

## **Anatomical and Physiological Features of School Children and Adolescents in the Developmental Period**

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**Abstract:** From the first years of independence, the President and the state have been creating all conditions and opportunities for the young generation to grow up physically healthy and mentally mature. In order to continue these processes, Uzbekistan is pursuing all stages of the market economy on the basis of noble goals and plans, strong social policy and its own development program. A striking example of this policy is the comprehensive reforms undergone in the health care system. One of its main directions is the new conceptual approaches to the protection of motherhood and childhood, which are aimed at creating all the conditions for the birth and upbringing of a healthy generation.

**Keywords:** Physiological, School, Children, Adolescents.

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Nowadays, large-scale rehabilitation measures are being carried out in Uzbekistan. The main goal is to achieve the goal of "Healthy mother - healthy child." One of the most important indicators of a child's health is his or her harmonious physical development. Properly organized physical education and children's participation in sports provide a wide range of opportunities for harmonious physical and mental development.

In Uzbekistan, the further development of high spirituality, the improvement of the national education system, the strengthening of its national foundations, their raising to a higher level in accordance with modern requirements are becoming increasingly important. Based on this, a national training program and a state program for the development of school education have been adopted. A distinctive feature of the national model of training personnels is the transition to independent and compulsory stages of 9-year general secondary and 3-year secondary special, vocational education. In this section of the guide, we will look at the developmental characteristics of children aged 6-7 to 17-18 years at this stage of continuing education.

This period plays an important role in human life. During these years, the basic processes of physical and mental development begin to unfold. Adolescence occurs. This period will serve as a basis for preparation for a great life, work and family. Preparation for the successful completion of these tasks will depend on the physical, mental and spiritual health of graduates of schools, academic lyceums, professional colleges on the threshold of a great life.

### **Basic laws of growth and development of children and adolescents**

During 11-12 years the height of pupils grows averagely to 53 cm in boys and 38 cm in girls. The annual growth rate of height tends to decrease as the child gets older. At the root of the slowdown in growth rates is its acceleration when it reaches a certain point. It occurs rapidly before puberty and is called a "pubertal jump". This period is 11-13 years for girls and 13-15 years for boys. In a year the body can grow up to 10 cm in length. When he turns 18, it is practically complete.

Girls grow slower than boys at birth and during 9 years, but at the age of 10-11 they begin to "chase" boys, and this tendency persists to 14-15 until the boys are completely ahead of them. Simultaneously with the growth of height, the shape of the body and its proportions also change. By the age of 9-10 years, the upper half of the body is slightly superior to the lower half, and by the age of 10-11 years, active growth of the legs is observed, which eventually leads to an inverse proportion.

During the growth and development of the child, the functioning of organs and systems improves. The anatomical structures of the brain are mainly formed at the age of 8-9 years, but the development of their functions continues from the beginning to the end of the school period. The increase in body size and the improvement of the musculoskeletal system are closely linked with the development of the respiratory and cardiovascular systems. At the age of 7-14 years, the volume of the heart and lungs more than doubles. The number of heartbeats decreases, but the volume of blood pumped into the blood vessels increases each time the heart beats. The number of breaths also decreases, but its depth and volume increase.

The process of sexual maturation occurs at school age. It lasts for several years: an average of 10-16 years in girls and 11 to 17 years in boys. Growth and maturation rates are not the same in all children. Some children (10-15%) grow and develop faster than most of their peers. About the

same number of children fall behind their age norm. That is, in many children, the "biological" age may exceed the calendar ("passport") age, or lag behind.

Biological age is determined by the weight and length of the body, the musculoskeletal system (chest circumference, muscle strength, etc.), according to the average indicators of sexual development for this age. If the difference between a child's biological and passport age is around 1,5-2 years, this is the norm, and if the difference is more than two years or behind, it indicates that there are health disorders.

It should be noted that the development of children and adolescents from the beginning to the end of the school period is not the same, this period has its own laws depending on both age groups. Therefore, the correct use of means and forms of physical education, as well as various sports can be achieved only if the anatomical and physiological features of the body of children of this age are taken into account.

