

# Physical Development of Primary Class Students in Rural Conditions of Kashkadarya Region

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**Abstract** This article studies body weight, height, chest circumference and some anthropometric indices of 359 7-10 year old schoolchildren studying in rural conditions of Kashkadarya region. According to the obtained results, somatometric indicators of students do not significantly differ from existing standards. Their anthropometric indices were found to belong to the weak and very weak type in children of both sexes. In order to prevent such a situation, it was discussed the need to rationalize the students' daily diet and develop appropriate practical measures in this regard.

**Keywords** Physical development, Body weight, Height, Chest circumference, Anthropometry, Harmonic development

## 1. Introduction

Currently, the study of indicators of physical development of schoolchildren, in particular body weight index, is being conducted in different directions abroad and in our Republic [1-8,11-17]. According to the conclusions of researchers and scientists working in this field, the study of physical development of children and adolescents has entered a new stage [9-14]. In general, this issue is extremely complex, and the factors that affect children's body weight, height, chest circumference and other indicators are increasing and changing year by year [15-20]. Therefore, it will be useful to study the growth and development of schoolchildren, especially in rural conditions, to determine body weight, height, Kettle's index, chest circumference and other indicators of biological development and compare them with average values [17-21].

The study of the morphofunctional indicators of modern schoolchildren serves first of all for their health and the satisfactory performance of their mental and physical activities. This issue is one of the urgent tasks in our country and worldwide. Non-infectious and malnutrition-related diseases that occur especially among children and adolescents, their prevention, growth disorders in children, etc. are considered to be one of the important scientific and theoretical issues of physiology and medicine. In particular, body weight, height, chest circumference are among the main indicators that determine children's normal physical development and socio-economic status [5,10,20].

During the research conducted in our republic and abroad, special attention is paid to the above-mentioned issues, and the influence of various factors on the growth and development processes of children is being studied. Body weight, height, chest circumference and other somatometric indicators of elementary school students are affected by the environment they live in, daily diet, mental and physical loads, and the way they organize their daily routine. In this regard, the study and analysis of morphofunctional indicators of children of junior school age is considered one of the urgent tasks.

## 2. Materials and Methods

Observations were conducted among 359 students aged 7-10 (including 7-year-olds - 59, 8-year-olds - 122, 9-year-olds - 82, 10-year-olds - 96) studying in rural schools of Kasbi district of Kashkadarya region in 2021-2022. Physical development indicators of students were checked anthropometrically.

## 3. Results

During the observations, the body weight, height and chest circumference of the 7-10-year-old students were determined. According to the obtained results, the anthropometric indicators of students do not significantly differ from the existing standards. As students get older, their body weight, height, and chest circumference increase. In the table below, we present the results obtained in 2021.

**Table 1.** Some anthropometric indicators of primary schoolchildren (n=117, 2021)

Age groups	Body weight, kg		Height, sm		Chest circumference, sm	
	norm**	M±m	norm	M±m	norm	M±m
<b>Boys</b>						
7 (n=6)	22,55±2,45	22,4±0,74	119,95±3,75	124,4±2,46	56,5±2,3	62,6±1,50*
8 (n=16)	25,2±2,5	25,5±0,78	125,25±3,55	129,3±1,18	57,9±3,0	65,31±1,16*
9 (n=11)	26,25±3,35	31,2±1,50	128,05±4,55	139,0±1,72*	59,2±3,4	69,36±1,47*
10 (n=19)	31,05±4,15	34,26±1,55	135,6±4,8	144,6±1,46	61,6±3,6	70,36±1,20*
<b>Girls</b>						
7 (n=5)	22,0±2,6	23,3±0,80	118,5±4,3	126,6±1,89	56,25±2,55	65,1±0,74*
8 (n=16)	23,6±2,7	24,3±0,69	122,7±4,0	130,1±1,06	56,45±2,55	64,12±0,89*
9 (n=25)	26,05±2,55	26,16±0,76	128,55±3,15	135,4±1,15*	57,9±2,6	65,24±0,64*
10 (n=19)	30,15±4,05	35,5±1,44	134,15±5,05	146,0±1,23*	60,5±3,6	70,0±1,22*

\*P<0,05 \*\*Kamilova RT, Isakova LI and dr. Rating of physical development and culinary status in Uzbekistan. Method. recommendation (utv. MZ RUz #012-3/334 dated 18.09.2018). Tashkent, 2018. 83 p.

