the achieved growth of basic anthropometrical features and their proportionality at birth, compared to the anthropometrical status in adults. The anthropological investigation of 110 fullterm newborn boys and 109 fullterm newborn girls was carried out during 2001 in Sofia. The metrical data about five basic body sizes at birth and 4 indexes, giving information about proportionality between separate body parts are presented. The newborn boys have bigger sizes of the studied features, while the relative shares of these features compared to the final sizes in adults are bigger in newborn girls. The gender differences in absolute sizes of the anthropometrical features at birth are better marked compared to these about indexes of body proportionality. The results obtained characterize quantitatively the forthcoming changes after birth for proportionality between the lengths of torso and lower extremities and between the upper and lower extremities lengths.

Key words: anthropometrical features, proportionality, growth, fullterm newborns, adults.

Introduction

The basic characteristics of physical development in newborn infants are important indicators for their health state at birth, for the specificity of prenatal development, as well as, for the prognosis of future harmoniously body development of the child [1, 2, 4, 5]. The purposeful anthropological investigations for the determination of body maturity and body proportionality at birth could give information for these characteristics.

The **aim** of the present study is to assess the achieved growth of basic anthropometrical features and their proportionality at birth, compared to the anthropometrical status in adults.

Material and Methods

A detailed anthropological investigation of 219 fullterm clinically healthy newborn infants (110 boys and 109 girls) was carried out during the period of April-May 2001

in the ward of Neonatology at II[nd] Hospital of Obstetrics and Gynecology "Sheynovo"— Sofia. The anthropometrical measurements were taken using the Martin-Saller's classical methods [3], in a lying position of the child, from the right side of the body.

In this report we present the metrical data about five features, which reflect basic body sizes at birth and 4 indexes, giving information about body shape and proportionality between separate body parts.

To assess the achieved growth at birth we used not published till now data from the National Anthropological Program (NAP) of the IEMAM — BAS about mature Bulgarian population (30-40 years) from Sofia at the end of the 20[th] century.

Results

The assessment of physical development is led in two directions — in relation to the body sizes and about the proportionality between separate body parts and segments.

Comparative assessment of basic body sizes

The obtained metrical data of the basic body sizes are presented in Table 1 and Fig. 1.

The newborn boys have bigger sizes of five directly measured anthropometrical features, which show that even at birth the tendency of gender differences for body sizes that are typical for adults is marked. The biggest absolute differences between both genders of newborns are established for the stature (4.2 mm), and the smallest — for the lower extremities' length (0.6 mm).

Notwithstanding the metrical priority for boys, the relative shares of each five anthropometrical feature compared to the final sizes in adults are bigger in the newborn girls. The achieved growth of these features by them varies between 24.04 per cent and 34.64 per cent, and by boys — between 22.62 per cent and 32.02 per cent. The torso length for both genders is nearest to the final sizes at birth as the girls have priority over the boys with 2.62 per cent. The biacromial breadth and stature are the following features in newborn girls that achieved 30.0 per cent and more from the final sizes in adult women. In the newborn boys the achieved growth of these features is already under 30.0 per cent. The growth of their biacromial breadth up to birth is lower with 2.8 per cent than in girls, and of their stature with 1.95 per cent. The newborns from both genders have smallest relative shares about upper and lower extremities' length compared to their sizes in adults. For the upper extremities' length and the lower extremities' length the girls have priority over boys with 1.79 per cent and 1.42 per cent respectively.

