J Biochem Technol (2021) 12(4): 67-71
https://doi.org/10.51847/JesqloXQhS
ISSN: 0974-2328

Possibilities of Students' Health Improvement through Physical Training in the Aquatic Environment

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Received: 07 June 2021 / Received in revised form: 02 December 2021, Accepted: 08 December 2021, Published online: 17 December 2021

Abstract

Regular execution of movements while in the aquatic environment, ensuring the swimming process, heals the entire body. As a result of regular swimming, many positive changes occur in human tissues. As a result of systematic swimming training, a functional improvement of all human internal organs occurs. Frequent swimming training improves health and enhances the severity of physical and mental performance. Swimming strengthens the heart, improves vascular function, trains skeletal muscles, activates immunity, stimulates the breathing process, neutralizes most of the effects of stress, and tones all body tissues. Swimming is considered as a dosed physical activity that forms a stable positive emotional background and leads to the recovery of the whole organism. In the central nervous system, during the performance of motor actions in the aquatic environment, a more pronounced intensification of life processes occurs than during the performance of physical exercises on land. This effect is possible due to the stimulation of skin receptors with water. Private swimming training stimulates the autonomic nervous system. Swimming weakens the activity of its sympathetic part and increases the biological capabilities of its parasympathetic component. This contributes to the normalization of peripheral vascular tone, optimizes heart rate, lowers blood pressure, stimulates gas exchange processes, contributing to an increase in oxygen content in the blood, and intensifies metabolism in all cells.

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Keywords: Physical training, Water environment, Muscle activity, Organism, Swimming, Student age

Introduction

It is believed that swimming is a versatile and highly physiological type of muscle activity (Chistyakova, 2014; Moubarez *et al*., 2019; Hanawi *et al*., 2020; Zavalishina *et al*., 2021a). As a result of swimming, life processes in all organs are normalized (Karpov *et al*., 2021a). It enhances the capabilities of the heart muscle, optimizes vascular tone, hypertrophies muscles, enhances the immune system, activates respiration, reduces stress in the body (Bespalov *et al*., 2018), and eliminates emotional stress (Zavalishina, 2020a). In the case of an increased tone of the nervous system, swimming relaxes, and in the case of asthenia, it tones the body (Glagoleva *et al*., 2018). For this reason, swimming is a very effective form of physical activity, which improves the emotional state and seriously stimulates all internal organs (Kotova *et al*., 2017).

It is now recognized that swimming is quite accessible to everyone in any health condition and at any age (Karpov *et al*., 2021b; Zavalishina *et al*., 2021b). Systematic swimming training, even for a short duration, is very effective in preventing any pathology and helping to treat any somatic and nervous diseases (Zavalishina, 2018a; Zavalishina *et al*., 2021c).

When comparing the effectiveness of swimming with other types of aerobic training conducted in the air, it demonstrates the strongest stimulating effect (Vasiliev *et al*., 2015; Zavalishina, 2020b). During the process of swimming as an external environment for the body, water provides it with twice as strong resistance for the implementation of movements than in the air. This is the basis for the general stimulation of the activity of the entire human body during swimming (Kazyzaeva, 2015).

Under conditions of immersion in the aquatic environment, a person experiences a series of sensations, largely similar to those in weightlessness. This is because the density of water is higher than that of air (Vasiliev *et al*., 2015). This contributes to the achievement of a relaxed state in water, similar to the state in zero gravity.

The study aimed to examine the effects of swimming on the human body at college age.

Materials and Methods

Publicly available scientific sources of information became the material for the research performed. Scientific search in the course of the study was carried out in the database of the Russian scientific electronic library eLIBRARY.RU and the scientific database Scopus. The research methods in this work were methods of analysis and synthesis, methods of induction and deduction, and the method of statistical data processing using traditional statistical programs.

Results and Discussion

In the process of swimming training in the body, the mechanisms that provide hardening are activated. This stimulates processes that increase the body's resistance to adverse influences from the external environment of a physical and biological nature. For this reason, feasible swimming loads are very useful for people with weakened immunity, often suffering from infectious diseases (Kireeva & Rasskazov, 2018).

Taking into account the previous observations, swimming should be considered a very effective health-improving form of physical activity (Skoryatina & Zavalishina, 2017). Even when a person is in cool water, stimulation of life processes in all internal organs develops. Respiratory processes are very actively intensified, the pulse rate rises, and the course of metabolic processes intensifies **(Figure 1)** (Makurina *et al*., 2020).

Swimming regularly enhances functional processes throughout the body. They activate the respiratory muscles, make the chest more mobile, increase the vital capacity of the lungs and stimulate their ventilation (Zavalishina *et al.*, 2018). These changes stimulate the entire respiratory system to work. Under these conditions, swimming reduces the gravitational effect on the spine and spinal cord. There comes a strengthening of the muscles supporting the spine, normalizing the state of posture (Vorobyeva *et al.*, 2020). Due to the stimulation of the skin receptors by the aqueous medium, the functioning of the brain is activated with the elimination of the phenomena of fatigue and the appearance of a feeling of vigor (Kazyzaeva, 2015; Zavalishina, 2020c). Hydromassage of the body surface during swimming stimulates the autonomic nervous system. Against this background, there is an increase in the body's resistance to the effect of low temperatures on it (Vasiliev *et al.*, 2015; Vorobyeva *et al.*, 2018a).