The table above shows the main results of the anthropometric tests conducted in spring, in 2021. According to it, the body weight, height and chest circumference of 7-10-year-old boys and girls do not differ from the existing standards for 7-8-year-olds. In 9-10-year-old boys, especially in girls, it was noted that the indicators recorded increased by 6.2- 18.6% compared to younger ages and the norm. Such a situation can be explained in connection with the individual physiological characteristics associated with the increase in age in students, as well as the corresponding changes that occur in the body during the pre-puberty stages. In addition, in the physical development

of 7-10-year-old students, the indicators of body weight, height and chest circumference are slightly higher in girls compared to boys, especially in 10-year-olds. In particular, body weight and height in 10-year-old boys are on average 34.26±1.55 kg and 144.6±1.46 cm, respectively, and in girls, these indicators are 35.5±1.44 kg and 144.6±1.46 cm, respectively. It is 146.0±1.23 cm. Such a situation can be explained by the changes that occur during the prepubertal period of students.

In the table below, we present the results of the study of anthropometric indicators of elementary schoolchildren during the observations conducted in 2022.

**Table 2.** Some anthropometric indicators of primary schoolchildren (n=242, 2022)

Age groups	Body weight, kg		Height, sm		Chest circumference, cm	
	norm**	M±m	norm	M±m	norm**	M±m
<b>Boys</b>						
7 (n=26)	22,55±2,45	20,77±0,32	119,95±3,75	117,6±0,68	56,5±2,3	59,38±0,51
8 (n=46)	25,2±2,5	25,08±0,60	125,25±3,55	125,9±0,83	57,9±3,0	60,84±0,57
9 (n=23)	26,25±3,35	29,34±0,83	128,05±4,55	135,5±1,33	59,2±3,4	65,59±0,94
10 (n=21)	31,05±4,15	34,04±0,84	135,6±4,8	135,8±1,80	61,6±3,6	67,61±0,59
<b>Girls</b>						
7 (n=22)	22,0±2,6	19,01±0,47	118,5±4,3	118,2±0,56	56,25±2,55	56,59±0,31
8 (n=44)	23,6±2,7	23,53±0,54	122,7±4,0	124,0±0,76	56,45±2,55	58,68±0,59
9 (n=23)	26,05±2,55	28,62±0,94	128,55±3,15	135,4±1,13*	57,9±2,6	64,26±0,99*
10 (n=37)	30,15±4,05	31,60±0,75	134,15±5,05	134,8±1,67	60,5±3,6	65,56±0,71

\*P<0,05 \*\*Kamilova RT, Isakova LI and dr. Rating of physical development and culinary status in Uzbekistan. Method. recommendation (utv. MZ RUz #012-3/334 dated 18.09.2018). Tashkent, 2018. 83 p.

As can be seen in the table above, the body weight of 7-year-old boys is 20.77±0.32 kg, height is 117.6±0.68 cm, and girls of the same age are 19.01±0.47 kg and 118.2±0.56 cm. That is, there is no significant difference in their height and body weight. By the age of 9-10, an increase of 1-1.5 times was noted between these indicators. At the same time, as mentioned above, it can be explained by some hormonal changes in the children's body or relative activation of growth processes. A similar trend is observed in chest circumference indicators. Such a situation requires special attention to be paid to the way of life, daily routine

and especially healthy eating of students at this age. If this issue is treated with indifference, it can seriously affect not only the physical development of the growing young organism, but also the development of their mental and emotional states. Therefore, it will be useful for parents and teachers at school to carry out various daily practical activities (timely eating, controlling the amount of mental and physical workload, etc.) for children to grow up healthy in all aspects.

The table below shows the average values of the results obtained in 2021-2022.

**Table 3.** Some anthropometric indicators of primary school students (2021-2022, n=359)

Age groups	Body weight, kg		Height, sm		Chest circumference, sm	
	norm**	M±m	norm	M±m	norm**	M±m
<b>Boys</b>						
7 (n=32)	22,55±2,45	21,6±0,53	119,95±3,75	121,0±1,57	56,5±2,3	60,99±1,00
8 (n=62)	25,2±2,5	25,3±0,69	125,25±3,55	127,6±1,005	57,9±3,0	63,07±0,86
9 (n=34)	26,25±3,35	30,3±1,16	128,05±4,55	137,25±1,52*	59,2±3,4	67,4±1,20*
10 (n=40)	31,05±4,15	34,2±1,19	135,6±4,8	140,2±1,63	61,6±3,6	68,9±0,89*
<b>Girls</b>						
7 (n=27)	22,0±2,6	21,2±0,63	118,5±4,3	122,4±1,22	56,25±2,55	60,84±0,52
8 (n=60)	23,6±2,7	23,9±0,61	122,7±4,0	127,0±0,91	56,45±2,55	61,4±0,74
9 (n=48)	26,05±2,55	27,8±0,85	128,55±3,15	135,4±1,14*	57,9±2,6	64,75±0,81*
10 (n=56)	30,15±4,05	33,6±1,09	134,15±5,05	140,4±1,45	60,5±3,6	67,78±0,96*

\*P<0,05 \*\*Kamilova RT, Isakova LI and dr. Rating of physical development and culinary status in Uzbekistan. Method. recommendation (utv. MZ RUz #012-3/334 dated 18.09.2018). Tashkent, 2018. 83 p.

