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Functional Features Of The Cardiovascular System In Athletes.

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ABSTRACT

The cardiovascular system ensures the delivery of nutrients and oxygen to all cells of the body. Under conditions of intensive and prolonged muscular work, increased demands are placed on the activity of the heart, which leads to morphological changes in it. In addition, under the influence of systematic muscle loads in the heart and in other tissues grows capillary network. It becomes thicker, the number of anastomoses increases - the blood supply to the heart improves. Regular exercise has a positive effect on the walls of blood vessels, peripheral circulation and blood-forming organs. This leads to ensuring that the morphofunctional properties of the heart, blood vessels and blood correspond to the level of human physical activity at the current time. Exercise is a powerful means of healing, including the cardiovascular system in a modern person with low motor activity. The blood vessels in the process of physical training become more elastic, and blood pressure is constantly maintained within the normal range. In addition, physical exercises develop the musculoskeletal muscles and thereby improve the exchange of gases between the lungs and the atmosphere. Regular physical training significantly increases endurance and improves blood circulation, which is why experienced athletes are able to perform heavy physical exercises for a long time. The increased blood flow supplies the muscles with enough oxygen and nutrients that the muscles need during exercise. As a result of regular training, the cardiovascular system adapts to the new loads. Her work at the same time becomes more economical and efficient. The muscles of the whole body during training appear large functional reserve.

Keywords: sport, heart, vessels, blood circulation, physical training.

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INTRODUCTION

The cardiovascular system provides continuous delivery of nutrients and oxygen to all cells of the body [1, 2]. Under conditions of intensive and prolonged muscular work, increased demands are made on the activity of the heart, which leads to adaptive morphological changes in it [3, 4]. In addition, under the influence of systematic muscular loads in the heart and in other tissues the capillary network grows [5, 6]. It becomes thicker, the number of anastomoses increases. All this improves the blood supply to the heart. Regular exercise has a positive effect on the walls of blood vessels, peripheral circulation and blood-forming organs [7]. This leads to ensuring that the morphofunctional properties of the heart, blood vessels and blood correspond to the level of physical activity of a person at the current time [8,9].

Given the extremely functional importance of the reaction of the heart and blood vessels to physical training, it was important to analyze them in detail in the course of a review of the available literature. In this regard, the goal was set in the work: to compile basic information about the effect of regular physical activity on the cardiovascular system [10,11].

The heart is the main center of the circulatory system, working according to the type of pump, thanks to which the body moves blood [12,13]. As a result of physical training, the size and weight of the heart increase due to the thickening of the heart muscle and the increase in its volume [14,15]. This increases the power and efficiency of the heart as a whole [16, 17].

An important indicator of the health of the heart is its systolic blood volume, the amount of blood pushed by the left ventricle of the heart into the bloodstream with one contraction. The systolic volume of the heart in a trained person is much higher both in muscular work and at rest than in untrained people [18]. Another informative indicator of the health of the heart is the number of heartbeats. In the process of sports training, the heart rate at rest and during physical exertion becomes less frequent with time due to an increase in the power of each heartbeat. This is explained by the fact that the heart of an untrained person is forced to contract with a greater frequency to ensure the required minute volume of blood, since he has less systolic volume [19]. The heart of a trained person is more permeated with blood vessels [20]. In such a heart is better nourishment of muscle tissue. Its performance is higher [21]. Schematically, the cardiac cycle can be divided into 3 phases: atrial systole (0.1s), ventricular systole (0.3 s) and a total pause (0.4 s). Even if it is conditionally accepted that these parts are equal in time, the rest pause for an untrained person with a heart rate of 80 beats per minute will be 0.25s, and for a trained person with a heart rate of 60 beats per minute, the rest pause increases to 0.33s. Hence, the heart of a trained person in each cycle of his work has more time for rest and recovery [22-25].

With intensive physical work in trained people, systolic blood pressure rises to 200 mm Hg. st. Art. more and can hold on for a long time. During rest, after they stop physical work, their blood pressure quickly returns to normal. In untrained people, the maximum blood pressure first rises to 200 mm Hg. Art., and then quickly decreases as a result of fatigue of the heart muscle. After physical exertion, these people have a maximum and minimum blood pressure for a long time to remain elevated [26].

Back in the 11th century, the great Tajik philosopher, physician and scientist Abu Ali Ibn Sina (Avicenna) wrote: regime "[27]. Exercise greatly improves the pumping function of the heart [28]. One of the most important effects of exercise is slowing down the pulse at rest. This is a sign of lower myocardial oxygen consumption, i.e. enhanced protection from coronary heart disease [29]. Adaptation of the peripheral blood circulation includes a number of vascular and tissue changes [30]. Muscle blood flow during exercise increases significantly and can increase by 100 times, which requires strengthening of the heart [31,32]. In the trained muscles, the density of capillaries increases [33]. The increase in arteriovenous oxygen difference is due to the increase in muscle mitochondria and the number of capillaries, as well as more efficient bypass of blood from non-working muscles and abdominal organs [34]. The activity of oxidative enzymes increases. These changes reduce the amount of blood required by the muscles during work. An increase in the oxygen transport capacity of the blood and the ability of red blood cells to release oxygen further increases the arteriovenous difference [35].

