Publication date: 01.09.2021
DOI: 10.51871/2588-0500_2021_05_03_9
UDC 612.6

PHYSICAL DEVELOPMENT OF NATIVES OF THE MIDDLE OB' REGION AGED 5-7 YEARS

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Keywords: preschool children, physical development, body type, natives of the Middle Ob' region.

Annotation. Indicators of physical development are the most important medical and biological criteria that reflect the influence of endogenous and exogenous factors. This study presents features of the physical development of children aged 5-7 years in the first and second generation of an alien habitancy of the unstable population of the Middle Ob' region, who were born and permanently live in the hypo-comfortable natural and climatic conditions of the northern region of Russia. A total of 70 children of both sexes were examined. Results of the study showed that the main indicators of physical development of children aged 5-7 years of the Middle Ob' region were within the general biological patterns, while a wide variability of the analyzed data was observed. The predominant body type in the examined group of children was mesomorphic, the level of physical development was "average", harmonious physical development was observed in 72% of boys and 54% of girls. The annual body mass gain in the examined children aged 5-7 years ranged from 0,80 to 1,30 kg per year, the increase in body length from 3,00 to 5,70 cm per year. There were no statistically significant differences in body length and mass in boys and girls aged 5-7 years.

Introduction. One of the main indicators of the population's health is physical development, the formation of which occurs due to a number of factors presented by both the inherited program and the environmental influence. The continuously growing and developing organism of a child is especially sensitive to the influence of endogenous and exogenous effects. Of particular importance is a study of physical development of children, who live in various climatic and geographic conditions, including hypo-comfortable conditions of the northern region, where environmental factors have a substantial effect on the organism's development [1-2]. Monitoring of physical development indicators that include

anthropometric indicators, tempo of their change in the growth process, harmony of development and features of children's body type are the foundation of controlling health of the children population [3-6].

The aim of the study was to define and evaluate parameters of physical development of 5-7 year old children, who were born and live in conditions of the Middle Ob' region.

Methods and organization. Children aged 5-7 years, who live in Surgut, participated in the study. Total of 70 children of I-II health groups (girls – 34 %, boys – 66 %), who were born in conditions of the Middle Ob's region to the Slavic parents of the alien habitancy. A voluntary informed consent of children's legal representatives for examination and personal data processing was obtained.

We defined main total body dimensions (chest girth at rest (cm), body length (cm) and mass (kg)), calculated the body mass index (BMI) and evaluated physical development [7]. When presenting results of the study, the centile method with defining median (Me), Q1-Q4 quartiles was used. To define the normality of selections, the Shapiro-Wilk and Kolgomorov-Smirnov tests were used, to compare same indicators in various sex and age groups – the Mann-Whitney U-test and Kruskal-Wallis test. The significance level when testing statistic hypotheses in the study was accepted if it was equal to 0,05.

Results and discussion. The physical development shows main features of the child's organism – processes of growth and development at different stages of the ontogenesis [4, 7]. The growth's speed has its periods of acceleration and deceleration in the ontogenesis. The "half-growth spurt" occurs within the age of 5-7 years. Within this period, decrease of fat and increase of muscle mass take place, as well as predominating speed of the body length's growth in comparison with the speed of the body mass's growth. Organism's resources are aimed at the intense growth [8-9].

Main anthropometric indicators, the so-called total body dimensions of 5-7 year old children, who live in Surgut, are presented in Table 1.

Body length and mass are indicators of the child's organism development. General biological regularities were observed in changes of the body length and mass indicator of examined children. The main maker, which shows the systemic development process (speed of growth processes and heritability), is body length [5, 10]. There were no statistically significant differences between indicators of body length and mass in examined groups of boys and girls. Annual growth rates of body length in boys were 5,00 to 6,50 cm a year, in girls – 0,5 to 7,75 cm a year. Annual growth rates in boys was 1,2 to 1,3 kg a year, in girls – 0,8 to 1,2 kg a year.

Table 1

Total body dimensions of 5-7 year old children, who live in Surgut (Me, Q1-Q4)

