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PLANNING LOADS IN PHYSICAL EDUCATION CLASSES, TAKING INTO ACCOUNT PHYSIOLOGICAL INDICATORS - THE WAY TO THE IMPROVEMENT OF STUDENTS

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Annotation:
School years are one of the most important stages in the development of a person as an active member of society. During this period, the development of physiological systems, including the motor apparatus, is completed. That is why in these years a solid foundation should be created for strengthening the health and physical improvement of a person.

Keywords: improvement, physiological systems, practice, intensification

The formation of basic motor qualities and skills in the process of physical education can be more successful if the means and methods of physical culture are reasonably used, as well as the intensification of physical loads that require intense activity of all physiological systems. However, it is necessary to take into account the age-sex and individual characteristics of children and adolescents, as well as the reserve capabilities of their body at different stages of development.
This approach will protect the practice of physical education from the use of insufficient and, along with this, excessive loads that are dangerous to the health of students.
The problem of a child's adaptation to large training and competitive loads is of not only theoretical, but also practical interest, since the relationship between the student's state and the given load is one of the important points in planning classes. At the same time, the factor of the magnitude of the load itself is not decisive, the main thing is the degree of its correspondence to the state of the body and the level of its preparedness. Physical overstrain develops when the training load exceeds the functional capabilities of the body. Loads above the optimal level become excessive and cause various pathological changes in the body from overstrain, both physical and emotional. It is impossible not to see that the vector of pedagogical influences is aimed at changing the physical potential of the child and adolescent, that is, at the biological side of his essence. Therefore, without a control system that provides an assessment of changes in physical condition, it is impossible to properly plan and conduct the pedagogical process of increasing fitness.
How important is the rationing of loads at physical education lessons for children, when physical education lessons will have a healing value?
Physiological and hygienic regulation is subject to all the main factors that determine the state and development of the body. And of course, no one doubts the need to substantiate the physiological norms of physical activity in the process of physical education of children and adolescents. When substantiating and grading physical loads that are adequate to the functional capabilities of the body, as a rule, they approach from three positions:

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1. gradation of physical activity according to individual physiological parameters, in particular, according to heart rate, oxygen consumption, pulmonary ventilation, etc.;
2. dosage intensity of physical activity depending on the maximum speed of movement;
3. assessment of the intensity of the load, based on the maximum energy capabilities of the body.

When normalizing loads, it is recommended to take into account five components:

- ✓ the duration of the exercise;
- ✓ intensity;
- ✓ duration of rest intervals between exercises;
- ✓ the nature of the rest;
- ✓ the number of repetitions of the exercise.

For example, when normalizing the performance of cyclic exercises, the processes of age-related development of the motor system deserve special attention. Changes in physiological processes in connection with exercise are due to the impact on the body of repetitive movements. In this case, first of all, changes in the functional state of the motor system occur. Vegetative processes are rebuilt under the influence of stimuli signaling possible hypoxia, but mainly under the influence of motor reflexes. Therefore, when planning classes and choosing loads, it is important to take into account not only metabolic processes, but also age-related features of the regulation of movements and mastering the technique of motor skills.

One of the goals of a reasonable rationing of loads in physical education lessons is that the energy costs, the number of repetitions of exercises and the duration of the series of exercises were optimal. If the energy costs and the number of repetitions are small, then the effect of the exercises will be reduced due to insufficient mobilization of physiological functions. If the energy costs, the number of repetitions and the duration of the exercises are excessively large, then the effect of the exercises will be reduced due to the weakening of physiological processes due to the depletion of substances rich in energy and enzymes, as well as the nervous mechanisms for regulating movements.

Promotion of harmonious physical development, education of basic physical qualities should be carried out from the primary grades, however, the implementation of exercises for the development of physical qualities requires a fairly accurate dosage of physical activity and control over the body's reaction.

Anatomical, physiological and psychological features that distinguish schoolchildren of different ages have a significant impact on the organization of the educational process, teaching methods and, of course, the rationing of loads. Let us dwell on some age characteristics of students that should be taken into account in physical education lessons.