CONCLUSION

Exercise is a powerful means of healing, including the cardiovascular system in a modern person with low motor activity. During physical training, blood vessels become more elastic, arterial pressure constantly remains within the normal range. Exercise develops skeletal muscles and thereby improves the exchange of gases between the air and the atmosphere. Regular physical training significantly increases endurance and improves blood circulation, which is why experienced athletes are able to perform heavy physical exercises for a long time. Strengthened blood flow provides the muscles with enough oxygen and nutrients that are needed for muscle input loads. As a result of regular training, the cardiovascular system adapts to the new loads. Her work at the same time becomes more economical and efficient, she has a greater functional reserve.

REFERENCES

- [1] Vatnikov YuA, Zavalishina SYu, Seleznev SB, Kulikov EV, Notina EA, Rystsova EO, Petrov AK, Kochneva MV, Glagoleva TI. (2018) Orderly muscle activity in elimination of erythrocytes microrheological abnormalities in rats with experimentally developed obesity. *Bali Medical Journal*. 7(3) : 698-705. DOI:10.15562/bmj.v7i3.739.
- [2] Skoryatina IA, Zavalishina SYu. (2017) Ability to aggregation of basic regular blood elements of patients with hypertension and dyslipidemia receiving non-medication and simvastatin. *Bali Medical Journal*. 6(3):514-520. DOI:10.15562/bmj.v6i3.553.
- [3] Bikbulatova AA. (2018) Peculiarities of locomotor apparatus of children at preschool age with scoliosis of I-II degree living in Central Russia. *Bali Medical Journal*. 7(3): 693-697. DOI:10.15562/bmj.v7i3.738.
- [4] Bespalov DV, Kharitonov EL, Zavalishina SYu, Mal GS, Makurina ON. (2018) Physiological Basis For The Distribution Of Functions In The Cerebral Cortex. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5): 605-612.
- [5] Skorjatina IA (2018) Therapeutic Possibilities Of Rosuvastatin In The Medical Complex In Relation To Disaggregation Vascular Control Over Erythrocytes In Persons With Arterial Hypertension And Dyslipidemia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(2) : 977-983.
- [6] Apanasyuk LA, Soldatov AA. (2017) Socio-Psychological Conditions for Optimizing Intercultural Interaction in the Educational Space of the University. *Scientific Notes of Russian State Social University*. 16(5-144) : 143-150. doi: 10.17922/2071-5323-2017-16-5-143-150.
- [7] Bikbulatova AA, Andreeva EG. (2018) Achievement of psychological comfort in 5-6-Year-Old children with scoliosis against the background of daily medicinal-prophylactic clothes' wearing for half a year. *Bali Medical Journal*. 7(3): 706-711. DOI:10.15562/bmj.v7i3.947.
- [8] Bikbulatova AA, Andreeva EG. (2018) Restoration Of The Profile Of Bioregulators Of Blood Plasma In People Of Second Adulthood With Osteochondrosis Of The Spine Against The Background Of Daily Wearing Of Medical And Preventive Clothing. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4) : 413-419.
- [9] Bikbulatova AA. (2018) Bioregulatory Effects Of The Daily Wearing Of Medical And Preventive Pants On The Body Of Pregnant Women Suffering From Habitual Miscarriages Of The Fetus. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4) : 889-896.
- [10] Bikbulatova AA, Karplyuk AV. (2018) Professional And Labor Orientation Of Persons With Disabilities In The Resource Educational And Methodological Center Of The Russian State Social University. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4) : 1648-1655.
- [11] Maloletko AN, Yudina TN. (2017) (Un)Making Europe: Capitalism, Solidarities, Subjectivities. *Contemporary problems of social work*. 3 (3-11) : 4-5.
- [12] Glagoleva TI, Zavalishina SYu, Mal GS, Makurina ON, Skorjatina IA. (2018) Physiological Features Of Hemo-coagulation In Sows During Sucking. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4):29-33.
- [13] Zavalishina SYu, Makurina ON, Vorobyeva NV, Mal GS, Glagoleva TI. (2018) Physiological Features Of Surface Properties Of The Erythrocyte Membrane In Newborn Piglets. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4):34-38.
- [14] Pozdnyakova ML, Soldatov AA. (2017) The Essential and Forms of the Approaches to Control the Documents Execution. *Contemporary problems of social work*. 3 (1-9): 39-46. doi: 10.17922/2412-5466-2017-3-1-39-46.

