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The Influence of Regular Physical Activity on the Functional Parameters of the Youthful Organism

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Abstract

To find out the effect of systematic training in adaptive football on the motor abilities of students with congenital hearing loss. 24 nineteen-year-old male students with congenital hearing loss were observed. They were divided into a main group of 12 students who started training in adaptive football, and a control group of 12 young men who had physical activity only in the process of university physical education. Standard functional tests were used and traditional standards were recorded. The obtained data were processed by Student's criterion (t) and correlation analysis. Systematic training in the framework of adaptive football among young men with hearing loss increased their coordination properties, motor characteristics, and body stability in space. Those who go in for adaptive football increased their level of strength capabilities and increased endurance. Systematic training in adaptive football significantly increased the accuracy of sports and domestic movements and stimulated internal organs. These results were achieved by enhancing the basic functional and metabolic parameters of the trainees' organisms. Training in adaptive football increases the motor capabilities and the effectiveness of neural control over the muscles in young men with congenital hearing loss studying at the university.

Keywords: Boys, Hearing loss, Adaptive football, Exercise, Muscle activity, Health

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Introduction

Modern science recognizes that regular feasible muscular loads improve the morphological and functional status of the body of any healthy person with signs of pathology (Skripleva *et al*., 2018; Vorobyeva *et al*., 2018a). The onset of a healing effect occurs only if the work of the muscular apparatus is enhanced due to the stimulation of biosynthetic and nervous processes (Kachenkova *et al.*, 2020; Zavalishina, 2020b). This result is of particular importance for modern society in the course of systematic health improvement of student youth with somatic pathology (Komarov *et al*., 2019). An increase in her general physical activity during adaptive sports training leads to an improvement in the functioning of their internal organs, especially the heart and lungs (Pavlov & Kuznetsova, 1998; Kotova *et al*., 2017). Therefore, it is necessary to continue the search for effective approaches to improving the health of young people, especially students, by increasing their physical activity (Apanasenko & Popova, 2000; Zavalishina *et al*., 2020a). The planned implementation of this approach can lead to the physical strengthening of young people with somatic pathology and their involvement in the labor process (Mal *et al*., 2018).

It is clear that the systematic manifestations of physical activity, especially of the lower extremities, significantly increase the general adaptive characteristics of a person suffering from pathology. In this regard, the results of adaptive football training with young men suffering from congenital health disorders and especially hearing loss are very interesting for modern coaches (Vorobyeva *et al*., 2018b). For this category, starting to play sports, low physical development, low working capacity, and rather weak socialization are characteristics. It was found that muscle activity during football training, including adaptive training, can increase the overall physical capabilities of this category of trainees (Bespalov *et al*., 2018). It is very important for increasing the effectiveness of training in adaptive football the assessment of changes in the physical development of young men

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who have impairments in the auditory analyzer and have started training in adaptive football.

Purpose: to find out the effect of systematic training in adaptive football on the motor abilities of students with congenital hearing loss.

Materials and Methods

To perform the work, 24 nineteen-year-old male students with confirmed congenital hearing loss of I-II degree were taken under supervision. Two groups of surveyed students were formed among them. The main group included 12 students who started regular training in adaptive football. The control group consisted of 12 students who experienced muscle loads only at university classes devoted to physical culture. The indicators were assessed initially and after six months of observation.

In the course of the study, standard functional tests were used and the results obtained were assessed according to several control standards in the observed students. The following indicators were recorded in the work: the duration of a run for a distance of 30 m, the duration of a run for a distance of 60 m, the length of a long jump, the duration of a 4x9 shuttle run, the number of jumps on a rope for a period of 25 s, the length of a distance that can be run in 6 minutes, the number performed pull-ups, the values of torso flexion from a lying position for 1 minute.

Statistical processing in this study was performed using the StatSoft, Inc. program. USA, by calculating the values of the Student's t-test (t) and Pearson's correlation coefficient.

Results and Discussion

When performing this study, the dynamics of their indicators were traced among young male students **(Table 1)**. The initial state of the speed-strength parameters recorded in the thirty-meter run test (6.1±0.09 s), in the sixty-meter run test (10.5±0.49 s), during the registration of the jump length (1.55 ± 0.29 m) was small. When included in the study, the endurance of the examined was low. This was indicated by the small distance that the examined could run within six minutes. The low initial physical abilities were also evidenced by the small number of pull-ups performed on the crossbar, which they were capable of. The results of their participation in the shuttle run and the small number of jumps they made with the help of a rope indicated the small coordination capabilities of those observed in the outcome. At the first examination, all the observed had a rapid onset of fatigue, accompanied by a mass of errors in motor actions, a decrease in attention, and inhibition of sports movements. Evaluating the results obtained, it was clear that initially, all male students with hearing loss had poor physical development.