To date, more and more evidence is accumulating that the physical qualities of students should be developed as fully as possible already in the first years of schooling. The possibility of purposeful development of endurance in children of primary school age is emphasized. To substantiate this, the age pattern of vegetative reactions and a number of biomechanical parameters of work were studied when performing loads of different intensity. It was found that from 7-8 to 9-10 years old, endurance increases only to loads performed in the aerobic energy supply mode, i.e. to those whose maximum duration is more than 2.5 minutes. The maximum duration of work at 70% load increases by an average

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of 2.5 minutes, and at 50% load - by 4 minutes. An analysis of the natural increase in endurance to loads of different intensity by 9-10 years old indicates that this quality increases more intensively with physical loads of greater power and less - with moderate loads. At the age of 7-8 years, a somewhat more intense activity of the systems providing oxygen transport, and less efficient utilization of it from ventilated air under aerobic loads, was noted. A shorter maximum duration of work in schoolchildren aged 7-8 years when performing 70% of the load is combined with a less effective oxygen productivity of the respiratory and cardiac cycles. Thus, the results of studying the age dynamics of the natural development of the performance indicators of schoolchildren aged 7-8 and 9-10 years and the features of adaptation of their respiratory and circulatory systems give reason to believe that the use of loads of high and moderate intensity will increase the effectiveness of physical education lessons aimed at developing endurance junior schoolchildren (Alekseeva.Yu.A., Borisova M.A. and others. "Health and physical education of children and adolescents")

From 5th to 8th grades (10-14 years old), the growth and development of children occur unevenly. Especially rapid morphological and functional changes in all body systems occur with the onset of puberty. A common phenomenon inherent in all children during this period is an increase in the growth rate of body length, which can reach 10 cm per year. All bone and muscle dimensions of the body also change, although not to the same extent. The puberty jump spreads to the heart muscle and to all other organs. Moreover, changes in the physiological functions of the body are more pronounced in boys than in girls. At the end of adolescence, boys, due to the ability to display greater muscle strength, by 1 kg. muscles become much stronger girls.

Due to the fact that after the age of 12, muscle resistance to stretching increases significantly, at this age, increased attention should be paid to the development of flexibility. High lability and excitability of the neuromuscular apparatus contribute to the accelerated development of the speed of movement and reach a maximum in terms of the speed of muscle contraction. Therefore, adolescents need to develop speed, agility, dynamic strength.

The processes of puberty that do not occur simultaneously in different students make the work of the teacher difficult, since adolescents in the initial stages of puberty and adolescents in whom this process is already being completed study in the same class. In this regard, for the qualitative conduct of the educational process, it is necessary to carry out a differentiated approach to students, especially carefully select exercises and load.

At the age of 15-17, the morphofunctional maturation of the body is almost completed, but the development of the musculoskeletal and ligamentous apparatus continues: the hardening of the bones of the legs, arms, and spine is not yet completed, therefore, excessive loads should be avoided by exercising with weights. High school students have not yet completed the development of the nervous regulation of the heart. Too much episodic load can lead to adverse consequences. Moreover, young men of this age tend to overestimate their capabilities. Do not allow the maximum intensity of exercise. For girls of this age, an increase in body weight is characteristic. Moreover, the strength increases to a lesser extent than body weight. This is due to the decline in relative strength among girls, as a result of which it is more difficult for them than for boys to cope with exercises, the implementation of which

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requires overcoming their own weight. Mandatory for girls are exercises of moderate intensity, aimed at strengthening the muscles of the back, abdomen, and small pelvis.

From the above, the variety of distinctive features, the uniqueness of each student does not mean that only individual work with schoolchildren is effective. The teacher should be based on the typical characteristics of students, i.e. highlight the characteristics inherent in certain groups of students: for example, the class is usually divided into groups by gender, within these groups - by readiness, and experienced teachers and within these groups single out students who require a different approach to themselves. This may apply to the children of the preparatory medical group or referred for health reasons to a special medical group, who, due to certain circumstances, are involved with everyone.

