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METHODOLOGY OF DEVELOPING PHYSICAL QUALITIES IN STUDENTS

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A B S T R A C T

This article describes the structural basis of the development of physical qualities in relation to progressive morphological and biochemical changes in the musculoskeletal system, central and peripheral nervous systems, and internal organs, and the methodology for educating the physical qualities of high-grade students.

K E Y W O R D S

Physical qualities, musculoskeletal system, education of physical qualities, general endurance.

INTRODUCTION

Today, under the strong influence of Western scientific and technological achievements, world culture has developed, which has determined the superiority of human Hippocratic views over many things in the world around him. In searching for the optimal level of human motor activity, it is necessary to rely not only on age and gender norms, but also on deep knowledge of the specific characteristics of the organism.

The child's age-related development periods are determined based on the weight and size of the body and its organs, the degree of hardening of the bones of the skeleton, the appearance of teeth, the development of connective tissue in the endocrine glands, the characteristics of cortical activity, and other signs. The final conclusions of many studies have proven that traditional physical education classes in general secondary schools do not fully meet the requirements of the growing young organism due to the imperfection of the content, volume, and intensity of the exercises, and the lack of consideration of the individual capabilities of students.

The methodology of developing physical qualities in students is the process of studying methods and techniques aimed at the physical development of students through physical education lessons, the formation and development of physical qualities such as strength, endurance, speed, and elasticity. Physical qualities are physiological properties of the human body that help ensure effective activity in the learning process.

Teaching theoretical and practical knowledge: In the process of developing physical qualities, students need to be taught theoretical concepts and methodological skills. For example, practical exercises on physical education programs and their advantages, theoretical concepts of movements and their formation are given.Выполняйте упражнения в разнообразных формах:

Variety of exercises is important for developing physical qualities. By using a variety of exercises, you can motivate students and develop their abilities. For example:
Activities such as long-distance running, cycling and swimming to improve endurance.
Weight lifting, pull-ups, push-ups, squats, etc. to develop strength.
Fast running, sprinting exercises and quick steps to develop speed.
Yoga, gymnastics or various elastic exercises to improve flexibility (elasticity).
Control of order and attendance:
Regularity and discipline are very important in developing physical qualities in students. Each exercise should be performed in a prescribed manner and for a specific purpose. Exercises should be carried out in accordance with the physical condition and capabilities of the students.

Formulation of programs and plans: Individual or group exercise programs are prepared for students to develop physical qualities. The intensity, duration, time and repetition of exercises play an important role in the program. The intensity of the exercises should be controlled according to the physical condition of each student.Uslubiy yondashuv:
It is necessary to take into account the individual characteristics of each student. If the student is a beginner, the exercises should be chosen light and easy, gradually increasing their complexity. For older students, the weight and intensity should be increased.

• **Motivation and psychological approach:** Student motivation plays an important role in developing physical qualities. Praising students for their achievements, celebrating their successes, and monitoring their results increases motivation.

• • **Individual approach:** Designing exercises taking into account the individual capabilities of each student. Adapting exercises to the age, physical condition, and health of students.

• **Group Exercises:** Develop physical skills by dividing students into groups and performing various exercises together. This method promotes greater cooperation and team spirit.

• **Modified exercises:** To increase student interest and develop physical qualities perfectly by performing each exercise in different forms and with modifications.
The structural basis of the development of physical qualities is associated with progressive morphological and biochemical changes in the musculoskeletal system, central and peripheral nervous systems, and internal organs. Accordingly, the level of development of physical qualities directly depends on the harmony of somatic and vegetative functions.
V.P. Guba, L.V. Volkov, R.N. Dorokhov, V.A. Bykov, I.V. Lyakh noted that the development of physical qualities in school-age children has age-specific characteristics, namely [3, 5]:
- the development of various physical qualities occurs in a heterochronous manner;
- annual growth rates are not the same at different age periods and differ in their relative magnitude when comparing growth;
- in most children of primary and secondary school age, indicators of physical qualities differ in their level (for example, strength, static endurance, do not usually correspond to the level of dynamic endurance);

- a special training session conducted using the same method, when given physical loads of the same volume and intensity, allows comparing the data of children of different ages, genders and different physical development, thereby achieving different pedagogical effects;
- the level of development of physical qualities in adolescent athletes during the period of natural growth (sensitive periods) is much higher than the average level of development of the same qualities in children and adolescents who do not engage in sports;

The main tasks in training young athletes are to strengthen the health and physical development of children in all aspects, to implement a gradual, goal-oriented transition to the chosen sport, to increase the level of physical fitness based on teaching the technique of the chosen sport, and to select promising young athletes for future training in the chosen sport.

