

Physiological Reaction of the Body of Students to Regular Physical Activity

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Abstract

For the long-term preservation of the optimal physical status of a person, regular physical activity is required. Rational muscle activity can stimulate the entire body. It increases oxygen consumption and accelerates the release of toxic products, stimulates metabolism and protein synthesis. Frequent feasible physical training inhibits the development of pathological changes in the nervous system and internal organs. Systematic physical training has a strong healing effect on the musculoskeletal system and activates the entire endocrine system. With regular exercise, blood and venous pressure are normalized and lymph circulation is enhanced. Physical activity normalizes the processes of humoral regulation in all body systems. The most pronounced positive effect develops in the case of a combination of feasible exercises that stimulate different muscle regions. This leads to the activation of biosynthetic processes in all cells of the body. Regular dosed physical activity with optimal nutrition and sufficient sleep has a strong stimulating effect on physical capabilities and mental performance.

Keywords: Physical exercise, Muscle activity, Functional activity, Modern society

Introduction

In modern society, young people are increasingly experiencing a deficit in motor activity (Belan and Sadchikova, 2018). In this regard, to preserve the health of young people, their general muscle

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activity should be massively increased (Ren-Zhang, *et al.*, 2020; Algahtani, 2020; Bespalov *et al.*, 2018a; Alzaid *et al.*, 2020). The danger of physical inactivity is associated with the possibility of life shortening. This has been repeatedly confirmed under experimental conditions by the accelerated development in physically inactive animals of signs of early aging throughout the body with a significant increase in biological age (Larina *et al.*, 2019; Karpov *et al.*, 2020). In the case of long-term preservation at a low level of motor activity, energy processes in the heart are disrupted with a weakening of its contractile function, the manifestation of signs of stagnation in the liver and lungs, a decrease in the formation of hormones, the formation of dysfunctions in many nerve centers and a decrease in the general resistance of the body against all negative environmental factors (Amelina and Medvedev, 2009; Makhov and Medvedev, 2018b).

Systematic active muscular activity has a pronounced activating effect on the human body (Mal *et al.*, 2018b). It intensifies the assimilation of oxygen, activates the neutralization of toxic substances, and stimulates all types of metabolism (Medvedev, 2018a; Oshurkova and Medvedev, 2018a). In this regard, at all stages of ontogenesis, it is necessary to regularly perform physical exercises (Skoryatina and Medvedev, 2019), which provide a stable healing effect in all organ systems (Bespalov *et al.*, 2018b; Mal *et al.*, 2020).

To achieve the most pronounced recovery from regular physical activity, muscle load should be correctly dosed. It is imperative to take into account the initial level of fitness, the dynamics of the functional status of each young person, and changes in the general state of health against the background of stress. The purpose of this work was to assess the severity of the health-improving reactions of the human body to systematic dosed muscle loads.

Materials and Methods

The material for this work was the sources of information contained in the public domain. The search was carried out in the database of the scientific electronic library eLIBRARY.RU and the Scopus database. The research methods in this work were the methods of analysis and synthesis, induction and deduction, and the method of mathematical processing using standard statistical programs.

Results and Discussion

A low degree of fitness in conditions of refusal from systematic physical education leads to negative changes in metabolism (Boldov *et al.*, 2018). The resulting negative changes in fat metabolism are very functionally significant (Galkin *et al.*, 2010). For many people with physical inactivity, already at a young age, an increased level of cholesterol in the blood is characteristic. This is an important "risk factor" for the formation of cardiovascular pathology in them. In the context of continuing to maintain low physical activity, the risk of cardiac pathology increases significantly (Karpov *et al.*, 2018).

Systematic feasible muscular activity leads to activation of pulmonary ventilation, stimulation of the heart, increased blood supply to all organs with the satisfaction of the needs of cells in oxygen, and a pronounced intensification of the synthesis of proteins (Arova *et al.*, 2018; Glagoleva and Medvedev, 2020).

