

FEATURES OF AGE- AND SEX-RELATED DIFFERENCES IN GROWTH INDICATORS OF CHILDREN AGED 7–9 YEARS IN THE CONDITIONS OF SCHOOL EDUCATION

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Abstract.

The period of primary school age represents a key stage of a child’s physical development, during which active growth and the formation of morphofunctional systems continue. Educational conditions, reduced physical activity, and changes in the daily routine may significantly affect growth rates and children’s health status. The obtained data reflect natural age-related growth trends and confirm the influence of academic workload and physical activity on the intensity of somatic development. Episodes of growth deceleration may be considered indicators of adaptive stress, especially during periods of intensive learning and reduced motor activity.

Keywords: height, primary school age, growth rate, physical activity, academic workload

Introduction. Primary school age is one of the key stages of a child’s physical development. During this period, intensive body growth continues, major morphofunctional systems are formed and improved, and adaptation to new educational conditions takes place. Entering school is accompanied by changes in the daily routine, increased mental workload, and reduced physical activity, which may affect growth rates and the overall health of children. Anthropometric assessment of height is widely used as a simple and informative criterion for evaluating physical development.

Aim of the Study. To assess height indicators as a component of physical development in primary school children under educational conditions in a general secondary school.

Materials and Methods. A total of 246 pupils from grades 1–3 of School No. 31 in Andijan were examined, including 134 girls and 112 boys. Measurements were performed at the beginning, middle, and end of the academic year. Statistical analysis included calculation of the arithmetic mean (M), standard error (m), standard deviation (σ), coefficient of variation, and Student’s t-test. Statistical significance was accepted at $p < 0.05$.

Results. Analysis of anthropometric indicators showed a significant increase in length and body weight in all children examined during the school year, which corresponds to typical age-related growth patterns.

An interagency comparison at the beginning of the school year revealed that the body length of girls exceeded the average age values by 2.57 cm at 8 years old, by 3.66 cm at 9 years old and by 0.58 cm at 10 years old. In boys, the excess of standards was more pronounced: by 2.53 cm at 7 years old, 5.07 cm at 8 years old, 3.97 cm at 9 years old and 6.56 cm at 10 years old. Only girls 7 years old showed a lag behind the age standard by 1.14 cm.

Table 1

Age-related changes in height among schoolchildren aged 7–9 years

Age	Boys Beginning (cm)	Boys End (cm)	Girls Beginning (cm)	Girls End (cm)
7 years	117.4±0.5	125.4±0.86	115.8±0.5	123.6±0.65
8 years	124.8±0.76	128.2±0.35	125.4±0.43	128.5±0.34

9 years	128.6±0.33	136.4±0.74	128.7±0.6	134.7±0.8
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It was found that the most intense growth jump is observed in children 7 years old, which is associated with the passage of an important stage of age-related development and high sensitivity to external environmental factors.

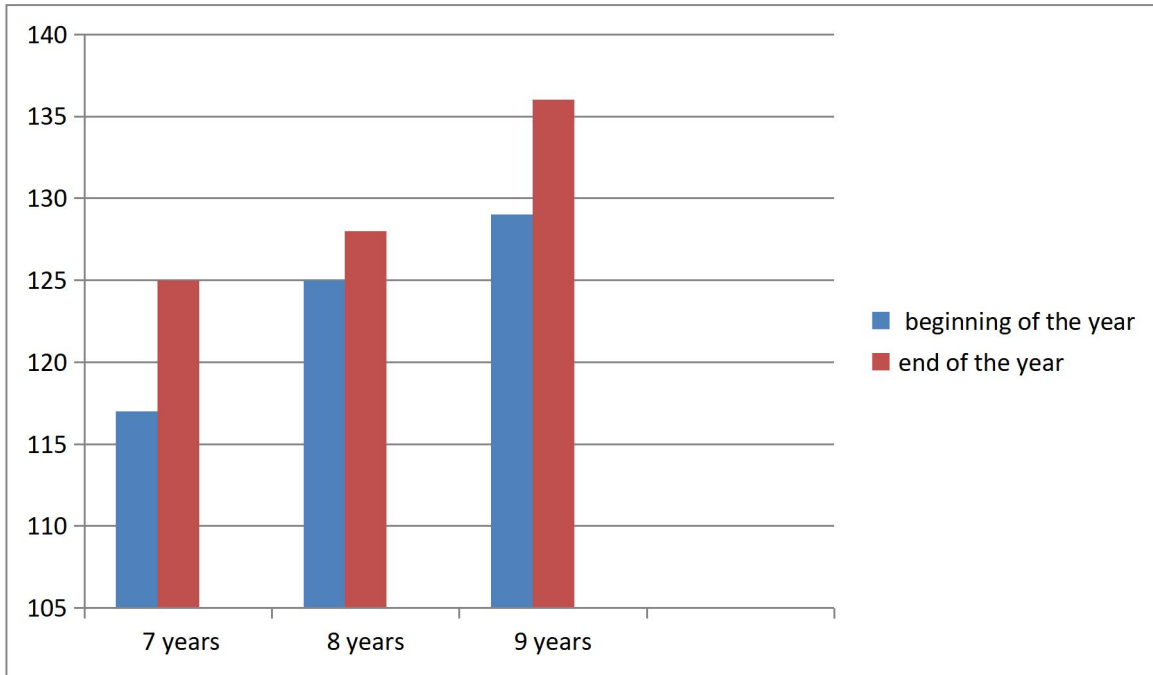


Figure 1. Height of boys at the beginning and end of the academic year.