V.P. Filin, V.P. Guba, I.V. Lyakh, L.V. Volkov and many other specialists have conducted scientific research on the issues of studying the movement functions, age-specific characteristics and development of physical qualities of young athletes. According to their opinion, childhood is an important stage for many years of physical development and a favorable period for starting sports training [3, 4, 8].

Good physical fitness is determined by the level of development of the main physical qualities and is the basis of high performance in all types of activities. In the process of physical education, it is necessary to take into account the basic laws of the development of the child's organism and not to treat the child as a small copy of an adult. The younger the child, the more unique his organism is, the more it differs from adults, and the process of his maturation is subject to certain laws. The upbringing of physical qualities in school-age children has a number of features associated with the development and growth of the organism:

- the development of one physical quality in adolescence and youth has a positive effect on the growth of other qualities, teachers are required to take an integrated approach to the education of physical qualities;
- the growth of physical qualities in the development of the organism occurs especially intensively in some young people. These are called sensitive periods. For example, the highest growth rate for muscle strength is characteristic of 13-15-year-olds, 14 years is the most favorable for the development of endurance, and 8-11 years is the most favorable for the development of speed capabilities.

In the scientific works of a number of researchers, it is emphasized that it is necessary to take into account the age, gender and training of the participants when choosing physical education equipment. The main type of activity of students is mental labor. The constant increase in the volume of information, the complexity of educational programs requires a lot of time for lesson preparation, group classes and significantly limits motor activity. In such conditions, regular physical exercise is important, which helps to mobilize the functional capabilities of the body of children and adolescents. This leads to a restructuring not only in the function of individual organs and systems, but also in their interaction. The child's age, gender and somatotype significantly affect the formation of physical performance in the process of ontogenesis.

The criterion of normal hormonal physical development is not the expression of each anthropometric sign, but their mutual expression, the mutual compatibility of their combined effects. These determine the proportionality and harmony of development. The physical qualities of students are not formed evenly and simultaneously, growth is different at different age periods. Although the growth and

development of qualities in the normal state of the organism are in very close contact and cooperation with each other, they do not occur simultaneously and at the same pace, since an increase in the mass of any organ does not mean its simultaneous functional improvement.

Uneven growth, that is, uneven growth and development rates of internal organs and physiological systems in the body, are manifested in the alternation of periods of smooth and rapid development. The period of elongation alternates with the period of rounding. As a result of the lack of necessary conditions, growth and development stop, that is, the phenomenon of retardation occurs. For example, due to illness or other reasons, physical development may stop for a long time. Later, there is a lag in weight and height, and a specific type of constitution is formed (hypostature).

The number of children with retardation has reached 13-20% in age groups, which is especially important to take into account when designing the educational process. In order to achieve good results in educating such children, it is necessary to carry out educational work in a uniform manner. If the existing conditions accelerate the use of all the capabilities of the organism, then rapid growth of the organism occurs - acceleration. Accelerations are common among adolescents. Such children make up an average of 13-20% of the total number of children of this age. They are characterized by relatively high growth, great muscle strength, and great capabilities of the respiratory system. Such children reach puberty much earlier, growth stops prematurely (usually at the age of 15-17), and, according to most scientists, mental development occurs somewhat faster. Unfortunately, the phenomenon of acceleration does not always have a positive effect on the functional capabilities of the organism.

The development of the height and heart of accelerated children lags behind the growth of the body. This leads to impaired functioning. Such children need a strictly individual approach. The biological maturation of school-age children at different rates creates special conditions for them in the process of physical education. Heterochronism (development ahead of time) is well observed in the development of motor function. For example, the increase in muscle strength is 260% from 7 to 16 years and is most pronounced in the first 2-3 years after the puberty (Latin "sexual maturity") growth spurt. Boys reach this stage at 18 years of age.

