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PHYSIOLOGICAL CHANGES IN ATHLETES DURING TRAINING SESSIONS

Assistant at the Department of Theory of Physical Education, Humanities, and Natural Sciences of the Nukus

branch of **UzSWLU** Doctor of Philosophy (PhD) in Pedagogical Sciences.

Berdibayeva Gulshat Sultamuratovna

Abstract. This article analyzes the physiological changes occurring in the human body during physical exercise. Functional changes occurring in the cardiovascular, respiratory, muscular, nervous, and endocrine systems under the influence of sports activities are highlighted. The significance of warm-up exercises in preparing the body for physical exertion and their physiological effects are also revealed. It is scientifically substantiated that as a result of regular training, the body's adaptive capacity, endurance, and general productivity increase.

Keywords: physical training, physiological changes, sports physiology, body adaptation, warm-up, cardiovascular system, respiratory system, muscle activity, endurance, recovery process, hot climate,athletic performance.

The human body operates as a complex mechanism in which the tissues of all its organs interact with each other; physiological changes occur in the body when a person is distressed, afraid, or excited by something, and physiological changes occur in all its organs when engaged in sports. Modern sports require not only achieving high results but also a profound study of the human organism's capabilities. Athletes' bodies undergo various physiological changes under the influence of regular training sessions. These changes contribute to the body's adaptation to external loads, increased endurance, and the strengthening of general health. During training, significant changes occur in the cardiovascular, respiratory, muscular, nervous, and endocrine systems.

Warm-up exercises play a major role in preparing the body for the approaching state of work, as unconditioned reflex reactions arising from muscle work during physiological preparation are linked to the mechanism of the conditioned reflex in the states preceding the start of work. Exercise training is a set of exercises performed before a training session or competition, which helps accelerate the workflow and increase efficiency. The physiological effects of warm-up vary: 1) increased excitability and activity of the sensory, motor, and autonomic centers of the central nervous system; 2) enhancing the activity of the endocrine glands, which facilitate the regulation of autonomic and motor functions during subsequent work; 3) an increase in body temperature, which ensures the activity of enzymes and the rate of biochemical reactions in muscle fibers, muscle excitability and lability, as well as the rate of their contraction and relaxation, and especially the activity of functioning muscles; 4) increased blood flow to the skin and a decrease in the sweating threshold, which facilitates heat transfer and prevents overheating during subsequent warm-up exercises, as well as improves the functioning of systems that supply oxygen to working muscles: increased pulmonary ventilation, increased oxygen distribution rate from alveoli to the blood, increased minute circulation volume, dilated arterial vessels of skeletal muscles, opened capillaries in them, increased venous return, and an increase in the intensity of oxyhemoglobin secretion in tissues and blood pressure. It adapts the body to future loads and reduces the risk of injury.

-The main physiological effects of warm-up include:

- The excitability and activity of the central nervous system increase.
- The activity of the endocrine glands increases.

- Biochemical processes in the muscles are accelerated

The process of sweating accelerates, and heat exchange improves: for example, during physical exertion in a hot climate, the volume of blood in active muscles increases, and microcirculation in the skin is strengthened. During physical exertion, the dilation of the skin's blood vessels makes it difficult for blood to return to the heart. High temperature and high humidity increase body temperature, which increases sweating and leads to the loss of electrolytes, certain organic substances, glycogen, iron, etc., in large quantities.

In order to accelerate adaptation to such conditions, eliminate fatigue, and restore athletic performance, it is advisable to take a warm shower, and in the morning, a contrast shower (especially during the first 3-5 days), hyperthermal baths, and a sauna. Physiological movement is explained by the large mass of skeletal muscles (about 40% of body weight) and their ability to change immediately within a wide range of functional activity levels. At rest, the blood flow in the striated muscles accounts for 15-20% of the minute blood volume (DMV), while at heavy work, it can reach 80-85% of the DMV. Regarding the changes observed in the body during physical labor, V.P. Zagryadskaya and Z.K. Tsvi-Samuillo conducted a study.

Boundary displacements in visceral systems in muscle function

Measurements	at rest	when performing physical work	Measurements multiplicity
Heart rate per minute	70	220	3
Blood pressure, mmHg	120	200	2
Arterial pressure, diastolic	80		2
Blood pressure, pulse	40	40	4
Pulse volume of blood, ml	60	120	3
Minute blood volume, L	4,5	180	8
Arteriovenous oxygen difference.	4	40	4
Respiratory rate per minute	10	16	6
Respiratory depth, L	0,5	60	10
Minute respiratory volume, L	6	5	20
Oxygen supply L/min^{-1}	0,25	120	20
Carbon dioxide excretion L/min^{-1}	0,2	54	20

During physical exercise, physiological changes are observed in all organs, including an increase in heart rate (pulse) during training, through which more oxygen is delivered to the body. In novice athletes, the heart gets tired faster, but as a result of regular training, the heart muscle is strengthened. As a result, the heart works more efficiently and the body performs more work with less energy, and the rate and depth of breathing increase. This is due to the increased need for oxygen in the body. Through the respiratory system, oxygen is delivered to the muscles and carbon dioxide is expelled.

Regular training yields the following results:

- The vital capacity of the lungs increases
- Respiratory muscles strengthen
- Gas exchange efficiency increases

-Maximum oxygen consumption increases.This allows the athlete to work without fatigue

for a long time.

Physical exercise has a direct impact on the muscular system. During physical exertion, muscle fibers contract and consume energy. As a result of these processes, microdamage occurs in the muscles, and during the recovery process, the muscles become stronger and reshape. The physiological changes occurring in athletes during training are considered a complex and multifaceted process. These changes encompass all systems of the body, increasing their functional capabilities. Regular and scientifically grounded training not only improves athletic results but also strengthens human health and contributes to longevity.

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