Table 1. The absolute values and relative shares of body sizes in newborn infants compared to the respective data in adults

Features	Fullterm newborns						Adults (30-40 years old)			
	Boys (n = 110)			Girls (n = 109)			Males (n = 230)		Females (n = 271)	
	X	SD	% from adults	X	SD	% from adults	X	SD	X	SD
1. Stature	505.5	14.9	29.22	501.3	16.5	31.17	1730.0	64.9	1608.1	58.1
2. Torso length	172.9	9.0	32.02	173.6	8.6	34.64	540.0	30.6	501.2	27.2
3. Biacr. breadth	119.9	7.0	29.30	118.0	6.3	32.10	409.2	22.3	367.6	18.1
4. Upper extr.length	210.4	9.1	27.53	207.2	7.9	29.32	764.2	39.5	706.6	33.2
5. Lower extr.length	220.8	8.3	22.62	220.2	7.9	24.04	976.3	53.5	915.8	43.7

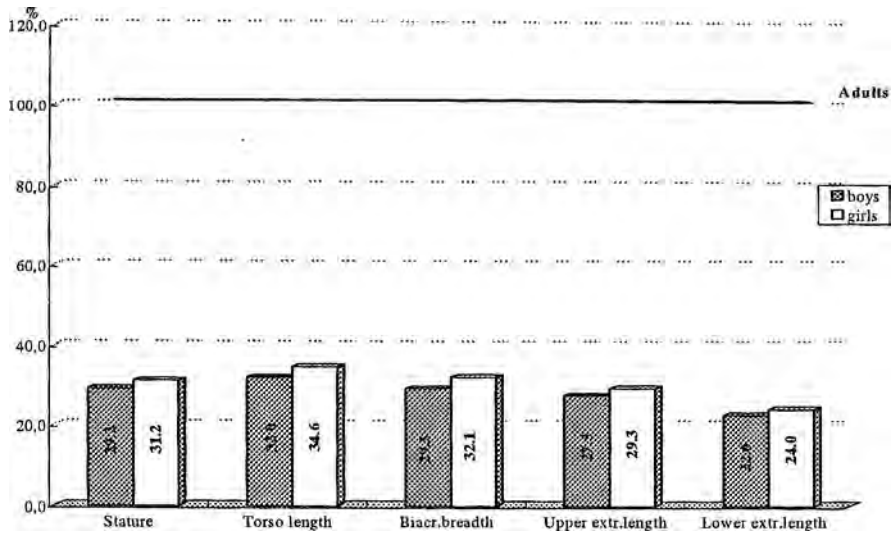

Fig. 1. The achieved growth of basic anthropometrical features in newborn infants compared to the final sizes in adults

Comparative assessment of body proportionality

In this study we make an attempt to characterize quantitatively the differences between body proportionality at birth and body proportionality in adults (Table 2, Figs. 2, 3).

The gender differences of the achieved body proportionality at birth are lower, compared to these in the absolute sizes of the anthropometrical features. The biacromial breadth proportion in newborn infants from both genders is nearest to the same one in adults. This result shows that at birth the proportionality between both sizes of shoulder girdle and stature is already formed.

The biggest differences between newborn infants and adults are established for the ratio lower extremity length/torso length. The relative length of lower extremities at birth is quite lower (about 30.0 per cent) than it is in adults and the formation of their proportionality continues during the following stage of postnatal ontogenesis. The torso length related to stature is about 10.0 per cent bigger at birth, compared to this in adults. The data from interextremities index show that the upper and lower

T a b l e 2. Body proportionality in both newborns and adults — comparative assessment

Indexes	Fullterm newborns						Adults (30-40 years old)			
	Boys (n = 110)			Girls (n = 109)			Males (n = 230)		Females (n = 271)	
	X	SD	% from adults	X	SD	% from adults	X	SD	X	SD
1. Torso length proportion	34.20	1.42	109.62	34.63	1.39	110.99	31.2	1.5	31.2	1.5
2. Biacr. breadth proportion	23.73	1.20	100.13	23.56	1.21	102.88	23.7	1.2	22.9	1.1
3. Interextremities index	95.33	3.61	121.75	94.17	2.98	121.98	78.3	2.9	77.2	2.8
4. Lower extr.length / Torso length	127.94	6.19	70.76	127.07	6.23	69.54	180.80	-	188.72	-

