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Basic Anthropometrical Data about Physical Development in Children Aged 3-6 Years (Preliminary report)

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The aim of the present work is to characterize the main features of physical development-stature and body weight in children aged 3-6 years, living in Sofia City. Data about 374 children (172 boys and 202 girls) are analyzed and assessed. Both features are greater in all boys. Only at 5 years the stature has almost equal values for boys and girls. The intersexual differences are most distinct for the 3 years old children. The year's increment of stature is biggest between fifth and sixth year in boys and between third and fourth year in girls. The growth is most intensive during the period 3–4 years in both sexes. Biggest amount of body weight is accumulated during the period 4–5 years in both sexes. The growth velocity of body weight is biggest during the periods 5–6 years in boys and 3–4 years in girls.

Key words: stature, body weight, children, year's increment, growth velocity.

Introduction

The incomplete processes of growth and development are the most characteristic biological peculiarity of child's organism [4]. The assessment of basic anthropometrical features supplies important data about the specificity of quick changes in human body measurements during the separate childhood periods. These periods have fluctuations in time, intensity and continuance due to genetic and various environmental factors. The stature and body weight are main features indicating the stage of physical development and the health status of the individual [1, 2, 3].

The **Aim** of the present work is to characterize the main features of physical development in 3-6 years old children from Sofia City.

Material and Methods

For the analysis and assessment are used data about stature and body weight. The research has begun in June 2004 and is still going on and that is why the data presented

are preliminary. Till now, 374 children are examined (172 boys and 202 girls) in their third, fourth, fifth and sixth year from several different kindergartens in Sofia.

The intersexual differences are evaluated according to the corresponding index, calculated by the generally accepted in the anthropology formula, which shows these differences in index units (IU):

$$ISD = (\bar{x}\ \text{boys} - \bar{x}\ \text{girls} \times 100) / \bar{x}\ \text{boys}.$$

The statistical significance of the established intersexual differences is assessed by the t-criterion of Student, calculated by the independent extracts formula and evaluated in value of importance for $P < 0.05$.

The year's increment and the growth velocity are computed for every feature. For evaluating the growth velocity the following formula is used:

$$(\bar{x}_2 - \bar{x}_1 \times 100) / \bar{x}_2 + \bar{x}_1.$$

Results

On the table applied are presented the statistical data about stature and body weight, the year's increment and growth velocity by them, the data about ISD, and the t-criterion for the statistical significance of these differences.

Stature (Fig. 1, 3, 4)

At the age of three the stature in boys is 101.62 cm and in girls – 98.09 cm. The boys are at 3.53 cm taller than the girls. This is the only age in which the intersexual differences for stature are statistically significant and are biggest from all investigated years – ISD = 3,48 IU.

The stature of the 4 years old boys is again bigger than it is of the 4 years old girls, but the difference is smaller (1.67 cm) than in the 3 years old children. The average value for the feature is 107.70 cm for boys and 106.03 cm for girls. This is probably due to the more quickened growth velocity in girls during the 3 –5 years period. The values of ISD are distinctly smaller than in 3 years old children and the t-test does not show statistically significant differences.

The boys and girls aged 5 and 6 years have relatively equal values for stature. It is interesting to point out that the 5 years old girls overtake even insignificantly the boys of the same age. The mean value of stature is 113.79 cm for boys and 113.93 cm for girls.

