

## SPORTS MEDICINE

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## **Annotation**

This article is devoted to such discipline and science at the same time as sports physiology. For a long time such scientists as N.A. Aghajanyan, T.M. Lyuboshenko, A.S. Solodkov and many others studied this science and came to the conclusion that it is important in the study of the athlete's physiology in order to select a competent load. In order to select an even physical load, it is necessary to take into account the periods: pre-work, work and post-work, in which a certain motor load and exercises are provided.

Also, sports physiology is considered an applied science, which allows you to organize preventive measures in order to maintain a healthy well-being and condition of the body. Sport physiology should be studied especially by physical education teachers and coaches who prepare their athletes for serious competitions and who are very much responsible for the life and health of their charges. Key words: sports physiology, basic sciences, human physiology, cycle ergometer, treadmill, exercise classification, athlete psychology, pre-work period, work period, post-work period. Such a science as sports physiology has an important place in the discipline of

"physical culture", as it is the basis of the fundamentals in the study of the human body in training activities. Sports physiology is a special section of human physiology that studies changes in body functions and their mechanisms under the influence of muscular (sports) activity and substantiates practical measures to increase its effectiveness [3].

Sports physiology contains two relatively independent and at the same time interconnected sections.

The first section includes general sports physiology, which studies the physiological foundations of adaptation to physical activity and the body's reserve capabilities, functional changes and body conditions during sports activities, as well as the athlete's physical endurance, fatigue and recovery in sports activities. These disciplines include biology, human and animal physiology, chemistry and physics. The second section considers particular sports physiology, namely the physiological classification of physical exercises, the mechanisms and patterns of formation and development of motor qualities and skills, sports performance in special environmental conditions, the physiological characteristics of training women and children of different ages, the physiological foundations of mass forms of recreational physical culture. This includes such disciplines as anatomy, biochemistry, biomechanics, hygiene, psychology, pedagogy, exercise therapy, sports medicine [4].

Sports physiology has a scientific basis, thanks to which it allows the implementation and development of activities that allow achieving high sports results and at the same time maintaining the health of athletes. It is worth noting the fact that the main task of sports physiology is a comparative study of the functional state of the human body. An experimental study is usually carried out before the implementation of physical activity, during and after its implementation. Thus, specialists have developed special stress tests that help to dose physical activity and record the corresponding changes in body functions during various periods of human activity.

For this, such devices as a bicycle ergometer, a treadmill (treadmill), steps of different heights, as well as all kinds of devices that allow you to mark the functions of the cardiovascular, respiratory, muscular and central nervous systems at a distance, transmitting the corresponding indicators via telemetric channels [2].

L.V. Kapilevich considers sports physiology as an applied science and considers prevention as its main purpose, due to the fact that when studying and taking into account the reserve capabilities of the human body, it substantiates ways and means of increasing efficiency, accelerating recovery processes, preventing overwork, overstrain and pathological changes in body functions, as well as the prevention of various diseases [2]. In our opinion, it is worth agreeing with the opinion of the scientist, since this science studies the physiological state of the athlete's body, which makes it possible to identify his strengths and weaknesses, thanks to which he correctly doses physical activity. It can be assumed that under the influence of properly organized physical exercises, the plastic process is enhanced, which leads to accelerated formation of bone tissue in the process of human growth.

This process is most evident in childhood. In addition, moderate physical activity lasting 1.5-2.0 hours can cause an increase in the level of growth hormone in the blood



by 3 times. And the higher the level of self-totropin, the more intense the growth of a person [6].

Regular exercise can help increase the strength and endurance of the respiratory muscles, increase lung size and depth of breathing, and reduce the frequency of respiratory movements, thereby greatly improving the process of air exchange in the airways. In this case, the lungs more fully meet the human body's need for oxygen [5]. Physiological changes in the respiratory system also manifest themselves in the form of an increase in the oxygen utilization coefficient and an increase in the ability of the respiratory center to maintain excitation at the maximum level for a long time.

The oxygen capacity of the blood and the ability of skeletal muscles to use oxygen from the blood increase, which creates conditions for a decrease in pulmonary ventilation, both at rest and during physical exertion [7]. Regular exercise contributes to an increase in the number of alveoli by 15-20%, which creates a significant anatomical and functional respiratory reserve [4]. Some authors [1, 3] note that physical exercises of a cyclic nature lead to an increase in the volume-velocity parameters of the respiratory system. So, in the studies of N.G.Varlamova [3] found that in people involved in cross-country skiing, the patency of the respiratory tract in its different parts is higher than in people who do not go in for sports.

The cardiovascular system plays a leading role in ensuring the body's adaptation to physical activity, thereby limiting the development of the body's adaptive response [8]. Systematic physical exercises contribute to the intensive development of the heart and improve its function. Many morphological changes occur in the myocardium, that is, the synthesis of contractile protein increases, the number of mitochondria increases, and the concentration of myoglobin in the capillary network increases in proportion to the increase in heart mass. All this leads to moderate hypertrophy of the myocardium and an increase in its cavity, therefore, cardiac output increases, and the pulse rate decreases. These morphological and functional rearrangements provide savings of the heart and adapt the cardiovascular system to various muscle loads [2]. It is not uncommon for people who exercise regularly to experience sinus bradycardia at rest, which is characterized by low heart rates. Most often, a slowdown in the heart rate occurs in people who regularly engage in cyclic exercises for the development of endurance. A decrease in heart rate in a sportsman is a manifestation of the influence of the vagus nerve on the sinus node and is considered a more efficient and economical circulatory system. This is due to the fact that filling in the ventricles is created during a long diastole and the metabolic process of the myocardium after the previous contraction is completely restored. One of the main manifestations as a result of a



decrease in heart rate at rest is considered to be a decrease in myocardial oxygen demand [2].