**It is recognized that students from 6 to 14-15 years of age are conditionally divided into two age groups according to their anatomical and physiological characteristics:**

Primary school age - 6-7 to 10-11 years.

High school period - 11-12 to 14-15 years.

After graduating from 9<sup>th</sup> grade, children enter academic lyceums and vocational colleges (15-16 to 17-18 years old).

## **ANATOMICAL AND PHYSIOLOGICAL FEATURES**

### **Primary school period - students of grades 1-4 (6-7 to 10-11 years)**

This is the age at which a child first enters school and learns new conditions. The peculiarity of this period is that the process of growth of the child is less noticeable, but changes in other indicators predominate, leading to the improvement of the function of organs and systems of the organism. This period is considered to be a unique bridge between childhood and adolescence. The main indicators of physical development in girls aged 6-7 years are as follows:

Body weight averages 23.2 kg, body length "height" - an average of 122.7 cm; in boys it is 23.7 kg and 123.6 cm. Although growth rates are slow and changes in structures and functions are the same, longitudinal growth in girls under 11 years of age and boys under 12 years of age is more rapid than in body weight gain. Annual weight gain is on average 3-4 kg. Body length increases by 4-5 cm, and the circumference of the chest expands by 1.5-2 cm. Body proportions vary: the legs lengthen significantly, the chest index (ratio of chest circumference to body length) and the Erisman index (the difference between the chest circumference and half of body length) decrease, i.e. the body appears to be elongated. At the age of 7, a boy's body weight is only 0.2 kg more than a girl's. Less than 0.4 kg at 10 years of age; At the age of 7, the height of a boy is only 1 cm higher than that of a girl, and at the age of 11 it is less than 0.6 cm. In girls aged 7-8 years, the strength of the claw muscles is about 5 kg less than in boys, and at the age of 11-12 years - 10 kg less. In addition, in girls aged 11-12 years, the chest circumference is 1.2-2 cm, and the vital capacity of the lungs is 100-200 cm less than in boys of the same age. Therefore, the loads in cyclic and power-consuming exercises in girls should be slightly less.

During this period, the ongoing development of the musculoskeletal system - the ossification of the skeleton - is of great importance. Skeletal bones, especially the spine, are still weak and flexible. As a result, excessive stress, as well as lack of motor activity leads to postural disorders,

scoliosis, hump-backedness. Accordingly, it is necessary to choose the right position when sitting at a desk, table, carrying books in backpacks and backpacks rather than in a briefcase, to pay more attention to active games in the fresh air. By the age of 7, the formation of the claws, the strengthening of the arm joints and the longitudinal apparatus is practically completed. Coordination of movements is somewhat improved. Muscle tension and strength increase.

Special attention should be paid to the features of skeletal formation in physical education. In jumps, sudden movements during the fall to the ground, the load not falling evenly on the left and right legs can cause the pelvis to slip and they end incorrectly. If the ossification process is not yet complete, overuse of the legs can lead to flat feet. The physiological state of the respiratory and cardiovascular systems plays an important role in the normal development of children and the proper organization of motor activity. One of the indicators of external respiratory function is that the respiratory rate slows down with age: at the age of 7 it averages 23, at the age of 8 - 22, at the age of 9 - 21, at the age of 10 - 20, at the age of 11 - 19 times per minute. The depth of respiration, on the other hand, increases and is 163,170,230,254 ml, respectively. The vital capacity of the lungs increases from 1,200 to 2,100 ml between the ages of 7 and 11. At the same time, the average performance in girls is lower than in boys. The total size of the alveolar surface (level) and capillaries in children in the younger age group is less than in older children, indicating a lower diffusion capacity, which is one of the most important components of gas exchange. Children's responses to physical activity also have many peculiarities. This is especially noticeable in terms of respiratory and circulatory function. In children, prolonged physical activity is marked by slightly lower values of maximum oxygen consumption (MOC) or anaerobic productivity of the organism, which characterizes the intensity of oxidative-metabolic processes. For example, the MOC in boys aged 8-9 years reaches an average of only 1535 ml / min per minute, and in girls - 1022 ml / min per minute (3000-4000 ml / min per minute in adults). is determined to be a bit faster. (breathe 60-70 and 20-40 times per minute, respectively). They also have slightly lower maximal values of pulmonary ventilation.