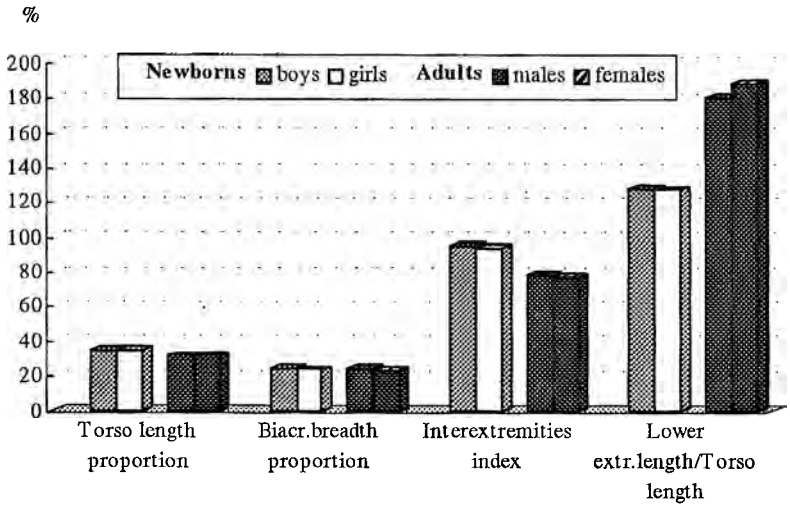

Fig. 2. Gender differences in the body proportionality

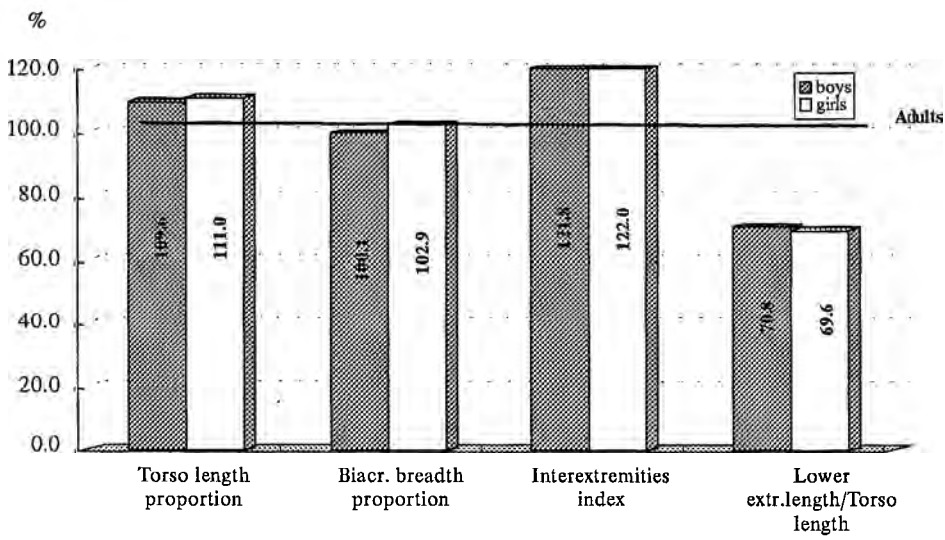

Fig.3. Body proportionality in newborn infants compared to the proportionality in adults

extremities' length have similar values at birth, while in adults the upper extremities' length is smaller with 20.0 per cent and more from the lower extremities' length.

The changes of body proportionality after birth show tendencies to increment of the relative length of lower extremities, compared to the torso length approximately by 30 per cent; to decrement of the relative torso length, compared to the stature approximately by 10 per cent and to a change of the proportion of both extremities lengths, in order to reach their proportionality in adults.

Conclusions

- The newborn boys have bigger sizes for the five studied anthropometrical features of physical development than newborn girls;
- The newborn girls have bigger relative shares of the same features compared to the final sizes in adults;
- The gender differences in absolute sizes of the anthropometrical features at birth are better marked compared to these differences in the indexes of body proportionality;
- The results obtained characterize quantitatively the forthcoming changes after birth for proportionality between the lengths of torso and lower extremities and between the upper and lower extremities lengths.

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