Table 1. Dynamics of motor abilities

Parameters	Observation, M±m, n=24	Upon completion of observation, M ± m	
		Main group, n = 12	Control group, n = 12
Duration of running at a distance of 30m, s	6.1±0.09	4.4±0.14 p<0.01	6.20±0.14
Duration of running at a distance of 60m, s	10.5±0.49	8.0±0.71 p<0.01	10.6±0.74
Long jump length, m	1.55±0.29	2.02±0.19 p<0.01	1.60±0.25
Duration of shuttle run 4x9, s	11.4±0.92	8.2±1.22 p<0.01	10.9±0.99
The number of jumps on the rope for 25 seconds, repetitions	24.1±3.14	39.1±2.10 p<0.01	26.1±1.78
Distance length for 6 minutes of running, m	970.3±27.9	1152.1±34.5 p<0.05	975.8±28.4
Pull-ups on crossbar, once	5.1±0.41	8.8±0.54 p<0,01	5.4±0.29
Performing body lifts from a lying position per minute, times	23.3±1.26	37.0±1.34 p<0.01	26.2±0.94

Legend: p – is the reliability of the dynamics of parameters during the entire study.

At the end of the observation, there were no significant changes in the recorded characteristics in the control group. The surveyed students who formed the main group, at the end of adaptive football lessons, found an increase in their physical capabilities **(Table 1)**. This was evidenced by the dynamics of their physical capabilities (decrease in the time spent running for several short distances; increase in the distance of the jump), increase in the level of strength (increase in the number of pull-ups and body lifts from a horizontal position), optimization of coordination (fast shuttle run, a large number of jumps on a skipping rope in 25 seconds) and stimulation of endurance (greater distance covered by running in 6 minutes).

After six months of regular training in the main group during physical activity, the manifestations of fatigue weakened. This

was judged by the dynamics of sensations and a decrease in the value of the pulse under load at the end of the study. In the control, this indicator was unchanged during the entire observation period. During the training in adaptive football among the boys of the main group, the most difficult movements in mastering were movements with a high speed of implementation and a rapid change in the vector of movement, jogging from a place with a quick stop, a combination of running and dribbling with a transition to walking with a changing direction of movement.

Acceleration of mastering the skills of rational leg movements occurred in the course of frequent repetition of motor actions by the trainees. The boys included in the main group, after 6 months of training in the football section, increased locomotor stability, reduced the number of irrational movements during active movements, and developed the ability to long-term deep breathing.

A very important aspect in the development of motor actions in football is the correlation between the duration of the shuttle run and the time of running the thirty-meter run ($r=0.681$; $p<0.056$) found at the end of the work. Improvement in jumping results using the standard rope correlated among the observed football players by the end of the study with the distance of the jump on the plane ($r=0.517$; $p<0.052$). The revealed acceleration of running at different distances was also correlated with the value of the distance of a jump from a place without a run ($r=0.610$; $p<0.51$).

Physical activity has long been considered to be a strong stimulant for all body tissues (Shilenok, 1997; Zavalishina, 2021). By increasing the work of striated muscles, lower extremities, and torso during football training, the body activates metabolism, hemodynamics in all organs, and protein synthesis processes. In regularly working muscles, capillaries open to allow blood cells to pass through (Fayzullina *et al.*, 2020). With an increase in muscle activity, a larger amount of oxygen comes to the skeletal muscles and more substances that have plastic and energy significance. Under these conditions, skeletal muscles significantly activate the synthesis of various proteins and generate more adenosine triphosphate (Vorobyeva *et al*., 2020). This increases their size and enhances their strength characteristics (Karpov *et al*., 2020).

It is known that feasible physical activity, which is not excessive for the body, enhances all processes in it (Zavalishina, 2020c). This has previously been found in a young human body and a mature human body without obvious pathology (Zavalishina *et al*., 2018). There were no significant gender differences in body responses to adequate physical activity (Vorobyeva *et al*., 2018c).

Of particular interest have always been studies on the effect of physical activity on a sick organism, including those with impaired functions of analyzers. In these studies, regular moderately dosed muscle activity was considered an effective approach to health improvement or a component of ongoing treatment (Tkacheva & Zavalishina, 2019). However, with the existing somatic pathology, it is not possible in all cases to improve the patient's condition by using only physical training. They can rightly be considered a significant element of general strengthening procedures, often as part of often different complexes aimed at eliminating the pathology of somatically different.