Boys						
Indicator	Age, years	Me	Q1	Q2	Q3	Q4
Body length, cm	5	112,50	106,50	110,50	115,38	120,00
	6	119,00**	107,00	114,38	122,25	129,00
	7	124,75**	111,50	120,25	128,63	132,00
Body mass, cm	5	21,35	16,50	18,75	22,65	26,50
	6	22,70	17,70	19,53	24,00	28,20
	7	23,10	20,00	21,13	24,00	34,50
Chest girth, cm	5	57,75	54,00	55,50	59,25	64,50
	6	60,00*	54,00	57,75	61,50	68,00
	7	60,11	54,00	57,25	62,50	71,00
BMI, c.u.	5	15,99	14,41	15,25	16,86	21,35
	6	15,38	13,98	14,92	16,44	20,73
	7	15,67	12,82	15,12	16,38	17,44
Girls						
Indicator	Age, years	Me	Q1	Q2	Q3	Q4
Body length, cm	5	113,25	108,00	109,88	114,00	118,00
	6	119,00**	108,00	115,25	121,38	129,50
	7	119,50	118,00	118,75	122,38	131,00
Body mass, cm	5	19,80	15,80	17,50	20,90	23,50
	6	21,10	16,50	18,78	23,93	25,00
	7	22,80	18,60	21,45	23,28	26,20
Chest girth, cm	5	54,75	52,00	53,13	56,00	59,00
	6	56,00*	53,00	54,25	58,88	59,50
	7	56,50	56,00	56,00	57,63	63,00
BMI, c.u.	5	14,85	14,15	14,39	15,98	19,24
	6	14,96	13,01	13,95	15,80	18,50
	7	14,78	13,36	13,85	15,76	16,38

Note: * – statistically significant differences according to the Mann-Whitney U-test in groups of boys and girls of the same age; ** – statistically significant differences according to the Mann-Whitney U-test in comparison with the previous age group of the same sex – $p<0,05$.

The significant effect on body mass of children of the northern region is made by climatic and geographic conditions, unfavorable conditions, i.e. annual low temperatures, which make it difficult for children to spend long time outside. Because of it, motor activity of the child decreases, and the so-called northern hypodynamia takes place. The excessive nutrition and unspent calories or insufficient nutrition and underestimation of growth possibilities of the organism lead to excessive body mass or its deficit. Moreover, constitution features and speed of metabolic processes in the organism also have a great effect on body mass.

Among examined 5-7 year old children of the Middle Ob' region, 23,9 % of boys and 12,5 % of girls have excessive body mass.

Indicators of chest girth (CG) had statistically significant differences among groups of 6-year-old boys and girls. The growth rate of CG in boys was 0,33-2,17 cm a year, in girls – 0,5-1,5 cm a year respectively.

Total body dimensions were changing within general biological regularities, typical for this period of the ontogenesis. Median values of body mass, body length, CG of Surgut girls and boys aged 5-7 years were within standard values (25-75 centile) of the physical development [4, 10]. Minimal and maximal indicators (Q1 and Q4) of body length of examined children were different from 13 to 20 cm in different age groups, body mass – from 7 to 10 kg, CG – to 7 cm.

In order to define the constitution type of children, we used the Vervek-Vorontsov index. The advantage of that method consists of the fact that it allows following up dynamics of relative indicators of physical development and giving characteristics to the tempo of such changes. In the examined group of boys, the predominant type of constitution is mesomorphic, which belongs to the intermediate version of body type, taking the mean value between dolichomorphic and brachymorphic types. Among girls, apart from the mesomorphic body type, the moderate dolichomorphic type was also present (predominance of linear growth) (Table 2).

Table 2

Incidence (%) of indicators of body types and evaluation of physical development of Surgut children of both sexes, aged 5-7 years

Indicators	Boys	Girls
Body type indicators (%)		
Mesomorphic	98	58
Moderate dolichomorphic	2	42
Physical development level indicators (%)		
Low	4	0
Below average	11	21
Average	59	67
Above average	15	12
High	11	0
Harmony of physical development indicators (%)		
Harmonious	72	54
Moderately disharmonious	28	42
Disharmonious	0	4

The greater range of indicators of the physical development level was registered in boys – from "low" (4 %) to "high" (11 %). Meanwhile, there were no such characteristics among girls, values of the physical development indicator were

presented as “below average” (21 %), “average” (67 %) and “above average” (12 %).

In the age of 5-7 years, changes in body proportions are registered, therefore the harmony of physical development is an important indicator to observe. “Harmonious” physical development was observed in 72 % of boys and in 54 % of girls (Table 2).

Disturbance in the organism’s development or its disharmony can be the sign of inherited and inborn pathology on the one hand, on the other hand – of features of the constitutional development of the child. Values, which belong to the “moderately disharmonious physical development” group, was observed in 28 % of boys and 42 % of girls. Moreover, 4 % of girls had “disharmonious” physical development.

Conclusion. Physical development of native-born children of the Middle Ob’ region of the first and second generation of the alien population in case of observed region-based features corresponds with general biological regularities by showing the tolerance of growing organism at early stages of the ontogenesis to hypo-comfortable conditions of living in the north of Russia. No statistically significant differences of total body dimensions in boys and girls aged 5-7 years were registered, except values of the chest girth in 6-year-old children. The predominant body type is mesomorphic, the type of physical development – average, disharmony of physical development was characterized with tall height, excessive body mass and body mass deficit. We also revealed high variety in indicators characterizing the physical level of native-born children of the Middle Ob’ region.

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