An essential indicator of the optimization of metabolism in all organs against the background of physical training is the normalization of body weight. Elimination of excess mass occurs primarily by reducing the volume of adipose tissue in the body. This ensures the growth of working capacity and general improvement of the whole organism (Komyak, 2015).

Against the background of regular physical training, the oxygen demand of the whole body increases sharply. In this regard, the more actively all groups of skeletal muscles work, the more efficiently and more economically the heart muscle functions (Oshurkova and Medvedev, 2018b). Its activity increases as the level of general fitness increases. In athletes, the systole of the heart has a high power, which ensures the ejection of a large volume of blood into the aorta with each heartbeat. At the same time, a trained heart under conditions of significant physical exertion slightly increases its rhythm and quickly restores it after any work (Makhov and Medvedev, 2018d).

Systematic feasible muscular loads prevent the occurrence of cardiovascular diseases. They increase the level of high-density lipoprotein cholesterol in the blood and lower the level of low-density lipoprotein cholesterol and the number of triglycerides (Selkov, 2019). This situation significantly increases the elasticity of blood vessels and reduces the risk of atherosclerosis progression and the appearance of its clinical manifestations in the future (Medvedev, 2018b; Glamazdin *et al.*, 2021). These effects are an effective basis for the prevention of cardiovascular disorders, contributing to the prolongation of human life (Makhov and Medvedev, 2020b).

An extreme physiologically significant consequence of regular physical exertion on the body at a young age is the optimization of the entire vascular system (Georgievna *et al.*, 2020). Under these conditions, the functioning of the circulatory system is greatly facilitated and economized. Systematic physical activity leads to the growth of new vessels in the skeletal and cardiac muscle tissue, stimulating their blood supply (Makhov and Medvedev, 2018c). The weakening of blood coagulation and platelet aggregation occurring under these conditions additionally facilitates blood circulation throughout the body (Zaitsev *et al.*, 2018).

Under conditions of regular muscular exertion, arterial and venous blood flow is normalized, and lymph flow is intensified (Medvedev, 2018c). For this reason, an increase in motor activity, which increases the level of physical fitness, is a very effective means of preventing many types of pathology (Pham and Tran, 2019). This is because systematic physical activity significantly inhibits atrophy in all parts of the body. Muscle loads are very effective in this regard, enhancing aerobic processes under conditions of muscular work and activating the synthesis of adenosine triphosphate (Stepanova *et al.*, 2018).

Intense muscular activity has a strikingly positive effect on the functioning of the entire nervous system (Mal *et al.*, 2018a; Makhov and Medvedev, 2020a). Under these conditions, the functional activity of the nerve centers increases significantly, and disturbances in the implementation of any movements are minimized. Positive changes also occur in the general emotional background of the trainees. Their state of health, sleep, and mood normalize, the feeling of fatigue is eliminated, the ability for mental activity increases (Zhukova, 2010; Vatnikov *et al.*, 2019).

Exercise has a serious stimulating effect on the respiratory organs. Against their background, the vital capacity of the lungs rapidly increases, the elasticity of the costal cartilage increases, the respiratory muscles are strengthened and their tone is optimized (Makhov and Medvedev, 2020b). Under these conditions, swimming, running, skiing to a comparable degree increase the overall efficiency of gas exchange in the lungs (Makhov and Medvedev, 2018a).

Intense physical activity, especially at a young age, provides a stimulating effect on the digestive capacity of the stomach and intestines. Regular, feasible physical activity stimulates the digestive glands and increases the absorption of nutrients. As a result of physical training, the peristalsis of the entire gastrointestinal tract increases, due to the strengthening of its smooth muscles, as well as due to hypertrophy of the muscles of the anterior abdominal wall (Vorobyeva and Medvedev, 2018). In these conditions, the risk of constipation is excluded.

Regular feasible muscular activity stimulates the work of the organs of the excretory system (Vorobyeva and Medvedev, 2019). It enhances blood supply, anabolic, and reparative processes in them. In this regard, it can be considered that physical activity facilitates the removal of various toxins from the body. In addition, under conditions of intense physical activity, the intensifying work of the endocrine system optimizes the processes of humoral regulation of all organs (Nesreen and Heba, 2019).

