



CAUSES OF BODY FATIGUE DURING SPORTS EXERCISES

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Abstract:

The article discusses the causes of athlete fatigue during sports activities. Health is an invaluable gift bestowed upon humans by nature. To maintain sports health and strengthen it for the purpose of improving health and preventing diseases, it is necessary to engage in physical culture intelligently. To withstand adversities, one must know their body and ensure its ability to overcome harmful influences and consequences through self-healing methods. Each of us needs to gradually strengthen our health. The article discusses the causes of athlete fatigue during sports activities.

Keywords: physical exertion, fatigue, overwork, strenuous work, chronic fatigue, performance, body, athletes.

Introduction

The main and objective sign of fatigue is a decrease in its performance. With fatigue, performance decreases temporarily, but it quickly recovers with daily, normal rest. The state of fatigue has its dynamics - it intensifies during work and decreases during rest (active, passive, and sleep). Fatigue should be considered as a natural, normal functional state of the body during work. Another important criterion for assessing fatigue is the change in the body's functions during work. Depending on the degree of fatigue, functional shifts can vary. In the initial stage of fatigue, clinical-physiological and psychophysiological indicators differ in instability and multidirectional nature of changes, but their fluctuations generally do not exceed physiological norms. With chronic fatigue, especially overwork, there is a unidirectional significant deterioration in all functional indicators of the body with simultaneous decrease in the level of a person's professional activity. Let's review the main theories of fatigue formation. The following are the main theories of fatigue formation: 1) depletion of energy resources in muscles, 2) muscle contamination with metabolic waste products, 3) poisoning by metabolites, 4) suffocation due to lack of oxygen.





These local-humoral versions do not fully reveal the mechanisms of fatigue, as they consider only changes in muscle tissue as its main cause. [1]

The most presumed and scientifically studied theory of fatigue, formulated by I.M. Sechenov in 1903, developed and supplemented by A.A. Ukhtomsky, links the onset of fatigue only with the activity of the nervous system, in particular, the cerebral hemispheres. [2] It was assumed that the basis of the fatigue mechanism is a weakening of the main nervous processes in the cortex of the brain, a disturbance of their balance with the relative predominance of the excitation process over the more weakened process of internal inhibition, and the development of protective inhibition. Current electrophysiological and biochemical research methods and the data obtained do not allow attributing the causes of fatigue to changes in any one organ or system of organs, including the nervous system. Therefore, attributing the onset of primary fatigue to any one system is unjustified.[3]

The main factor causing fatigue is physical or mental workload, which affects the afferent systems during work. The relationship between the magnitude of the workload and the degree of fatigue is almost always linear, meaning that the greater the workload, the more pronounced and early the fatigue. In addition to the absolute magnitude of the workload, several other factors influence the development of fatigue, including: the static or dynamic nature of the workload, its constant or periodic nature, and the intensity of the workload. Along with the main factor, namely the workload leading to fatigue, there is a list of additional or contributing factors. These factors themselves do not lead to the development of fatigue, but when combined with the action of the main factor, they contribute to an earlier and more pronounced onset of fatigue. Among the additional factors are: 1. Environmental factors (temperature, humidity, air composition, barometric pressure, etc.); 2. Household factors, namely, violations of the work and rest regimen; 3. Disruption of habitual circadian rhythms and sensory deprivation; 4. Socio-psychological factors - motivation, team relationships, family relationships, etc. The main sign of fatigue is a decrease in performance, which changes during the performance of various physical exercises for various reasons, so the physiological mechanisms of fatigue development are different. These mechanisms are determined by the intensity of work, its duration, the nature of the exercises, the complexity of their performance, etc.

During high-intensity periodic work, the primary cause of reduced performance and the development of fatigue is a decrease in the mobility of the main nervous processes in the central nervous system, with a predominance of inhibition due to a large flow of efferent impulses from nerve centers to muscles and afferent impulses from working muscles to centers. The working system of interconnected activity of cortical