- [15] Vorobyeva NV, Mal GS, Skripleva EV, Skriplev AV, Skoblikova TV. (2018) The Combined Impact Of Amlodipin And Regular Physical Exercises On Platelet And Inflammatory Markers In Patients With Arterial Hypertension. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4) : 1186-1192.
- [16] Bikbulatova AA, Karplyuk AA, Parshin GN, Dzhabfar-Zade DA, Serebryakov AG. (2018) Technique for Measuring Vocational Interests and Inclinations in High-School Students with Disabilities. *Psikhologicheskaya nauka i obrazovanie-psychological science and education*. 23(2) : 50-58. doi: 10.17759/pse.2018230206.
- [17] Zhalilov AV, Mironov IS. (2018) Identification Of The Most Significant Shortcomings Of Sports Competitions In Sambo Among People With Hearing Impairment In A Separate Region Of Russia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(3) : 672-677.
- [18] Alifirov AI, Mikhaylova IV. (2018) Physical Education Of Highly Qualified Chess Players. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4) : 1725-1730.
- [19] Gusarov AV, Kornev AV, Kartashev VP, Nekrasova MV. (2018) Effect Of Static Exercises With A Deflection On The Tone Of The Skeletal Musculature Of Middle-Aged Women. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4) : 1716-1724.
- [20] Makurina ON, Zaitsev VV, Kolesnikov AV, Sokol OV, Sadykhova AV. (2018) Aging changes' inhibition of hemostasis and blood rheological features on the background of antioxidant liposomal preparation "Lipovitam-Beta" application. *Bali Medical Journal*. 7(1): 114-119. DOI:10.15562/bmj.v7i1.626
- [21] Zavalishina SYu, Vatnikov YuA, Kubatbekov TS, Kulikov EV, Nikishov AA, Drukovsky SG, Khomenets NG, Zaykova EYu, Aleshin MV, Dinchenko OI, Glagoleva TI. (2018) Diagnostics of erythrocytes' early microrheological abnormalities in rats with experimentally developed obesity. *Bali Medical Journal*. 7(2): 436-441. DOI:10.15562/bmj.v7i2.740
- [22] Makhova AV. (2018) Physiology Of The Hypothalamus In The Human Body. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 478-484.
- [23] Maksimov VI, Zavalishina SYu, Parakhnevich AV, Klimova EN, Garbart NA, Zabolotnaya AA, Kovalev Yul, Nikiforova TYu, Sizoreva EI. (2018) Functional Activity Of The Blood Coagulation System Against The Background Of The Influence Of Krezacin And Gamavit In Newborn Piglets Who Underwent Acute Hypoxia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 2037-2042.
- [24] Maksimov VI, Zavalishina SYu, Parakhnevich AV, Klimova EN, Garbart NA, Zabolotnaya AA, Kovalev Yul, Nikiforova TYu, Sizoreva EI. (2018) Physiological Dynamics Of Microrheological Characteristics Of Erythrocytes In Piglets During The Phase Of Milk Nutrition. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 454-459.
- [25] Tkacheva ES, Zavalishina SYu. (2018) Physiological Features Of Platelet Aggregation In Newborn Piglets. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 36-42.
- [26] Tkacheva ES, Zavalishina SYu. (2018) Physiological Aspects Of Platelet Aggregation In Piglets Of Milk Nutrition. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 74-80.
- [27] Tkacheva ES, Zavalishina SYu. (2018) Physiology Of Platelet Hemostasis In Piglets During The Phase Of Newborns. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 1912-1918.
- [28] Zavalishina SYu. (2018) Physiological Mechanisms Of Hemostasis In Living Organisms. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 629-634.
- [29] Zavalishina SYu. (2018) Functional Properties Of Anticoagulant And Fibrinolytic Activity Of Blood Plasma In Calves In The Phase Of Milk Nutrition. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 659-664.
- [30] Zavalishina SYu. (2018) Physiological Dynamics Of The Blood Coagulation System Activity In Calves During The Phase Of Dairy Nutrition. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 680-685.
- [31] Zavalishina SYu. (2018) Functional Activity Of The Blood Clotting System In Calves During The Phase Of Milk And Vegetable Nutrition. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 720-725.
- [32] Zavalishina SYu. (2018) Anti-Coagulant And Fibrinolytic Activity Of Blood Plasma In Healthy Calves Of Dairy-Vegetative Nutrition. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 753-758.
- [33] Bikbulatova AA. (2018) Technology Implementation Of Competitions Of Professional Skill. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(5) : 407-419.



- [34] Bikbulatova AA, Kartoshkin SA, Pochinok NB. (2018) Schemes Of Competitions Of Professional Skills Among People With Disabilities In Russia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 357-362.
- [35] Bikbulatova AA, Matraeva LV, Erokhin SG, Makeeva DR, Karplyuk AV. (2018) Methodical Foundations Of Carrying Out Competitions Of Professional Skill Among People With Disabilities. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 243-247.