

Results of Studying Selected Functional Indicators in Schoolchildren

Umirzoqov Eldor Ochil o'g'li

Student, Karshi State University

Buranova Gulnoza Boymuratovna

Associate Professor, PhD. Karshi State University

gulnoza.2015@mail.ru

Received: 2025, 04, Dec

Accepted: 2026, 10, Jan

Published: 2026, 28, Feb

Copyright © 2026 by author(s) and Bio Science Academic Publishing. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/40/>



Annotation: The article presents comparative characteristics of body weight, height, chest circumference, and Kettle index of boys and girls aged 11-18 years in the city of Karshi. According to the results, no differences were found in body weight, height, and Kettle index in all age groups of students.

Keywords: schoolchildren, physical development, functional indicators, growth standards, adolescents, health assessment.

Introduction

Protecting the health of children and adolescents remains one of the most critical global public health challenges of the 21st century. In recent decades, the prevalence of overweight and obesity among children has risen dramatically worldwide, becoming a significant contributor to chronic non-communicable diseases and long-term health burdens. According to global epidemiological data, the proportion of children and adolescents aged 5 to 19 years who are overweight or obese has increased more than fourfold over the past several decades, highlighting a pervasive public health crisis that affects both developed and developing countries alike.

Assessing physical development in school-aged children is essential for early detection of underweight, overweight, and obesity, which have been linked to adverse health outcomes including cardiovascular disease, metabolic disorders, and psychosocial problems. Body Mass Index (BMI), defined as the ratio of weight to the square of height, is a widely used and practical indicator for evaluating the proportionality of growth and nutritional status in children. BMI classification enables the identification of underweight, normal weight, overweight, and obesity, and serves as a foundational tool for monitoring trends in child growth patterns.

Recent research underscores the importance of early intervention: for example, higher BMI in early childhood can significantly increase the likelihood of obesity in adolescence and adulthood, emphasizing the critical need for preventive strategies beginning in early life. Moreover, lifestyle factors such as physical inactivity, unhealthy dietary habits, and increased consumption of processed foods have been identified as key contributors to the rising prevalence of childhood obesity, necessitating comprehensive public health responses.

In this context, systematic assessment of BMI in schoolchildren, analysis of resulting data, and development of targeted preventive measures are of both scientific and practical significance for fostering healthy growth and mitigating future health risks.

Methods

The main objective of this work is to analyze the comparative characteristics of physical development indicators of schoolchildren. The tests were conducted among schoolchildren aged 11-18. Boys and girls studying in schools in the city of Karshi, Kashkadarya region, participated in this study. Their body weight, height, chest circumference, and Quetelet index were determined using generally accepted methods.

Result

In addition to determining anthropometric dimensions in students, it is important to also examine some of their functional indicators. Because these two indicators are interrelated. Taking this into account, we also determined some anthropometric indicators of students aged 11-18. The results are reflected in Table 1 below.

Table 1. Some functional indicators of students (boys)

Age	Heart beat	Tissues with O ₂	Systolic pressure, mmHg	Diastolic pressure, mmHg
11 (n=7)	78,1±3,24	99,1±0,26	102,8±1,84	52,8±9,18
12 (n=32)	84,3±1,53	98,6±0,09	106,5±1,59	65,6±2,05
13 (n=24)	81,3±1,66	97,8±0,51	110,4±1,53	66,6±1,15
14 (n=26)	82,4±2,07	95,8±0,83	106,9±2,05	60,0±1,83
15 (n=8)	79,0±2,79	98,7±0,25	103,7±1,82	60,0±3,27
16 (n=16)	80,8±2,64	97,3±0,96	110,0±1,82	60,0±2,88
17 (n=17)	82,1±2,51	98,8±0,56	113,5±2,09	73,5±1,90
18 (n=13)	86,4±2,08	98,0±1,00	113,0±2,86	71,5±2,22

According to the results of arterial blood pressure (diastolic and systolic), in 11-year-old boys, the systolic pressure was on average 102.8 ± 1.84 and the diastolic pressure was on average 52.8 ± 9.18 mm Hg. The heart rate was 84.3 ± 1.53 and the tissue oxygenation was on average 99.1 ± 0.26 . In 12-year-old boys, the systolic pressure was on average 106.5 ± 1.59 and the diastolic pressure was on average 65.6 ± 2.05 mm Hg. The heart rate was 78.1 ± 3.24 and the tissue oxygenation was on average 98.6 ± 0.09 . As can be seen from the table, the recorded indicators in students increase proportionally with age. However, considering that the average heart rate at 17-18 years old is 71-72 beats per minute, like that of adults, it can be noted that our results are slightly higher.

