Characteristics of Somatometric Indicators at Urban Schoolchildren

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ABSTRACT

The article presents the results of a study of urban schoolchildren. A number of somatometric parameters of schoolchildren of different ages were studied and compared with the norm. Based on the results obtained, conclusions were made and appropriate recommendations were made.

Keywords: Physical development, body weight, body height, somatometric indicators, chest circumference, Kettle index, Pignet index, Erisman index.

Relevance of the topic

Bringing up the young generation in a healthy and harmonious way is one of the most pressing issues in any society. Because a spiritually and physically healthy generation is the mainstay of the country and a necessary element for its development. Today, the world is paying special attention to the implementation of reforms related to the health of the younger generation. In particular, the United Nations World Health Organization's 2030 Sustainable Development Plans emphasize the importance of making strategic investments for children aged 10-19 without delay [4]. Determining the growth and development of children and adolescents is important in the study and assessment of their health. That's why so many researchers are focusing on this.

According to the literature, the level of physical development of children, students and adolescents of different ages differs to some extent from the norm. For example, in different regions of the Russian Federation there are different changes in age. In particular, in Rostov-on-Don compared to 1997-98, in 2007-2008 there was a decrease in physiometric indicators, in this decade there was a decrease in functional capacity, and in Tyumen region there was an increase in overweight among schoolchildren, Nizhny Novgorod, Moscow regions. In similar cases, changes in the appearance of physical development among students in Moscow have been identified (2).

A study in the Irkutsk region noted the importance of taking into account the area where the subjects lived when assessing physical development. Because the impact of socio-economic factors, nature and climate in urban and rural areas is not the same. As a result, the physical development of children living permanently in rural areas is different from that of children living in urban areas. A study in the Irkutsk region noted the importance of taking into account the area where the subjects lived when assessing physical development. Because the impact of socio-economic factors, nature and climate in

urban and rural areas is not the same. As a result, the physical development of children living permanently in rural areas is different from that of children living in urban areas. Some studies have shown that adolescents (15-18 years old) lack body mass. It is noted that underweight is a multifaceted problem, which is caused by many factors (environmental conditions, psychological factors and mental illness, pathology of the gastrointestinal tract, etc.) [8]. The same negative situation has been observed in the research conducted in the Republic. In particular, 10.7% of adolescent girls aged 15-19 years are overweight and 11.9% are underweight [6]. The results of observations and research show that the level of physical development of children in our country, in addition to socio-economic factors, depends on the hygienic environment, general knowledge of parents, the agenda of the examinees, nutrition, as well as the effectiveness of medical care [3, 7]. It is obvious that the identification and assessment of indicators of physical development of the younger generation is one of the most pressing issues not only in our country, but also around the world. Moreover, the importance of the issue becomes even clearer when we consider that the norms of physical development of children, students and adolescents of different ages change on average every 10-15 years. With this in mind, a lot of exemplary work is being done in our country to improve the level of physical development of the younger generation, to protect their health, to bring up a healthy and harmoniously developed generation. In particular, this issue is reflected in a number of decisions, decrees and other normative documents adopted by our government. But there are still many unresolved issues. Based on the above, we conducted some observations and research to study the indicators of physical development among schoolchildren in Karshi, Kashkadarya region.

Materials and methods

The study was conducted among 246 students aged 11, 16 and 18, of whom 97 were boys and 149 were girls. Students aged 11, 16 and 18 were conditionally divided into groups 1, 2 and 3. The study identified some somatometric parameters in the subjects, including height, body mass, chest circumference, as well as the Kettle, Pinye and Erisman indices, and chest excursion. The results were compared and evaluated with benchmarks [10]. The results of the study were statistically processed and analyzed in the Statistical Functions section of the standard functions presented in Microsoft Excel 2013. The subjects' height was measured using a rostometer, body weight on a medical scale, and chest circumference with a tape measure. The indices assessing physical development were calculated using special formulas.

Results for height, body mass, and chest circumference were compared with benchmarks, and averaged. The results of the Kettle, Pinye, Erisman indices, and chest excursion studies were compared with the norm size to determine what percentage of the subjects were classified.

Results obtained and their analysis. The results of the study of somatometric indicators in the subjects showed that there are specific changes in the level of development of schoolchildren. Table 1 below shows some of the somatometric parameters obtained from the respondents and their status relative to the norm.