Figure 1. Beginning of swimming lessons
https://files.pravda-nn.ru/2021/03/Estafeta-plovtsy-1200x801.jpg

Swimming lessons have a positive effect on the work of the cerebral cortex (Zavalishina, 2020d). Swimming in any type of water sport enhances synapse formation and stimulates neurons in all parts of the brain. At the same time, blood supply improves in the cerebral cortex, a functional balance of the processes of excitation and inhibition is achieved. During swimming, a feeling of weightlessness develops, which has a positive effect on thought processes and a positive effect on the emotional state (Yakub & Motorykina, 2018).

Swimming training can quickly eliminate asthenia, insomnia, and fatigue. Frequent swimming exercises increase memory capacity, stabilize attention, optimize mood, reduce irritability and help eliminate the feeling of fatigue (Vorobyeva *et al*., 2018b; Skripleva *et al.*, 2018). Swimming loads lead to stimulation of adaptive processes in all internal organs. Due to this, the degree of resistance of the vital organs of the body to the action of low temperatures increases. Swimming stimulates non-specific anti-infective immunity (Vorobyeva *et al*., 2018c; Kamilova, 2019).

The effect of water on the skin reduces nervous tension in any condition (Sungurova *et al*., 2018; Fayzullina *et al*., 2020). Swimming exercises normalize the thinking processes in people, especially with various brain diseases, increases the efficiency of

memory, and enhances attention (Glamazdin *et al*., 2018). Swimming has a strong therapeutic effect on the body in asthenia, malnutrition, and after injuries (Panova *et al*., 2017).

Swimming is very effective in preventing organ diseases, nervous dysfunctions, and the progression of degenerative processes in organs. Swimming exercises improve visual acuity and strengthen the general tone of the body (Tkacheva & Zavalishina, 2018a).

In the case of dysfunctions in the cardiovascular system, swimming is especially useful. In these patients, swimming activates the heart muscle and stimulates its metabolism (Boldov *et al*., 2018; Zavalishina, 2018b). During swimming, the heart muscle quickly strengthens, and the tone of its vessels is normalized. This provides an optimum supply of oxygen and nutrients to cardiomyocytes (Karpov *et al*., 2018). Due to this, during swimming in cardiac patients, the whole organism is stimulated (Tkacheva & Zavalishina, 2018b).

As a result of swimming, the statistical tension of the muscles of the body is quickly eliminated, which is important for maintaining an upright body position. This greatly facilitates the work of the trunk muscles (Zavalishina, 2018c). The effect of water on the surface of the human body during swimming increases blood circulation from the capillaries to the heart. This is facilitated by rhythmic contractions of the limb muscles during swimming. They stimulate the return of blood to the heart (Stepanova *et al*., 2018). This situation provides an optimal distribution of blood in the body horizontally and not vertically. This greatly facilitates the movement of blood from capillaries into venous vessels. The emerging situation facilitates the entire process of blood circulation in the body. When the body is in a watery environment, the heart can pump much more blood. This is largely due to the water temperature, which is lower than body temperature. This difference enhances and accelerates the return of blood from small vessels to large venous vessels and into the heart cavity **(Figure 2)** (Tkacheva & Zavalishina, 2018c).

Figure 2. The process of swimming lessons
https://www.botasot.info/media/botasot.info/images/2019/July/17/auto_not-587x3721563343724.jpg

In those who swim for a long time, the myocardium is very hardy. Outside of physical activity, their heartbeats no more than 60 times in one minute. At the same time, it works much less and rests for a long time. In addition, swimmers' hearts consume more oxygen and essential nutrients. A trained swimmer's heart works much more economical compared to an untrained person. The high power of the heart contraction increases the general functional characteristics of the entire system of the heart and blood vessels. This economization of the work of the heart and blood vessels is possible not only in conditions of physical rest. In the process of swimming, the process of hemodynamics in athletes is very economical (Kamilova, 2021).

Systematic swimming loads also have a positive effect on the tone of arterial vessels. They increase their elasticity, enhance trophism in the vascular walls and activate regeneration mechanisms. The resulting situation inhibits the flow of cholesterol into the walls of the arteries. In those who swim for a long time, the lumen of the vessels is significantly larger than in untrained people (Zavalishina, 2018d). In this regard, frequent swimming leads to a stable normalization of blood pressure at any age.

Conclusion

As a result of regular swimming training, health is significantly improved, and overall performance increases. Swimming stimulates the work of the heart and dilates blood vessels, trains skeletal muscles, activates immunity, enhances respiration, reduces stress manifestations, and tones up internal organs. Swimming creates a stable positive emotional background, contributing to overall health. The effect of regular execution of ordered movements in an aquatic environment significantly exceeds the effect of physical exercise in an air environment. Regular swimming training intensifies the work of the whole body. This is largely possible due to the situation of the processes of

neuroendocrine regulation of internal organs and the activation of metabolism in all tissues.

Acknowledgments: The team of authors thanks the administration of the Astrakhan State Medical University for the opportunity to research its basis.

Conflict of interest: None

Financial support: The study was conducted at the expense of the authors.

Ethics statement: The study was approved by the local ethics committee of the Astrakhan State Medical University on September 16, 2018 (protocol №11).

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