In the process of growth and development of the schoolboy, as the weight and volume of the heart increases, the proportions of its sections and the position of the chest change, the histological structure of the heart muscle and blood vessels is differentiated, the nervous control of blood circulation improves. By the age of 10, heart weight is 6 times greater than at birth. By the age of 14, the thickness of the heart walls doubles. Enlargement of the heart occurs mainly due to an increase in the weight of the left ventricle. Age-related features of the cardiovascular system require limiting the value of functional loads, which place high demands on the circulatory system. At the age of 7-10 years, the stratification of the histocomposition of the heart muscle, endocardium, and nerve tissue is completed, and the heart is reminiscent of the adult human heart in its structural features. However, complete morphological and functional development of the heart is completed by the age of 20 years.

The number of heartbeats slows down with age: at the age of 7-8 years it averages 80-92 per minute, at the age of 9-10 - 76-86, at the age of 11 - 72-80 per minute. Although the heart of young school-age children is able to adapt quickly to physical activity and quickly returns to its initial level at rest, its activity is often unstable. Therefore, various disturbances of heart rhythm and sudden changes in blood pressure can occur. The younger the body, the less likely it is that systolic blood flow will increase during physical activity, and this is due to the low volume of the heart, its functional properties. Even in less intense movements, the number of heartbeats in children is higher than in adults. In children aged 8-11 years, during periods of intense muscle

activity, it reaches 200-220 times per minute, while the MKI is 2.5 times less than in adults. This is why they have a slightly lower oxygen pulse, that is, a lower efficiency of each heart contraction. In children of this age, blood pressure rises slightly less during physical activity than in adults, which is explained by the slow development of the heart muscle, the small size of the heart and the slight width of the vascular space relative to the size of the heart.

Studies show that regular exercise with a steady pace of running, even for children aged 7-8 years, testifies to the fact that they are able to perform very large loads in size through the rhythmic movements of the circulatory and respiratory systems and recover quickly. At 6-7 years of age, the basic functions of the brain are still in the formative stages. The peculiarity of the mental processes of children at this age is related to this. Excitement in the CNS (central nervous system) still predominates over braking, so children are characterized by a very high level of activity, vitality.

If the child is in a state of inactivity for a long time, then the muscle tension increases, attention is weakened, he quickly becomes tired. Children are often distracted, squeamish, and restless when it comes to other things in class or homework. That's why kids run around in the breaks between classes, making a fuss. After 2-3 lessons, it is recommended to hold outdoor movement games and sports for 45 minutes - 1 hour. Morning physical education should be held before the start of classes, and a minute of physical education should be held between classes. It is noted that at this age the body's resistance to external influences is slightly higher than that of preschool children.

## **CONCLUSION**

Scientifically based and properly organized physical education and sports should have a positive effect on the growing organism of children and adolescents, promote the harmonization of physical and mental development. It is necessary to facilitate and expand the range of motion, increase the protective-adaptive reactions and strengthen the body's resistance to the adverse effects of the external environment. Implementing widely modern aspects of physical culture and sports in different parts of the country, strengthen the health of the younger generation, improving health through implementing developmental activities are being considered to be central in Uzbekistan.

## **USED LITERATURE:**

1. Vaynbaum Ya. S. Jismoniy mashqlar gigiyenasi. Toshkent "Meditsina" 1988.
2. Antropova M. V. Bolalar va o`smirlar gigiyenasi. Toshkent 1981.
3. Aminov B. Aminova Z. O`quvchilar va talabalar ta`lim tarbiya gigiyenasi. Qarshi "Nasaf" 1998.
4. Кардашенко И.Н. Руководство к лабораторным занятиям по гигиене детей и подростков. Москва «Медицина» 1983.
5. Логинова Р.А. Новикова И.М. Руководство к практическим занятиям по гигиене. Москва «Медицина» 1977.
6. Лаптев А.П. Малышева И.Н. Руководство к практическим занятиям по гигиене. Москва «Физкультура и спорт» 1975.
7. Петровский К.С. Ванханен В.Д. Гигиена питания. Москва «Медицина» 1982.