With all the variety of approaches in the study of the physical state (PS) of a person, general biological questions about the possibilities and limitations of the mechanisms of adaptive self-regulation of body functions and reserves under conditions of physical and mental stress turned out to be in the center of attention of specialists from various disciplines. The determination and evaluation of the FS of an organism is the task of functional diagnostics, the essence of which is to study the mechanisms of adaptation of an organ, system or organism as a whole to a particular load. In the field of functional diagnostics, a wide range of methods is used to determine the state of the body, including the cardiovascular, respiratory, nervous, neuromuscular and other systems. A group of methods for assessing the FS of an organism with the task of various kinds of loads is called functional methods. Among them, functional testing with the use of tests and tests with physical activity is of particular importance, since the level of the body's PS and its changes are most clearly manifested in this case. To date, many tests have been proposed that are used to determine the ability to perform various kinds of movements with different loads. When testing, one of the following types of loads is usually selected:

- continuous load of uniform intensity;
- continuous load of uniformly increasing power;
- continuous stepwise increasing load without rest intervals;
- stepwise increasing load with a rest interval after each step (V.V. Rozhentsov, M.M. Polevshchikov)

In functional tests with physical activity, natural movements are used during testing in the form of squats, jumps, running, weight lifting, as well as performing specific physical exercises, the dosage of the load is determined by the duration and pace of its implementation. The most widely used samples:

Kevdina - 40 sit-ups in 30 seconds;

Kotova-Deshina - 2-3 minutes running in place at a pace of 180 steps per minute with raising the hip to a height to a right angle position with the body.

The methods of normalizing physical activity still used in practice are based on the intuition of a physical education teacher and his individual pedagogical experience, which does not always lead to a positive result. The words that the loads should be "affordable", "optimal", etc., are devoid of specific meaning when preliminary planning with indication of specific quantitative indicators for the whole class is not based on individual functional indicators of students. Obviously, in this case, the same physical activity for some students will be low, and for others - high. In the first case, there will be no positive effect, and in the second, a negative result may be obtained. Unbearable physical activity leads

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to the fact that the student's face turns pale or red, profuse sweat flows from his forehead, he has shortness of breath, coordination of movements is disturbed, desire and interest in the lesson disappear.

In the conditions of a physical culture lesson, the compliance of the applied load with the functional state of the body can be judged by the pulse before the start of the next lesson. This is done as follows: before the start of the lesson, you need to rest while sitting for 3 minutes, and then count the number of heartbeats in 1 minute. If before each lesson their number is approximately the same, this indicates a normal recovery and readiness of the body for the start of the next lesson. The pulse value of 48-60 beats per minute is assessed as excellent, 60-74 beats - as good, 74 - 89 - as satisfactory, more than 90 beats / min - as unsatisfactory (Dutov V.S., Severin A.E. et al.)

During physical exercise, the degree of increase in heart rate depends on many factors, the main of which are the intensity and volume of physical activity. The pulse rate during exercise should be in order to provide a physiologically justified load aimed at the development of certain motor qualities. The basis for determining the intensity of the training load by heart rate is the relationship between them, the greater the load, the greater the heart rate. To determine the intensity of the load, not absolute, but relative indicators of heart rate are used. Relative working heart rate (% HR max.) is the percentage of the heart rate during exercise and the maximum heart rate for that person. Approximate heart rate max. can be calculated using the formula: HR max = 220 - age (years).

It should be borne in mind the rather significant differences in heart rate max for different children of the same age. In some cases, in schoolchildren with a low level of physical fitness, heart rate max = 180 - age (years) (LE Lyubomirsky).

When determining the intensity of training loads by heart rate, two indicators are used: threshold and peak heart rate. Threshold heart rate is the lowest intensity below which no training effect occurs. Peak heart rate is the highest intensity that should not be exceeded as a result of exercise. (Attachment 1). Approximate indicators of heart rate in relatively healthy people involved in physical education can be: threshold - 70 - 75% of heart rate max., Peak - 90 - 95% of heart rate max.

To normalize cyclic exercises used in physical education lessons, it is important to single out such moderately intense muscle activity that can be maintained for a long time without a significant increase in oxygen debt. A load of 50% of the maximum can be maintained for a long time.