If we assume that the maximum muscle strength is 100%, then muscle strength in boys is 70% at 13-14 years old, 80% at 15-16 years old. At 17-18 years old, it is about 90%. Taking into account the age-specific characteristics of children, two main methods are used in strength training - the use of repetitive and dynamic loads. It is recommended to use exercises involving overcoming the resistance of various objects (stuffed balls, dumbbells, etc.), the resistance of a partner, the external environment, various weights and personal weight.

Regular exercise accelerates the development of motor skills, but their growth is different at different ages. Morphologically more favorable conditions for the development of strength occur at the ages of 9-10 and 14-17. Early exposure to strength training in children can lead to changes in their stature, since the skeleton is still forming at this age.

The development of muscle strength depends on the type of muscle fibers (fast or slow-twitch). If the muscles have a lot of fast-twitch fibers, then a person can develop maximum strength during intense force-generating movements, while slow-twitch fibers allow the muscle to maintain tension for a long time. Strength has the ability to control muscle work and is closely related to the growth of bone and muscle tissue. The development of muscle strength depends on the type of muscle fibers (fast or slow-twitch). If the muscles have a lot of fast-twitch fibers, then a person can develop maximum strength

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Most authors believe that muscle strength naturally increases with age. During puberty, as a result of accelerated physical development, muscle strength indicators increase even more. According to research results, in 13-14-year-olds, the biceps brachii, the muscles that flex the palms of the hands, and the adductor muscle reach greater values during dynamic work than in young children (8-9 years old). The increase in muscle strength in various groups occurs much more rapidly in 13-14-year-old adolescents, calculated per kilogram of body weight, than in 8-9-year-old children. One of the reasons for the increase in muscle strength in children is the increase in muscle mass in the body, that is, an increase in the transverse dimensions of the muscles. As it turned out, the differentiation of the neuromuscular apparatus plays an important role in the development of strength during this period. Muscle strength changes with age, but various data from experts about age indicate that it increases even more. According to V.P. Filin, at the age of 10-14, absolute strength increases steadily, at the age of 15-16 it decreases, and at the age of 17 it increases significantly again. The periods of rapid growth of absolute and relative strength do not coincide with each other.

Experts working with children and adolescents are divided on the possibilities of developing muscle strength. Other experts doubt the feasibility of systematically training schoolchildren in muscle strength. Numerous studies have proven the effectiveness of using strength training in preparing students for school activities [3].

At the age of 12-15, strength development is carried out mainly with the help of exercises performed with the athlete's own body weight, weight balls, dumbbells, gymnastic shells. Various pebbles and a barbell are used as weights. The development of endurance is especially important depending on age. Starting from the age of 12-14, the ability to continue tiring work without losing strength appears, while increasing fatigue is compensated by vegetative changes. Endurance continues to develop until the age of 20-30.

Endurance is the ability of a person to perform unusual activities for a long time and successfully. The manifestation of general endurance is based on the functional properties of the human body. They form a non-specific basis for the manifestation of endurance for various types of motor activity. It is advisable to start developing general endurance with the use of a continuous standardized training method. The optimal duration of the exercises ranges from 20-30 minutes for physically unprepared people to several hours for qualified athletes specializing in sports that require a high level of endurance.

The ability to resist fatigue in a number of activities is called endurance. Children of average development adapt faster to physical loads that develop endurance. It is more difficult for tall and short children to adapt. A significant increase in the duration of work in anaerobic power exercises is observed from 10-12 to 13-14 years. Positive changes in the development of general endurance achieved through cyclic exercises have a positive effect on the ability to work from movements that

differ in structure. In other words, a high increase in endurance is observed with exercises performed in zones of small and large physiological intensity.

Like other physical abilities, the development of endurance is not uniform. At the age of 10-13 and 16, the endurance indicator increases significantly, and it is necessary to consistently influence the development of this quality from the junior school age. According to V. Nikitushkin, during the period of puberty in boys, endurance does not increase in the anaerobic range of power, but significantly decreases. At the same time, the volume of work performed at the maximum intensity increases significantly in children aged 8-10, then stabilizes and increases again after 15 years. According to V.I. Lyakh, the growth of endurance has its own age dynamics. In children from 7 to 10-11 years, the results improve at a rapid pace. By the age of 14-15, the results begin to stabilize [5].