Regular muscle training increases joint mobility, strengthens bone tissue, delays the development of osteoporosis, prevents the occurrence of fractures, and also eliminates social loneliness by including an athlete in the company of like-minded people (Medvedev, 2018d; Misyuk *et al.*, 2019).

Conclusion

Systematic muscle training has a powerful stimulating effect on the body. Against their background, oxygen consumption increases and the neutralization of toxic substances intensifies, all types of metabolism and the synthesis of adenosine triphosphoric acid are activated. Frequent feasible physical training, especially at a young age, has a complex stimulating effect on all body systems. With their help, it is possible to slow down any developed pathology in the internal organs. Systematic physical education has a vivid normalizing effect on the work of the heart, central nervous system, and endocrine glands. As a result of regular muscle exercise, blood pressure, microcirculation, and lymph circulation are optimized. Muscle loads normalize all regulatory processes in the body. This is most clearly manifested in the case of a rational combination of different exercise options. When performing physical activity, special attention should be paid to strict adherence to the norms of a balanced diet, sufficient duration of sleep, and a competent alternation of physical activity and rest. This will help maintain general physical activity and the health of all organ systems for many years.

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References

- Algahtani, F. D. (2020). Healthy Lifestyle among Ha'il University Students, Saudi Arabia. *International Journal of Pharmaceutical Research and Allied Sciences*, 9(1), 160-7.
- Alzaid, A., Alosaimi, M., Alkahtani, K. F., Alshehri, B. A., Asiri, A. E., Asiri, A. M., Althibait, S. A. S., Aldrees, W. S., Althwaiqub, A. K., Almakhayitah, O. A., & Almarzooq, M.J. (2020). Saudi Parents' Knowledge, Attitudes, and Practices Regarding Antibiotic use for Upper Respiratory Tract Infections in Children. *International Journal of Pharmaceutical Research & Allied Sciences*, 9(1), 115-20.
- Amelina, I. V., & Medvedev, I. N. (2009). Transcriptional activity of chromosome nucleolar organizing regions in population of Kursk region. *Bulletin of Experimental Biology and Medicine*, 147(6), 730-732.
- Arova, A. A., Kramar, L. V., Nevinsky, A. B., & Larina, T. Yu. (2018). Diagnosis, etiologic and pathogenetic treatment of acute respiratory viral infections in children. *Medicinal Bulletin*, 12(4 (72)), 48-56.
- Belan, E. B., & Sadchikova, T. L. (2018). Acute respiratory viral infections: a current look at the problem and a modern approach to treatment. *Russian Medical Journal. Medical Review*, 2(11), 60-64.
- Bespalov, D. V., Medvedev, I. N., Mal, G. S., & Makurina, O. N. (2018b). Functional activity of the vascular endothelium in patients with initial signs of atherosclerosis against the background of regularly dose-related exercise stress. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(2), 1020-1024.