Table 1.
Status of some somatometric parameters in the subjects relative to the norm

Indicators		**11 years old**		**16 years old**		**18 years old**	
		Boys, n=66	Girls, n=49	Boys, n=47	Girls, n=28	Boys, n=36	Girls, n=20
Height (sm)	The result	134,7±0,7	135,8±0,25	168,3±0,3	160±0,55	170,8±0,47	162,5±0,5

	obtained						
	Norm	141,3±0,6	142,3±0,6	169,2±0,6	159,5±0,5	175,6±0,6	164±0,5
	Relative to the norm, %	95,3%	95,4%	99,5%	100%	97,3%	99%
Body mass (kg)	The result obtained	30,8±0,15	29,8±0,16	58,6±0,25	50,7±0,5	61,6±0,4	55,1±0,5
	Norm	34±0,5	34,4±0,5	56,2±0,7	51,1±0,5	67,8±0,5	57,3±0,3
	Relative to the norm, %	90,6%	86,6%	104%	99,2%	90,8%	96%
Chest circumference (sm)	The result obtained	63,7±0,1	62,6±0,08	79,2±0,25	81±0,33	84,6±0,27	83,8±0,48
	Norm	66,4±0,4	65,7±0,5	82,3±0,5	79,5±0,3	90,8±0,4	83,5±0,5
	Relative to the norm, %	96%	95,3%	96%	102%	93%	100%

The results of the table show that there are no significant changes in the height of the subjects. The lowest deficits were in 11-year-old boys and girls (95.3% and 95.4%, respectively). In other groups of respondents, height is the norm.

The same results were obtained with body mass index. The lowest rate of YA is in 11-year-old girls (86.6% of the norm; ie 29.8 ± 0.16 kg instead of the norm of 34.4 ± 0.5 kg). . A similar result was obtained in boys of the same age (90.6% of the norm; ie 30.8 ± 0.15 kg instead of the norm of 34 ± 0.5 kg). Significant weight loss was also found in 18-year-old boys (90.8% of normal). No significant deviations from the norm were observed in the subjects of other ages.

Chest circumference results are also consistent with height and body mass. Of the 11-year-old girls who underwent YA, their chest circumference averaged 95.3% above normal. In 18-year-old boys, the lowest chest circumference was recorded, averaging 93% of the norm. No significant change in benchmarks was found in other groups of subjects.

The data show that significant changes in anthropometric parameters, i.e. height, body mass, and chest circumference, were observed mainly in group 1, i.e., 11-year-olds. Only boys in group 3, 18-year-olds, had lower chest circumferences and lower body weight than normal. In other groups of subjects, all three indicators were normal.

Table 2 below shows the results of the Kettle, Pinye, Erisman indices, and chest excursion studies in the subjects.

Table 2.
Results of Kettle, Pinye, Erisman indices and chest excursion in subjects

Indicators		**11 years old**		**16 years old**		**18 years old**	
		Boys, n=66	Girls, n=49	Boys, n=47	Girls, n=28	Boys, n=36	Girls, n=20
Kettle index, %	Significant shortage	33	55	-	-	-	-

	Lack of body weight (Low body weight)	44	33	15	32	6	25
	Grade 1 obesity	-	-	6	-	-	5
	Norm	23	12	79	68	94	70
Pignet index, %	Asthenic	88	98	15	11	6	10
	Normosthenic	12	2	83	86	92	85
	Hypersthenic	-	-	2	3	2	5
Erisman index, %	Insufficient development	-	-	6	-	3	-
	Average development	100	80	81	61	81	55
	Good development	-	20	13	39	16	45
Chest excursion, %	Insufficient development	86	78	53	64	36	55
	Average development	12	14	34	25	47	45
	Good development	2	8	13	11	17	-

The results in Table 2 show that the most significant change in the Kettle index was observed in group 1 (11-year-old students). Significant underweight was observed in 33% of boys and 55% of girls in this group. Similarly, 44% of boys and 33% of girls of this age were found to be underweight. Overall, 77% of 11-year-old boys were underweight or severely deficient, compared to 88% of girls of the same age. The Kettle index was at the norm in 23% of boys and 12% of girls in Group 1 of 11-year-old students. This means that 11-year-olds have more serious changes due to weight loss.

According to the Kettle index, significant body mass deficits are not observed in groups 2 and 3. However, underweight is 16% in 16-year-old girls (group 2) and 25% in 18-year-old girls (group 3). Overweight and obesity were rare among schoolchildren. Only 6% of 16-year-old boys and 5% of 18-year-old girls were diagnosed with grade I obesity.