The main means of developing endurance are: sports such as running, rowing, swimming, cycling, performed at subcritical speeds. The level of endurance can be achieved using continuous and intermittent training methods. For uniform application of the method, exercises are performed at constant speed, that is, 75-80% of them are performed within 20 minutes or more of serious time. Ya.S. Weinbaum in his sources cited the duration of the loads aimed at developing general endurance as more than 3 minutes for schoolchildren, when the BMR is around 140-160 beats per minute [2].

General endurance, provided by aerobic processes, according to V.L. Volkov, increases sharply in the period from 8 to 9 years, then remains at this level until about 11 years, then increases slightly and stabilizes at 14-15 years [3]. It is reflected in the ability of fast-strength muscles to quickly perform movements associated with overcoming relatively small external resistance.

In his scientific research conducted among 11-13 year old children, V.M. Volkov concluded that children of this age can withstand short-term rapid-force loads well [3].

As a result of his scientific research, N.A. Bernstein found that a significant increase in the maximum speed of running in children aged 8-12 years is determined by the natural development of speed of movement, while at 12-14 years the increase in running speed occurs mainly due to an increase in speed-strength qualities and muscle strength. The author substantiated the fact that at the age of 8-12 years the movement analyzer matures, and the formation of important locomotor acts of running occurs [1].

I.V. Lyakh developed the following methodological rules for performing exercises to develop the quality of agility [5]:

- The exercise should not be complicated in terms of technique;
- The exercises should be well mastered by the participants;
- The duration of the exercises should be such that at the end of their performance, agility does not decrease due to fatigue;
- The duration of agility exercises should not exceed 16-17 seconds in children and adolescents;
- The following exercises are performed in the recovery phase;
- Active rest should be used before repeated agility exercises, which can last 1-2 minutes;
- Agility exercises are performed among the first in the training.

It is advisable to include sports games, relay races, movement games, exercises that develop strength and flexibility, various jumps, gymnastic and acrobatic exercises, running from low and high starts, long jumps in the program of training for schoolchildren aged 12-13. In the process of developing speed, it is necessary to strive to maximize the speed of movements that do not require large muscle tension, to ensure the optimal amplitude of movements as much as possible, and to maximally relax

muscle groups that are not involved in the work. In the process of developing speed, it is necessary to pay attention to muscle relaxation during the exercises. It is very important for the trainee to feel the difference between the tense and relaxed state of the muscles.

The age dynamics of the energy cost per meter of distance traveled when running at an average speed is of great interest. It has been noted that energy expenditure becomes more and more economical as the child grows older. This leads to an increase in the endurance of senior schoolchildren. The development of speed abilities occurs with increasing age. Studies on heredity show that speed abilities are closely related to genotype factors. According to the authors, the speed of a simple motor reaction is determined by heredity in approximately 60-88% of cases.

According to experts, various indicators of speed abilities significantly predict the children's motor talents at the initial stage of selecting them for one or another type of sports. When a child is at school, the development of speed abilities is not as pronounced as the development of strength and slows down with age. From 7 to 17 years, the indicators characterizing a person's speed improve by 20-60% or more. As in boys, in girls, the results improve more rapidly from 7 to 10 years. By the age of 14-15, the results begin to stabilize.

Mutaxassislarning fikriga ko'ra, tezlik qobiliyatining turli ko'rsatkichlari bolalarning motor qobiliyatlarini sportning u yoki bu turiga tanlashning dastlabki bosqichida sezilarli darajada taxmin qiladi. Bola maktabda bo'lganida, tezlik qobiliyatining rivojlanishi kuchning rivojlanishi kabi aniq emas va yoshi bilan sekinlashadi. 7 yoshdan 17 yoshgacha insonning tezligini tavsiflovchi ko'rsatkichlar 20-60% yoki undan ko'proq yaxshilanadi. O'g'il bolalarda bo'lgani kabi, qizlarda ham natijalar 7 yoshdan 10 yoshgacha tezroq yaxshilanadi. 14-15 yoshga kelib natijalar barqarorlasha boshlaydi.