Increasing muscle activity is recognized as having more opportunities in terms of health improvement when one analyzer malfunctions. At the same time, the effect of physical training on the level of physical development in hearing loss remains not completely clear. The effect of regular football training in the presence of hearing loss has not yet been fully elucidated. Their health-improving potential for hearing loss in adolescence has not been definitively established. The serious need for these studies is because hearing loss can impair socialization, lower the quality of life and significantly reduce a person's ability to work.

Recently, disruptions in the work of analyzers are increasingly common among young people, which leads to the impossibility of fully realizing their labor potential inherent in nature, often contributing to the appearance of disability. For this reason, a further search for types of physical stimulation of a young organism with hearing loss is very relevant today. Regular football training can be considered an effective way of influencing the body which can help in this case. Their potential for hearing loss is still undervalued due to testing in a few studies.

Previously used for many disorders in the body, physical activity has always had a strictly therapeutic orientation. Most often these were different types of athletics. They showed a therapeutic effect on a sick human body, but their ability to increase the physical fitness of the deaf was unclear. At the same time, one could unambiguously think that an increase in physical activity stimulates an increase in the volume of skeletal muscles.

Applying physical activity, in our study, it was not possible to influence the severity of hearing loss. In addition, the preventive possibilities of increasing muscle activity in young people in terms of reducing the risk of developing hearing pathology and aggravating existing hearing loss also remain highly controversial. At the same time, the possibility of physical stimulation of hearing-impaired youths with the help of football training was unequivocally clear. Given these circumstances, the study, on the one hand, closed the existing gaps in scientific knowledge, and, on the other hand, confirmed the already known information.

The results of the observation testified to the serious health-improving manifestations of systematic football training in people of adolescence with hearing loss. The results obtained in the study suggest that regular football can normalize heart parameters and increase physical capabilities.

The information found in the course of this study unequivocally indicates a serious health-improving potential of playing football in people adolescence with hearing loss. Significantly more functionally beneficial changes found at the end of the observation in the group of trainees were determined by more pronounced stimulation of the muscles of the leg of the trunk in the young men of this group during their football activities. Considering the obtained results, it becomes clear that frequent

football loads should be considered an effective means of general somatic strengthening of young men, not only healthy but also those with severe hearing loss.

The authors believe that, despite some difficulty in coming into contact with young people, it is quite possible to involve them in regular football training in an organized way. Moreover, such regular training enhances the functioning of their muscular system, circulatory system, and respiratory system. In this regard, it is clear that significant muscle activity during regular football training increases the overall adaptive capacity of vital organs. An essential mechanism for increasing the physical capabilities of the body of young men and its cardiovascular system due to the growth of regular physical activity (Zavalishina & Makhov, 2019; Karpov *et al*., 2019a). This creates conditions for increasing its capabilities concerning the oxygen supply of all formations in the body (Zavalishina *et al.*, 2019). At the same time, in conditions of an increase in general physical activity due to football training in young men with hearing loss, the degree of myocardial development increases with biologically favorable inhibition of hemostasis, which ensures optimal hemocirculation in tissues (Evgrafov & Kuznetsov, 2010).

An increase in locomotor stability in people included in the main group after six months of training is associated with successful adaptation to physical stress in trainees of their entire muscular system (Karpov *et al*., 2019b). The increase in the degree of stability of the subjects in the process of running along a changing trajectory during six-month training in adaptive football was also provided during the implementation of sports activities due to the development of an increase in the fitness of their vestibular system (Zavalishina *et al*., 2021e; Zavalishina *et al*., 2021f).

Taking into account the information known from the scientific literature and the data of our research, it is legitimate to assume that in the case of regular physical activity during football training, the development of skeletal muscles increases and the mobility of the main joints increases (Mal *et al*., 2021). Systematic football training leads to an increase in biosynthetic processes in various cells, optimizing the state of all parts of the body (Skoryatina *et al*., 2017). Physical activity during football loads brings into line the processes of excitation and inhibition in the cerebral cortex, the subcortex, in the autonomic nervous system, strengthening the body and preventing the appearance of many types of pathology (Mal *et al*., 2019; Makurina *et al*., 2022).

Conclusion

The possibility of significant improvement in conditions of a dosed muscle load is well known. Football training can be considered very effective in terms of recovery, and stimulating physical fitness among trainees. At the end of six months of adaptive football training, the students with congenital hearing loss significantly increased their strength capabilities, increased speed parameters, improved coordination of movements, and increased overall endurance. The presence of physical activity only during physical education classes at the place of study was not accompanied by changes in the recorded indicators. Regular adaptive football classes effectively stimulate movement and increase the overall physical performance of young men with congenital hearing loss during their university studies.

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