neurons is disrupted. Additionally, the levels of ATP and creatine phosphate decrease in neurons, while the brain structures show an increased content of the inhibitory mediator, gamma-aminobutyric acid. Significant changes in the functional state of the body's muscles, including reduced excitability, lability, and relaxation speed, also play a crucial role in fatigue development. During high-intensity cyclic work, the leading causes of fatigue are the inhibition of nerve center activity and changes in the body's internal environment. This is due to acute oxygen deficiency, leading to hypoxemia, decreased blood pH, and a 20-25 fold increase in blood lactate levels. Oxygen debt reaches maximum values of 20-22 liters. Undeveloped metabolic products worsen the activity of nerve cells. The intense activity of nerve centers occurs against the background of acute oxygen deficiency, leading to rapid fatigue development. High-intensity periodic work leads to fatigue due to motor and autonomic function discoordination. Intense cardiovascular and respiratory system activity is required to supply the intensely working body with the necessary amount of oxygen. This work exceeds oxygen consumption, resulting in an oxygen debt of 12-15 liters. The total energy expenditure during such intense work is significant, consuming up to 200 grams of glucose, leading to a decrease in blood glucose levels. There is also a reduction in the blood concentration of certain hormones from internal secretion glands (pituitary, adrenal glands). Prolonged moderate-intensity cyclic work leads to protective inhibition in the CNS, depletion of energy resources, tension in the oxygen transport system functions, tension in internal gland functions, and changes in metabolism. Glycogen reserves decrease in the body, leading to a decrease in blood glucose levels. Significant loss of water and salts by the body, changes in their quantitative ratio, and disruption of thermoregulation also lead to decreased performance and fatigue in athletes. Changes in protein metabolism and decreased functions of internal secretion glands play a role in the mechanism of fatigue development during prolonged physical exertion. As a result of these changes, and due to the prolonged influence of monotonous afferent stimuli in nerve centers, inhibition occurs. The inhibition of these centers leads to a significant decrease in the efficiency of movement regulation and disruption of their coordination. In different climatic conditions, prolonged work can lead to accelerated fatigue development due to disruptions in thermoregulation.

The mechanisms of fatigue development also vary during different types of non-cyclic movements. Specifically, during the performance of situational exercises of varying intensity, the higher brain centers and sensory systems experience greater stress because athletes need to constantly analyze the changing situation, program their





actions, and adjust the pace and structure of movements, which leads to fatigue development in their bodies.

In different sports disciplines, such as football, the main role is attributed to insufficient oxygen supply and the development of oxygen debt. During gymnastic exercises and combat sports, fatigue develops due to impaired cerebral blood flow and decreased functional state of muscles, resulting in reduced strength and excitability, as well as decreased contraction and relaxation speed. In static work, the main cause of fatigue is continuous tension of nerve centers and muscles, deactivation of less stable muscle fibers, and a high flow of afferent and efferent impulses between muscles and motor centers. [4]

Fatigue, which is a normal functional state of the body during work, completely disappears during regulated rest periods. With prolonged, intensive work and disruptions in work-rest cycles, fatigue indicators accumulate, leading to chronic fatigue and overwork.

Chronic fatigue of the body is a borderline functional state characterized by the persistence of subjective and objective signs of fatigue from previous work to the beginning of the next work period, requiring additional rest to alleviate. Chronic fatigue occurs during prolonged work with disruptions in work-rest cycles. Its main subjective signs include feeling tired before the start of the workday, quick exhaustion, irritability, and unstable mood; objective signs include significant changes in the body's functions, a noticeable decrease in athletic performance, and the occurrence of erroneous actions. In chronic fatigue, the necessary level of athletic performance can only be maintained temporarily by increasing the biological cost and rapidly depleting the body's functional reserves. To eliminate adverse disruptions in the body's functions and maintain athletic performance, it is necessary to correct training and rest schedules and provide athletes with additional extended rest periods. Failure to take these measures may lead chronic fatigue to progress into a state of overwork.

Overwork is a pathological condition of the body characterized by constant feelings of fatigue, lethargy, sleep disturbances, loss of appetite, chest pains, and other bodily discomforts. Additional rest alone is insufficient to alleviate these symptoms; specialized medical treatment is required in this condition. Objective signs of overwork include sudden changes in bodily functions, some of which exceed normal ranges, increased sweating, shortness of breath, weight loss, impaired attention and memory, atypical reactions to functional tests, which often do not reach completion. The main objective criterion of overwork is a sharp decline in athletic performance and the emergence of gross errors during the execution of specific physical exercises.



Athletes showing signs of overwork should be withdrawn from various types of training and competitions. They should undergo medical therapeutic correction. [5] Studies conducted in recent years by occupational physiologists have allowed for a quantitative assessment of the performance of various specialists, revealing that a decrease in direct and indirect indicators of performance by up to 15% compared to baseline indicates the presence of fatigue, 16-19% suggests the presence of chronic fatigue, while a decrease of 20% or more indicates the onset of overwork.

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