Sexual differences in the face of agility skills do not become significant until 12-15. Sexual dimorphism becomes more pronounced in the form of activity. Along with the increase in motor development with age, the project that is necessary for the greatest assistance of movement is engaged. The constancy of this indicator indicates the uniformity of the characteristics of muscle contraction during individual development after birth. The speed of movement is an important characteristic of agility. High-speed movement is characteristic of the movement of the arms and legs, and low-speed movement is characteristic of the ankle-heel joint. The increase in the speed of movement at different age periods is the same. The greatest increase is observed in children aged 4 to 6 years and 7 to 9 years. In later age periods, the growth rate decreases. There are specific characteristics and forms of agility: the speed of movement reaction under the influence of simple or complex signals, the speed of a single movement, the speed of transition from one movement to another.

By the age of 13-14, the speed of individual movements increases, approaching that of adults, and by the age of 16-17, growth partially slows down. The speed of movement reflects the acceleration properties of the whole organism. Sexual maturity and the level of physical development associated with it play an important role in the emergence of acceleration properties during puberty. By the age of 14-15, the growth of speed decreases. At the age of 10-11, for example, the frequency of running steps reaches its peak. At this age, adolescents are ahead of children aged 12-14.

There is a lot of information about the age-related changes in speed. Young athletes develop the best speed of movement at the age of 13-14. Although this advantage is still maintained in later years, the differences are reduced. This indicates that further growth in speed of movement is more effective at

a young age. A number of scientists recommend using the following to develop speed-strength qualities:

1) exercises designed to develop muscle strength and the speed of their contraction;
2) exercises aimed at developing speed-strength qualities;
3) exercises with a specific speed-strength nature (various jumping exercises).

Differences in the characteristics of the energetic provision of movement speed also affect the analysis of the age-related development of speed-strength properties in children and adolescents. Some researchers indicate that the development of speed-strength properties is important at the age of 9-10, and some at the age of 13-14. The reasons for the differences in the dynamics of the development of speed-strength properties have not been conclusively resolved. Coordination abilities are the capabilities of a person (individual), determining the level of his readiness to optimally control and regulate motor activity. Complex processes of motor coordination are ensured by neurophysiological mechanisms. The child's motor experience has a certain influence on the emergence of coordination abilities: the more a person has the ability and skills to move, the more developed his coordination of movements, as a rule.

It has been established that the development of coordination skills at different ages occurs in different directions. However, the most productive indicators of coordination skills of varying complexity increase from 11 to 12 years old, as confirmed by numerous studies. As children grow, the ability to repeat movements at a given pace improves, and 11-14-year-old students are able to perform complex coordinated movements and quickly master new exercises.

At the age of 12-13, there is a decrease in the growth rate of coordination features, over the next two years, absolute indicators increase, and by the age of 14-15 they are able to assess the position of the body or its individual parts in space at the level of adults. The most complete differentiation of muscle tone is formed by the age of 15-17. Flexibility is associated with the nervous control of muscle tone, as well as the tension of antagonist (opposite) muscles.

Flexibility is one of the qualities that develops quite early. From the age of 4, it improves rapidly throughout the entire preschool and primary school years, due to the good elasticity of muscle fibers and tendons in children. At all ages, flexibility is better expressed in the female body than in the male body. Unlike physical qualities, which can improve several times during the child's school years, flexibility begins to decline from the first years of life. This is due to the transformation of cartilage tissue into bone and a decrease in the elasticity of tendons.

The data presented indicate that the development of basic physical qualities is not uniform. Strength and endurance indicators are fully developed by 16-18 years of age, speed and power capabilities, speed of movements, clearly stratified muscle strength, stability of the vestibular apparatus by 13-14 years of age, and coordination of movements, flexibility and agility by 9-12 years of age.

One of the main problems of the theory and method of physical education is the relationship between physical qualities. According to the literature, most authors have considered the issues of physical fitness of students involved in sports, only some specialists describe this problem in the process of school lessons. Undoubtedly, regular physical exercise during the educational process has a significant impact on the physical fitness of students. Therefore, additional research is needed on the use of a stratified method when working with adolescents with different biological maturity and body structure. The analysis showed that the intensity, volume and standards of application of the

recommended methods for developing the physical qualities of schoolchildren have not been developed.

Based on the results of the above-mentioned analysis of scientific and methodological literature, it is possible to determine the goals and objectives of our scientific work. These tasks include selecting complex exercises that effectively help develop strength, agility, agility-strength and endurance qualities, determining the intensity, volume and norms of their use, developing a methodology for their implementation in practice and substantiating their effectiveness.

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