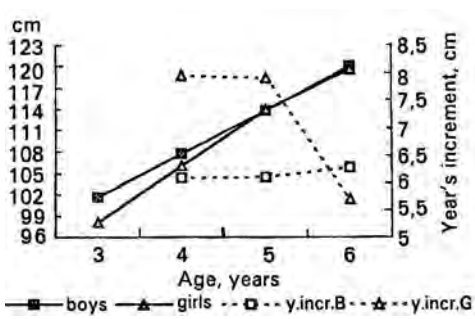

Fig. 1. Stature

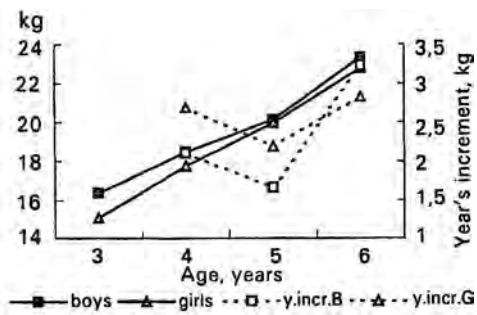

Fig. 2. Body weight

Table 1. The data about investigated features

Age	Parameters	Boys						Girls						ISD (IU)		t-test ♂/♀	
		Stature	Stature year's increment (cm)	Stature growth velocity (%)	Body weight	Body weight year's increment (kg)	Body weight growth velocity (%)	Stature	Stature year's increment (cm)	Stature growth velocity (%)	Body weight	Body weight year's increment (kg)	Body weight growth velocity (%)	Stature	Body weight	Stature	Body weight
3	*n*	35	-	-	35	–	–	45	–	–	45	–	–	3.48	7.88	3.24	2.66
	x	101.62			16.37			98.09			15.08						
	SD	5.26			2.42			4.23			1.76						
	V	27.69			27.69			17.93			3.11						
	min	92.10			13.00			83.50			10.10						
	max	119.70			23.40			106.90			19.20						
4	*n*	55	6.08	2.90	55	2.10	6.03	60	7.94	3.89	60	2.69	8.19	1.55	3.79	1.87	1.21
	x	107.70			18.47			106.03			17.77						
	SD	4.45			3.55			5.07			2.59						
	V	19.87			12.60			25.66			6.70						
	min	96.50			12.70			91.9			12.40						
	max	116.80			34.70			119.20			24.00						
5	*n*	48	6.09	2.75	48	1.66	4.30	62	7.90	3.59	62	2.19	5.80	-0.12	0.84	-0.16	0.37
	x	113.79			20.13			113.93			19.96						
	SD	4.74			2.35			4.65			2.64						
	V	22.47			5.52			21.64			6.94						
	min	104.00			16.30			102.90			15.00						
	max	122.80			26.00			123.70			28.50						
6	*n*	34	6.27	2.68	34	3.23	7.43	35	5.70	2.44	35	2.83	6.62	0.36	2.44	0.36	0.63
	x	120.06			23.36			119.63			22.79						
	SD	4.82			3.52			5.31			4.00						
	V	23.25			12.36			28.19			15.96						
	min	110.10			18.30			109.50			17.40						
	max	128.80			30.60			132.90			34.30						

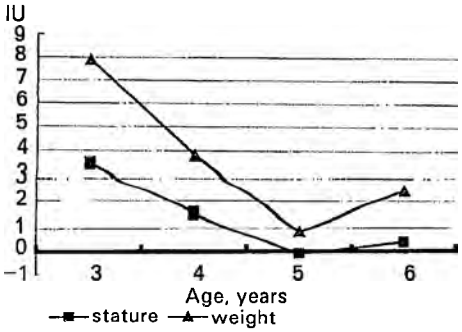

Fig. 3. Inter-sexual differences

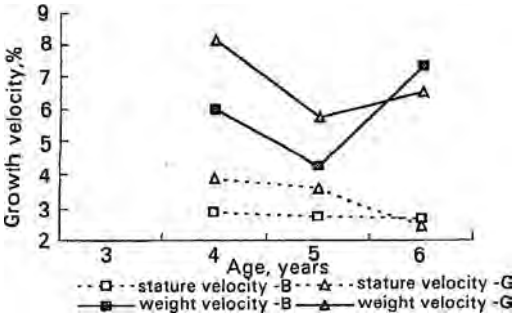

Fig. 4. Growth velocity

The year's increment for boys between the third and sixth year of age rises up but for girls these values gradually decrease. For boys the values of the feature increase with the average of 6 cm per year. The year's increment is biggest during the 5–6 year period, in which its value is 6.27 cm. In contrast to boys, girls have their biggest year's increment during the 3–4 year period when their stature is increasing with 7.94 cm. During the period 5–6 years, the year's increment in girls considerably decrease compared to the previous periods. At this age girls increase their stature with 5.70 cm.

The growth velocity for boys and girls is highest between third and fourth year, as it decrease gradually reaching the lowest value in the 6 years old children. In girls a more intensive decrease is observed between the fifth and sixth year.

Body weight (Fig. 2, 3, 4)

At the age of three boys have average body weight of 16.37 kg, and girls – 15.08 kg. The boys are at 1.29 kg heavier than girls are. Intersexual differences are statistically significant and their values are higher than in other age groups. At the age of four the differences in body weight between boys and girls decrease to 0.7 kg and at the age of five the values of the feature are relatively equal. This fact could be explained with the bigger growth velocity in girls during the 3-4 year period.

At the age of six the boys are again heavier than the girls, but the differences between both sexes do not reach those at 3 and 4 years old children.

The year's increment between third and fourth year is bigger for girls than for boys. Its values significantly decrease between the fourth and fifth year and reach their lowest values in both sexes. The biggest increase of body weight is established during the period between fifth and sixth year in which boys increase their body weight with 3.23 kg and the girls with 2.83 kg.

The growth velocity for boys is highest between 5-6 year. The girls are gaining in weight most intensively between the ages of three and four. It is interesting to be marked that in both sexes between fourth and fifth year, a decrease in the growth velocity is observed, after which it increases again.

Summarized the results show that:

1. The values of stature and body weight in all examined ages are higher in boys, except stature for the 5 years old children, which has relatively equal values for both sexes.

2. The intersexual differences for both features are greatest in the 3 years old children, as the body weight differences are much more distinct.

3. The year's increment of stature is biggest between fifth and sixth year for boys and between third and fourth year for girls. Biggest body weight is accumulated between fourth and fifth year for both sexes.

4. The most intensively stature growth for both sexes is established during the third and fourth year period. The weight growth velocity is highest between fifth and sixth year for boys and third and fourth year for girls.

In conclusion we can point out that the preliminary data issued in this research shows the direction in which age and sexual differences about the main characteristics of physical development in children are displayed at the age between three and six years.

We hope after finishing the investigation we will have in our disposal, representative data about the specificity of physical development for the children living in Sofia City at the aged from 3 to 6 years.

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