The results obtained for heart rate, tissue oxygenation, and systolic and diastolic blood pressure of girls aged 11-18 are presented in Table 2 below.

Table 1. Some functional indicators of students (girls)

Age	Heart beat	Tissues with O ₂	Systolic pressure, mmHg	Diastolic pressure, mmHg
11 (n=8)	$80,5 \pm 2,82$	$96,1 \pm 2,07$	$105,0 \pm 1,88$	$63,7 \pm 1,82$
12 (n=24)	$88,2 \pm 2,01$	$98,5 \pm 0,18$	$104,5 \pm 1,59$	$62,5 \pm 2,42$
13 (n=19)	$81,1 \pm 1,88$	$97,3 \pm 0,75$	$106,3 \pm 1,56$	$61,5 \pm 1,75$
14 (n=28)	$79,7 \pm 1,53$	$96,5 \pm 0,73$	$109,2 \pm 1,84$	$63,2 \pm 1,36$
15 (n=34)	$82,7 \pm 1,64$	$96,4 \pm 0,95$	$109,1 \pm 1,70$	$62,9 \pm 1,60$
16 (n=25)	$83,7 \pm 2,31$	$98,5 \pm 0,53$	$110,0 \pm 2,82$	$64,4 \pm 2,38$
17 (n=27)	$83,0 \pm 2,04$	$97,8 \pm 0,65$	$111,1 \pm 1,63$	$68,8 \pm 1,63$
18 (n=7)	$77,1 \pm 4,42$	$98,1 \pm 1,38$	$110,0 \pm 3,77$	$67,1 \pm 2,85$

As can be seen from the table above, in 11-year-old girls, the average heart rate was 80.5 ± 2.82 beats per minute, and the average tissue oxygenation was 96.1 ± 2.07 beats per minute. Also, the average systolic and diastolic blood pressures were 105.0 ± 1.88 and 63.7 ± 1.82 mm Hg, respectively. In 12-year-old girls, the average heart rate was 88.2 ± 2.01 beats per minute, and the average tissue oxygenation was 98.5 ± 0.18 beats per minute. Also, the average systolic and diastolic blood pressures were 104.5 ± 1.59 and 62.5 ± 2.42 mm Hg, respectively.

Conclusion

From the results obtained, the height, body weight, chest circumference, and Ketley index of students were analyzed separately for boys and girls. The physical development indicators of students do not fully comply with the existing standards. It was found that an average of 44.6% of

boys aged 11-18 had normal physical development, 15.6% were below the norm, and 16.5% were above the norm. On average, 49% of girls of the same age had normal physical development indicators, 11.2% were below the norm, and 12.1% were above the norm. Also, 1.6% of boys and 2.2% of girls were lagging behind in physical development.

References

1. Атамбаева Р.М., Исакова Ж.К., Аман Кызы Ж., Жумакеева Э.К., Сокубашева Б.К. Оценка физического развития и состояния здоровья современных девушек-подростков г.Бишкек // Вестник КГМА им. И.К. Ахунбаева. – 2014. – №3. – С. 24-27.
2. Каипбеков К. Популяционные особенности антропометрических признаков детей // Вестник Каракалпакского отделения Академии наук Республики Узбекистан. – 1999. – №2. – С. 76-79.
3. Керимбаева И.Б., Эсенаманова М.К., Кочкорова Ф.А. Особенности питания детей и подростков, обучающихся в учреждениях культуры и искусства // AVICENNABULLETIN. 2022. – Vol 24, № 2. - С.235-243.
4. Кильдиярова Р.Р. Оценка физического развития детей с помощью перцентильных диаграмм. // Вопросы современной педиатрии. 2017. – Том 16, № 5. - С.431-437.
5. Кочкорова Ф.А., Атамбаева Р.М., Китарова Г.С. Физическое развитие школьников, проживающих в южных регионах Кыргызской Республики: одномоментное исследование. Педиатрическая фармакология. 2018. – Том 15, №4, С. 310-317.
6. Кудайназарова З.Б., Сейтимбетова Б.З., Кодиров Х.С. Оценка физического развития подростков, проживающих в Республике Каракалпакистан // Бюллетень науки и практики. – 2019. – Т.5. – №4. – С. 152-156.