At the initial stage of training, the stroke volume of blood tends to increase its values, and as the sports experience increases, its values stabilize, which contributes to a decrease in the minute volume of blood at rest. Sports physiology is inextricably linked with human psychology. It plays an important role in the theory of physical culture, making up the basic knowledge necessary for a coach and teacher of physical culture to achieve high sports results and maintain the health of athletes. Therefore, the coach and teacher should be well informed about the features of the physiological processes that occur in the body of an athlete during training and competitive activities in order to improve their work, the ability to argue their orders and recommendations in order to avoid overwork and overstrain of their wards. The professionalism of the teacher lies in bringing to the consciousness of the athletes the meaning and significance of the tasks performed, explaining how to perform and why this particular exercise is offered. Joint analysis of the exercises, search for errors in the technique of movements, the causes of their occurrence contributes to the formation of a conscious and active attitude to the learning process among athletes, accustoms them to introspection, self-assessment, self-control of motor activity, develops interest and desire for self-improvement. Professional self-improvement is understood as a conscious process of improving personal professional competence and the formation of professionally important qualities that meet social requirements, as well as the necessary conditions for professional activity and a personal development program. Professional self-improvement of an athlete is carried out in two interrelated forms self-education and self-education [10]. For a coach, one of the primary tasks is to increase motivation for sports activities - this is not a lightning-fast process, since athletes need to independently analyze their results and observe the desired professional growth. To do this, it is necessary to take into account individual characteristics and interests when choosing the type of activity in physical training classes, as well as to develop in pupils a systematic need for sports outside the learning process.

Teachers must also understand the essence of the changes that occur in the athlete's body during the rehabilitation period in order to actively and competently influence them, accelerating recovery reactions [1].

In addition to the positive impact on the health of the practitioner, physical activity can have a negative impact on the functional state and cause various diseases and injuries.



This occurs as a result of a discrepancy between the performed load and the functional capabilities of the body. Excessive load can cause inhibition of plastic processes and a delay in the growth and development of the body. Intense physical activity for a long time, especially in combination with adverse environmental conditions, can cause and maintain inflammatory changes in the airways [9]. Yes, I.M. Vuljanko, D. Plavec [11] note that people exercising in an open environment are exposed to cold air, which may increase the risk of respiratory system dysfunction.

If we talk about the types of exercises with a standard nature of movements, then they are traditionally divided into two groups. 

The first group includes quantitative exercises aimed at developing strength, speed and endurance. 

The second group includes movements of qualitative significance, evaluated in points, and not in exact measures of space and time. The main task of an athlete when performing them is to show the ability to control their movements, to show the ability to combine them into coordinated acts of varying degrees of complexity, to use various muscle groups for movements, etc. These sports include gymnastics and rhythmic gymnastics, acrobatics, figure skating, diving and on a trampoline [1]. During training sessions or competitions, the functional state of a person changes, which makes it possible to distinguish three periods:

pre-work, work and after work. The pre-work period includes a pre-launch state and a warm-up. A warm-up, in turn, prepares the body for the upcoming work and accelerates the processes of working out. Warm-up exercises can include elements of rhythmic gymnastics. The working period implies working out, steady state, "dead point" and "second wind", fatigue. It is reasonable to use exercises from the first group here, as they develop strength, speed and endurance: jumping, running, squatting, etc. In the post-work period, recovery processes take place. In this case, it is recommended to use breathing exercises and muscle stretching exercises. Thus, we conclude that sports physiology as an educational and scientific discipline allows solving two main problems. One of them consists in the physiological substantiation of the patterns of strengthening human health through physical exercises and increasing the resistance of the body to the action of various adverse environmental factors (temperature, pressure, radiation, air and water pollution, infections, etc.), as well as in preservation and restoration of working capacity, preventing the development of early fatigue and correction of psycho-emotional overloads in the course of a person's professional activity. These tasks of sports physiology are solved within the framework of mass forms of physical culture. The second problem of sports physiology is the physiological substantiation of measures aimed at achieving high sports results, especially in professional sports. These two problems do not completely

coincide, since in order to achieve the highest results in the process of training, in some cases such loads are applied that can lead to a decrease in the body's resistance to adverse environmental influences, deterioration in health, and even the occurrence of diseases. Based on the foregoing, it becomes obvious that the physiological characteristics of body functions should be studied and evaluated separately both in relation to mass physical culture and physical training of special contingents (military personnel, firefighters, geologists, students, schoolchildren and some other categories), and in relation to various sports, especially elite sports. Particular attention to this discipline should be paid to physical education teachers and coaches who work directly with athletes and regulate their physical activity. After all, an illiterately selected load will not only not contribute to the achievement of high sports results, but will also cause irreparable damage to the athlete's health. Which is basically unacceptable.

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