- Bespalov, D. V., Medvedev, I. N., Mal, G. S., & Polyakova, O. V. (2018a). Physiological Capabilities of the Vascular Endothelium with the Developing Arterial Hypertension in People of Different Ages Who Had Long Had Low Physical Activity. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(2), 972-976.
- Boldov, A., Karpov, V., & Gusev, A. (2018). Study on the level of physical development and physical fitness in students of university of psychology and education. 34th International Scientific Conference on Economic and Social Development / 18th International Social Congress (ISC). Moscow, RUSSIA. International Scientific Conference on Economic and Social Development, 354-366.
- Galkin, V. A., Galkin, V. A., & Galkin, V. A. (2010). Influenza and acute respiratory viral infections. A role of a polyclinic therapist in timely diagnosis and treatment. *Therapeutic archive*, (1), 5-7.
- Georgievna, P. O., Andreevna, K. M., Tokhiriyon, B., Aleksandrovna, D. L., & Mikhaylovich, P. V. (2020). The Effectiveness and Functional Properties of the Plant-Based Dietary Supplement in Complex Respiratory System Diseases Therapy. *International Journal of Pharmaceutical Research & Allied Sciences*, 9(3), 66-70.
- Glagoleva, T. I., & Medvedev, I. N. (2020). Physiological features of aggregation of the main formed elements of blood in calves at the beginning of early ontogenesis 00161. Published online: 28 February 2020. DOI: <https://doi.org/10.1051/bioconf/20201700161>
- Glamazdin, I. G., Medvedev, I. N., Syssoeva, N. Y., Goryacheva, M. M., Kryukovskaya, G. M., & Maryushina, T. O. (2021). The Severity of Changes in the Levels of Formed Elements in the Blood of Pigs with Different Types of Higher Activity in the Conditions of their Use of Eleovite. *Bioscience Biotechnology Research Communications*, 14(1), 161-171.
- Karpov, V. Yu., Medvedev, I. N., Dorontsev, A. V., Svetlichkina, A. A., & Boldov, A. S. (2020). The State of Cardiac Activity in Greco-Roman Wrestlers on the Background of Different Options for Weight Loss. *Bioscience Biotechnology Research Communications*, 13(4), 1842-1846.
- Karpov, V. Yu., Pilosyan, N. A., Stepanova, O. N., & Bakulina, E. D. (2018). Physical rehabilitation of preschoolers with cerebral paralysis by means of hippotherapy. International Conference on Research Paradigms Transformation in Social Sciences. Tomsk Polytechnic Univ, Tomsk, RUSSIA. *European Proceedings of Social and Behavioural Sciences*, 35, 529-535.
- Komyak, Ya. F. (2015) Acute respiratory viral infections in children. *The World of Medicine*, (1), 12-14.
- Larina, V. N., Zakharova, M. I., Benevskaya, V. F., Golovko, M. G., & Soloviev, S. S. (2019). Acute respiratory viral infections and influenza: etiology, diagnosis and treatment algorithm. *RMJ. Medical Review*, 9, 18-23.
- Makhov, A. S., & Medvedev, I. N. (2018a). Functional Mechanisms to Ensure the Reactivity of the