To assess the impact of physical activity on the body of schoolchildren, you can use the classification of stress, which includes 5 zones:

1. zone of low intensity (20 - 30%). Here, work can be done for a very long time. At the same time, all the physiological functions of the body do not experience stress, the heart rate does not exceed 100 - 120 beats / min. This includes exercise modes with low intensity and low speed.

2. zone of moderate intensity (50% of the maximum load). The mode of performing physical exercises in this zone contributes to the development of general endurance. The value of the pulse when performing loads reaches 130 - 160 beats / min. Work in this zone contributes to the establishment of interaction between the functions of the cardiovascular system, respiration and the motor apparatus.

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3. zone of high intensity (70%). It causes stress of physiological functions in the body of schoolchildren during muscular work. The performance of the load in this zone does not exceed 4-5 minutes for younger students, and 10 minutes for older ones.
4. zone of submaximal or high intensity (80%).
Corresponds to the exercise regimen (short-distance running, speed-strength exercises, static loads, etc.), in which the work of the muscles of the heart and other organs and tissues is provided mainly by anaerobic energy sources. The maximum duration of cyclic loads for younger students is 50 seconds, for older students - 1 minute or more.
5. zone of maximum intensity (100%).
Corresponds to the performance of physical exercises with maximum speed, maximum pace and increase in the maximum time for performing loads up to 10 seconds. For such a short time, the functional shifts in the cardiovascular system, respiration and other functions do not reach high values.
Work zones by heart rate:
up to 120 - preparatory, warm-up, main exchange
up to 120 - 140 - restorative and supportive
up to 140 - 160 - developing endurance, aerobic
up to 160 - 180 - developing speed endurance
more than 180 - the development of speed.
The values of heart rate and blood pressure in children and adolescents are very variable due to increased reactivity. Thus, in first-graders, resting heart rate averages 88 beats/min. At 10 years old - 79 beats / min, at 16 years old - 72 beats / min. In this case, the individual spread of normal values can reach + 10 beats / min., and sometimes more. BP in children 7 - 10 years old 90/50 - 100/55 mm Hg; 10 - 12 years - 95/60 - 110/60; 13 - 14 year olds - 105/60 - 115/60; 15 - 16 year olds - 105/60 - 120/70. With physical activity, depending on its intensity, the heart rate increases, in children and adolescents it can exceed 200 beats / min. In children of school age, immediately after 20 squats, there is an increase in heart rate by 30 - 50%, an increase in max. BP by 10 - 20 mm Hg, lowering the minimum blood pressure by 4 - 10 mm Hg. Usually after 1 - 2 minutes. Heart rate and blood pressure are restored. Such a reaction of the CCC is assessed as favorable. A sharply reduced or vice versa, increased heart rate may indicate pathological changes in the heart or a violation of its neurohumoral regulation. Increased heart rate the next day after physical education, especially if it is accompanied by poor health, sleep disturbance, etc., indicates fatigue (V.V. Rozhentsov).
An effective method for assessing the degree of recovery after a lesson, for planning a further load, is an orthostatic test.
The student rests lying on his back for 5 minutes, then the heart rate is calculated in the prone position for 1 minute. After that, the student gets up, rests while standing for 1 minute, the pulse is again measured in a standing position for 1 minute. By the difference in heart rate standing and lying down, the response of the CVS to the load when the body position changes is judged. (Annex 2)
Another variant of the test is the Rufier test with squats: the subject lies on his back, after 5 minutes. heart rate is determined for 15 s. (recalculated in 1 min.) (P1), then, within 45 s. the student performs

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30 squats and lies down again, the heart rate is immediately determined for 15 s. (P2); then for the last 15 s. from the 1st min of recovery (P3). The sample is evaluated by the Rufier-Dixon index (Appendix 2).

This approach makes it possible to determine individual indicators of physical activity, calculated on the basis of the results of testing students' physical education. At the same time, the class is divided into groups with similar PHF indicators, and physical activity indicators are calculated for each group. In this case, within the framework of solving problems common to the entire class, a differentiated approach is implemented, due to the general criterion - the state of physical health of each student.

The ideal option would be to conduct testing of the PPE at the end of each academic quarter in order to adjust individual physical activity and the composition of groups based on the results obtained.

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