Studies have also shown that the Pinye index, which reflects body type and constitution, has a number of unique characteristics. In particular, the majority of 11-year-old respondents (88% of boys and 98% of girls) were diagnosed with asthenic, i.e., thin or narrow body structure. These results are consistent with the Kettle index, height and body mass index, which do not contradict each other. The majority of 16-year-old subjects (83% of boys and 86% of girls) had a normosthenic or normal, normal body composition. There are very few people in this group with asthenic physique (15% and 11% of boys and girls, respectively). Group 3 of 18-year-olds had fewer asthenic students (only 6% of boys and 10% of girls). The majority of members of this group (92% and 85% of boys and girls, respectively) had normostenic body composition. Pupils with a hypertensive (i.e., broad or broad, thick) body structure are very rare in groups 2 and 3 (average 2-5%), and in group 1, no controllers. Another important indicator is the Erisman index, which helps determine the relationship between breast size and growth. In the subjects, this indicator also has a number of peculiarities.

According to the Erisman Index, the majority of Group 1 (11-year-old) subjects (boys complete and 80% of girls) have a moderate level of chest development. In group 2, the average developmental rate was 81% and 61% for boys and girls, respectively. Similar results were reported in group 3

(average developmental rates for boys and girls were 81% and 55%, respectively). According to the Erisman index, the underdevelopment rate is only 6% in 16-year-old boys and 3% in 18-year-old boys. According to this index, the largest share of good development was observed in 18-year-old girls (45%) and 16-year-old girls (39%). Chest excursion, which describes the development of the respiratory system, was as follows. In group 1, the majority of subjects had an underdeveloped chest circumference (86% of boys and 78% of girls). Those with the same level were 53% in group 2 boys and 64% in girls, and 36% in boys and 55% in girls in group 3. Apparently, there are significant changes in the number of chest excursions in young children. Among middle and high school students, the changes in girls are significant.

Students with an average level of development of a chest excursion are younger, i.e., less likely in group 1 and relatively better in group 2. In group 3, the share of students with average development is much higher (47% of boys and 45% of girls). The level of development of the chest excursion is relatively good in group 2 and boys in group 3, with very few students in group 1 at this level. It should be noted that the indices of physical development complement each other, as well as some inconsistencies between them. Therefore, in assessing the growth rate of the subjects, it is advisable not only to compare the indices, but also to draw separate conclusions from each of them.

Overall, it can be seen that the most significant changes in growth and development in 11-year-olds were observed in all three groups examined. In particular, body mass index, Kettle index, Pinye index, and chest excursion rates show significant changes in physical development at this age. In 16-year-old students, there is a certain change in the chest excursion, and in other respects, the overall development is satisfactory. Among 18-year-old students, only boys showed slightly lower body weight. In this group, too, there are significant deviations from the norm in the chest excursion. The above situation observed during the study of the level of physical development of the subjects can be explained primarily by the socio-economic status of school students. How students eat at home and at school is an important factor. At home, parents should make sure that their children eat well. In the school environment, the role of the school administration and teachers is important. However, it is difficult to say that today in all secondary schools the conditions for student nutrition are good.

In addition, the level of physical activity and sports is one of the factors that have a significant impact on growth and development. At present, the country has created sufficient conditions for sports, as well as to increase physical activity, but to promote regular physical activity among the population, to include in the agenda the issue of allocating special time for physical activity it is not unlikely that it has not been adequately regulated.

It should also be noted that the level of development of children and students is closely linked to genetic factors, certain diseases that occur in them, as well as the specific characteristics of the organism.

Conclusion

Summarizing the literature and the results obtained, it can be concluded that the somatometric indicators of the surveyed schoolchildren did not deviate significantly from the norm. In terms of age, the most profound changes are observed in 11-year-olds (group 1). Group 2 of 16-year-olds also has some deficiencies in body indices. And for 18-year-olds, there aren't many serious changes.

The most significant changes in the indicators were observed in the Pinye and Kettle index, as well as in the chest excursion. The shifts in other indicators are insignificant.

Changes in the physical development of schoolchildren are closely related to their current diet, physical activity and sports participation, and many other factors. Achieving the normal development of children and youth is an important element in the healthy and harmonious development of the younger generation. In this regard, it is important to increase the role of parents,

kindergarten teachers, school teachers and management, as well as institutions and organizations that monitor growth and development, health.

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