- Organism. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 924-929.
- Makhov, A. S., & Medvedev, I. N. (2018b). Physiological Basis of Maintaining the Body's Reactivity. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 825-830.
- Makhov, A. S., & Medvedev, I. N. (2018c). The Effect of Physical Activity on Neurophysiological Processes in Students. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*. 9(6), 968-972.
- Makhov, A. S., & Medvedev, I. N. (2018d). The Physiological Reaction of the Body of Adolescents to the Classroom. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 947-951.
- Makhov, A. S., & Medvedev, I. N. (2020a). Physiological and morphological peculiarities of children with Down's syndrome: A brief review. *Bali Medical Journal*, 9(1), 51-54. DOI:10.15562/bmj.v9i1.1099
- Makhov, A. S., & Medvedev, I. N. (2020b). Parent's motivations on sports participation of their children with Down's syndrome in Russia. *Bali Medical Journal*, 9(1), 47-50. DOI:10.15562/bmj.v9i1.1111
- Mal, G. S., Kharitonov, E. L., Vorobyeva, N. V., Makhova, A. V., & Medvedev, I. N. (2018a). Functional Aspects of Body Resistance. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 60-65.
- Mal, G. S., Medvedev, I. N., & Makurina, O. N. (2020). The Prevalence of Extreme Severity of Autoaggression Among Residents of Russia. *Bioscience Biotechnology Research Communications*, 13(4), 2125-2129.
- Mal, G. S., Vorobyeva, N. V., Makhova, A. V., Medvedev, I. N., & Fayzullina, I. I. (2018b). Features of Physical Rehabilitation after Myocardial Infarction. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 280-285.
- Medvedev, I. N. (2018a). Functional Features of Intravascular Platelet Activity in Adolescents with High Normal Blood Pressure, Overweight or a Combination of Them Against the Background of Regular Physical Exertion. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 1258-1265.
- Medvedev, I. N. (2018b). Physiological Response of Intravascular Platelet Activity in Boys with High Normal Blood Pressure to Regular Physical Exercise. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 1244-1250.
- Medvedev, I. N. (2018c). The Physiological Properties of Platelets in People 18-35 Years Old, Trained in the Section of General Physical Training. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 1277-1283.
- Medvedev, I. N. (2018d). Dynamics of Functional Parameters of Platelet Hemostasis in Young People with Hemodynamic and Metabolic Disorders on the Background of Regular Physical Activity. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*. 9(6), 1217-1222.
- Misyuk, L. F., Yakubova, L.V., & Kashuy, A.V. (2019). Actual issues of prevention and treatment of acute respiratory viral infections and influenza on an outpatient basis. *Medical Business: Scientific and Practical Therapeutic Journal*, 3(67), 32-37.
- Nesreen, G.El-N., & Heba, A. A. (2019). Respiratory training efficacy on quality of life and functional capacity in patients with Leukemia. *Journal of Advanced Pharmacy education and research*, 9(2), 46-52.
- Oshurkova, Ju. L., & Medvedev, I. N. (2018a). Functional Features of Platelets in Newborn Calves Ayrshire Breed. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 313-318.
- Oshurkova, Ju. L., & Medvedev, I. N. (2018b). Physiological Indicators of Platelets in Ayrshire Calves During the Dairy Feeding Phase. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 171-176.
- Pham, T. T. K., & Tran, D. T. (2019). Respiratory Distress Associated with Dengue Hemorrhagic Fever on Paediatric Patients: Learning from a Provincial Hospital in Southern Vietnam. *Archives of Pharmacy Practice*, 10(3), 92-98.
- Ren-Zhang, L., Chee-Lan, L., & Hui-Yin, Y. (2020). The awareness and perception on Antimicrobial Stewardship among healthcare professionals in a tertiary teaching hospital Malaysia. *Archives of Pharmacy Practice*, 11(2), 50-59.
- Selkov, S. A. (2019). Flu and acute respiratory viral infections. *Infection and immunity*, 9(1), 216.
- Skoryatina, I. A., & Medvedev, I. N. (2019). Correction of aggregation level of basic regulation blood elements in patients with hypertension and dyslipidemia receiving rosuvastatin and non-medicinal treatment. *Bali Medical Journal*, 8(1), 194-200.
- Stepanova, O. N., Stepanova, D. P., Pirogova, A.A., & Karpov, V. Yu. (2018). Women's weight lifting as sport discriminated against on grounds of gender. International Conference on Research Paradigms Transformation in Social Sciences. Tomsk Polytechn Univ, Tomsk, RUSSIA. *European Proceedings of Social and Behavioural Sciences*, 35, 1325-1332.
- Vatnikov, Yu., Rudenko, A., Rudenko, P., Kulikov, Ev., Karamyan, A., Lutsay, V., Medvedev, I., Byakhova, V., Krotova, E., & Molvhanova, M. (2019). Immuneinflammatory concept of the pathogenesis of chronic heart failure in dogs with dilated cardiomyopathy. *Veterinary World*, 12(9), 1491-1498.
- Vorobyeva, N. V., & Medvedev, I. N. (2018). Physiological Features of Platelet Functioning In Calves of Holstein Breed During The Newborn. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 129-135.
- Vorobyeva, N. V., & Medvedev, I. N. (2019). Functional activity of platelets in newborn calves of black-marked breed. *Bulgarian Journal of Agricultural Science*, 25(3): 570-574
- Zaitsev, A. A., Akimkin, V. G., Tutelyan, A. V., & Maryin, G. G. (2018). Actual issues of epidemiology, pharmacotherapy, and prevention of acute respiratory viral infections. *Russian medical journal. Medical Review*, 2(11), 53-57.
- Zhukova, L. (2010). Differential diagnosis, treatment, and prevention of acute respiratory viral infections. *Doctor*, 10, 2-6.