We summarized the results of the body weight, height and chest circumference indicators of the students under observation and presented the average values. According to it, the average body weight of 7-year-old boys is 21.6±0.53 kg, and the average height is 121.0±1.57 cm. It can be seen that the body weight of children of this age is 21.07 - 22.13 kg, and this indicator increases accordingly with the age of children. In particular, the body weight of 8-year-olds is around 24.61-25.99 kg and so on. The above-mentioned trend can also be observed in the results of height indicators.

The average body weight of 7-year-old girls is 20.57-21.83 kg, and the average height is 121.18-123.62 cm. In 7-8-year-olds, there is no significant difference in the results of body weight and height. In the case of 9-10-year-olds, the corresponding differences can be seen in the recorded

indicators. This situation can be explained by physiological processes and some hormonal changes that occur in children's bodies as they grow older.

If we compare the average values of the above-mentioned indicators of 7-10-year-old students with the results of examinations conducted in other regions, it can be seen that the height is 6.9-11.3 cm, and the body weight is 5.5-8.2 kg. The chest circumference is 4.7-6.1 cm higher than the above-mentioned standard. It can be seen that height and weight growth in students is proportional to their body parts. In addition, stunting and low body weight were not observed among them.

Anthropometric indexes were also calculated in order to study the body structure of schoolchildren. We present the obtained results in the table below.

**Table 4.** Assessment of physical development of students according to anthropometric indices

Age	Kettle II, kg/m <sup>2</sup>	Norm, kg/m <sup>2</sup>	Pine indexes, w.b	Erismann index, sm
<b>Boys</b>				
7 (n=32)	14,7±0,28	16	38,15±0,83	0,28±0,57
8 (n=62)	15,4±0,30	16	39,61±0,66	-1,40±0,47
9 (n=34)	15,9±0,37	17	39,82±1,00	-1,45±0,69
10 (n=40)	17,4±0,53	17	36,95±1,42	-1,08±0,64
<b>Girls</b>				
7 (n=27)	13,8±0,62	16	41,21±0,83	-1,20±0,67
8 (n=60)	14,8±0,29	16	44,52±0,89	-5,44±0,59
9 (n=48)	14,9±0,36	17	43,34±0,89	-2,95±0,51
10 (n=56)	16,9±0,50	17	38,79±1,34	-2,25±0,70

According to the obtained results, the Kettle index of 7-9-year-old students is less than the norm, and the closeness of the 10-year-old students to the norm is clearly visible in the above table. This indicates that there were no underweight or overweight children among the students under observation.

The Pine index helps to infer body structure types in children regardless of gender. In particular, this indicator is considered to have strong body structure if it is less than 10,

normal if it is between 10-20, average between 21-25, weak between 26-35 and less than 36. In our results, as shown in Table 4 above, 7-10-year-old boys and girls had an average value of Pine index above 36. It is especially noteworthy that in 7-9-year-old girls, this indicator was in the range of 41.2-44.5.

The Erismann index helps to conclude about the harmony of the body structure. Its normal range is usually +4 to +2 in 7-year-olds, and +1 to -3 in 8-15-year-olds. When the Erismann

index was calculated in the students under observation, the obtained results were significantly different from the above-mentioned normal limits. In particular, in 7-year-old boys, this indicator is  $0.28 \pm 0.57$  cm. In 8-10-year-old children, indicators ranging from -1.08 to -1.45 can be noted. Similar results were observed in 7-10-year-old girls. That is, the harmony of the body structure in the elementary school students involved in the observation differs from the standard level.

#### 4. Discussion

Assessment of children's physical development is based on statistical analysis methods. The results of the somatometric parameters are compared with the data in the available tables and the mean values (M), mean square deviation (SD) and others are analyzed. The information obtained is used to create a physical development profile. Depending on the degree of deviation, average, above average, average and low physical development are studied.

Physical development indicators of students differ from existing standards. This situation calls for the rationalization of the daily diet of elementary school students and the development of appropriate practical measures in this regard. At the same time, it requires that parents, school management and teachers perform their duties responsibly.

#### 5. Conclusions

Based on the results of the study of some anthropometric indicators of 7-10-year-old students in rural schools of Kashkadarya region, it can be concluded as follows:

1. Some anthropometric indicators of students increase depending on their age;
2. 9-10-year-old pupils' body weight, height and chest circumference are higher than 7-8-year-old pupils and the norm;
3. There was no significant difference between the results of Kettle's index, Pine's index and Erisman's index in boys and girls;
4. Weak and very weak body types were observed in children of both sexes;
5. Underweight was more common in girls than in boys;
6. There was no obesity among the schoolchildren who were observed.

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