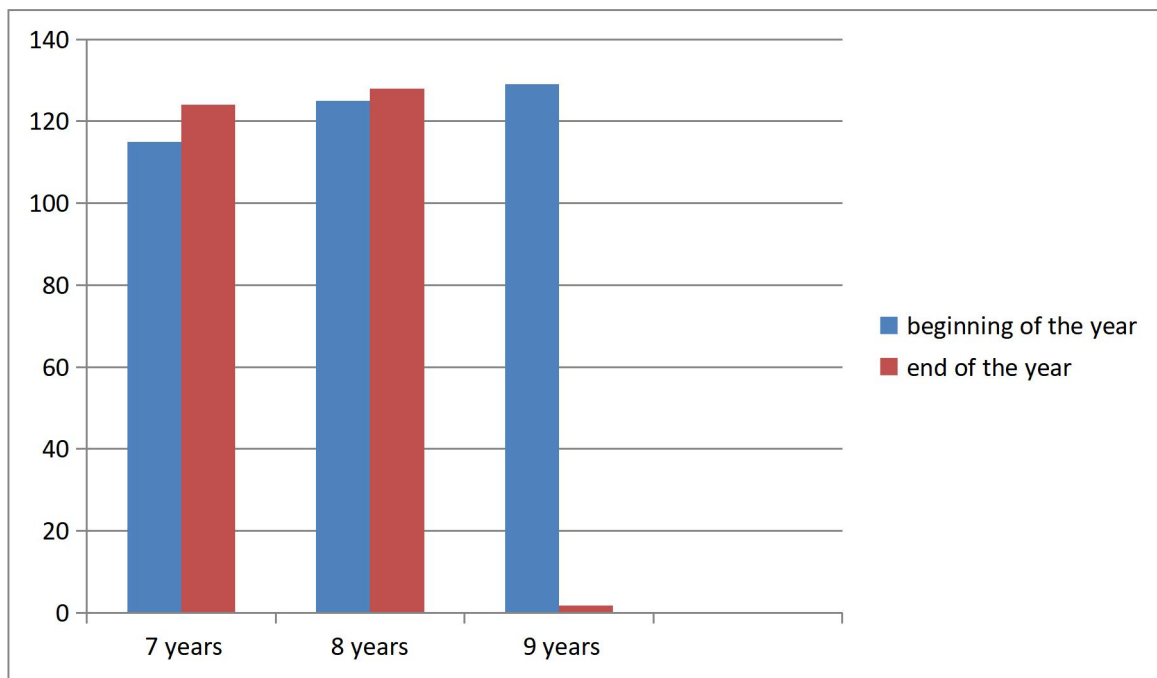


Figure 2. Height of girls at the beginning and end of the academic year.

The results of the assessment of the physical development of children showed that the body length indicators in students are distributed as follows: 46.2% of children had average values

(51.1% of girls and 42.4% of boys), higher than average indicators were found in 38.5%, and lower than average values - in 15.3% of the surveyed.

Analysis of the distribution of body length values by age groups revealed the following features. At the age of 7, half of the boys (50%) had indicators corresponding to the average age norm, while among girls this indicator was only 29.4%. At the same time, 41.2% of girls had values below average, which significantly exceeded the proportion of boys with a similar level of development (16.7%).

Table 2

Distribution of body length indicators in children aged 7–9 years compared to standards

Age	Sex	Normative range (cm)	Average (%)	Above average (%)	Below average (%)
7	Boys	117–122	50.0	33.3	16.7
7	Girls	115–121	29.4	29.4	41.2
8	Boys	124–129	50.0	31.3	18.7
8	Girls	120–128	75.0	6.2	18.8
9	Boys	129–134	50.0	33.3	16.7
9	Girls	130–134	50.0	50.0	0.0

At the age of 8, most girls (75%) were characterized by average body lengths, among boys this figure was 50%. At the same time, the proportion of boys with growth above average exceeded the same indicator for girls by 18.8%, which indicates a greater severity of accelerated physical development among boys of this age group.

At age 9, equal proportions of boys and girls (50% each) had average growth rates. In the second half of the sample, girls had values above the age norm, while among boys this level was observed only in 33.3%.

The assessment of children's growth made it possible to determine the growth rate of anthropometric indicators during the school year. It was revealed that boys had an average increase of 7 years: +8.0 cm; 8 years: +3.4 cm; 9 years: +7.8 cm; in girls, the average increase was 7 years: +7.8 cm; 8 years: +3.1 cm; 9 years: +6.0 cm. The most intensive growth was observed in 7 and 9 years, which corresponds to the age periods of activation of somatic development processes. The lowest rates were noted at 8 years, which may be due to individual characteristics of growth rates and an increase in educational and adaptation loads.

Comparison with age standards showed that at the beginning of the school year, the largest proportion of deviations occurred in girls 7 years old and boys 9 years old. By the end of the school year, some children overcame the initial lag, but there were still cases of a decrease in indicators relative to the normative range.

Conclusions:

1. Studies confirm that growth rates are a sensitive indicator of functional status, level of adaptation to the school environment and body resources.

2. It is shown that the intensity of growth is closely related to the level of physical activity and the mode of study load. Episodes of growth retardation can be considered as early signs of tension of adaptation mechanisms and as a risk criterion for the formation of functional deviations in the body of schoolchildren.
3. The results of the study emphasize the need for a systematic approach to maintaining the health of children during the learning period. The creation of favorable conditions for the educational environment contributes to maintaining the optimal functional state and full growth of schoolchildren.

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