

**Biomedical Communication**

# Effects of Regular Jogging on Functional Capabilities of the Cardiovascular System in Students

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## ABSTRACT

Physiological alternation of work and rest, systematic physical training, a balanced diet are necessary to maintain the health of the body and especially its cardiovascular system. Prolonged abstinence from regular physical activity causes a pronounced weakening of health and leads to the development of pathology of the heart and blood vessels. This study examined 48 boys. Of these, two observation groups were collected. The experimental group consisted of 25 young men with vegetative-vascular dystonia of the hypertensive type. The second observation group was the control group. It consisted of 23 healthy youths. Initially, both observation groups had a comparable low level of physical fitness. In the course of the study, the same physical activity was used in both observation groups for three months in the form of athletics jogging for 5 days a week for half an hour a day. Methods for assessing physical condition and methods of statistical processing were used. Systematic athletics jogging in young people with disorders of the cardiovascular system leads to an optimization of the heart rate and a stable optimization of the blood pressure level. At the same time, their complete normalization was possible after 3 months of jogging. As a result of regular jogging, the surveyed experienced an increase in the volume of the vital capacity of their lungs. Against this background, there was an increase in the general level of physical fitness, speed-strength characteristics and general endurance. It can be considered that regular jogging is a very effective means of health improvement in adolescence in conditions of beginning functional disorders of the cardiovascular system.

**KEY WORDS:** ADOLESCENCE, ATHLETICS, CARDIOVASCULAR SYSTEM, HEALTH IMPROVEMENT, PHYSICAL ACTIVITY.

## INTRODUCTION

The way of life of a person in modern society is very different from the way of life of all previous generations. Previously, human life and work were associated with great muscular efforts of the entire human community. Currently, the situation has changed and the lack of muscle activity is growing (Fayzullina et al. 2020; Karpov et al. 2020). This situation has a very detrimental effect on the entire organism of our contemporaries. Currently, a massive deficit of physical activity is becoming evident in society for about 80-90% of the working-age population. This position

of the lice weakens the adaptive capabilities, primarily of the cardiovascular system (Kotova et al. 2017; Makurina et al. 2020). In many economically developed countries, this is accompanied by the appearance of an asthenic state in a large part of the population, which ultimately leads to the appearance of diseases of the cardiovascular system (Skoryatina and Zavalishina 2017; Karpov et al. 2021a).

Low physical activity detrains the heart and blood vessels, leading to the development of their dysfunctions at a young age. The situation is further aggravated by the fact that most of the population lives in cities, sometimes with a difficult environmental situation, which further weakens the human body (Vorobyeva et al. 2018; Vorobyeva et al. 2020). There is an opinion that in order to level this difficult situation, it is necessary to consistently apply recreational running, which,

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being an aerobic load, strengthens the entire human body. It is recognized that with regular jogging, you can achieve greater productivity of physical and mental work and greater resistance to fatigue (Zavalishina et al. 2021a).

A very effective option for jogging is regular jogging in a free mode, which has previously shown its great potential for optimizing the work of individual internal organs. Another serious advantage is the absence of any material costs when using them (Zavalishina 2018a). The health-improving effect of jogging is associated with an increase in its background, the stimulation of the muscles of the lower extremities, which stimulates the return of venous blood to the heart in a strictly aerobic mode (Zavalishina 2018b; Zavalishina et al. 2021b). It is possible to engage in regular jogging not only at home, but also in the conditions of a sanatorium or resort stay, complementing any types of treatment (Lantsberg 1988; Karpov et al. 2021b).

The most rational way to strengthen the muscles of the heart is to run with a gradual increase in distance and speed, shortening and shortening the periods of stopping or moving in steps (Zavalishina 2018c). Serious health-improving potential of running is also associated with a clear positive effect on the conjugation of the work of the heart, blood vessels and the nervous system (Zavalishina 2018d; Zavalishina 2018e). In view of the strong health-improving effect of jogging, it seemed important to assess their influence on the functional parameters of the cardiovascular system in young men with emerging dysfunction in its work (Karpov et al. 2021c). The aim of the study is to determine the level of effectiveness of regular athletics jogging in relation to the improvement of the cardiovascular system in adolescence.

## MATERIAL AND METHODS

The study was approved by the local ethics committee of the Russian State Social University on September 15, 2017 (Protocol No. 9). 48 people of adolescence who are university students were examined. Of these, two observation groups were collected, on which the entire study was carried out. The experimental group consisted of 25 young men ( $18.7 \pm 1.2$  years) with a diagnosis of hypertensive vegetative-vascular dystonia confirmed by doctors. These examinees had a burdened heredity of hypertension - both or one of their parents had a diagnosis of hypertension. The second observation group was called the control group.

It consisted of 23 healthy boys ( $19.0 \pm 1.0$  years). This group of surveyed did not have a hereditary burden of cardiovascular diseases. Initially, both observation groups had a comparable low level of physical fitness. All of them experienced regular, but very moderate physical activity during academic physical education classes at the university. During the study, both observation groups used the same physical activity in the form of athletics jogging. Jogging sessions were carried out at a free pace for 5 days a week for half an hour a day on a horizontal plane or on a surface with an upward or downward slope of no more than  $15^\circ$ . The study was carried out during the warm season.

The general condition of the subjects who formed both observation groups was assessed daily. The registration of the indicators taken into account was carried out using traditional methods twice - when included in the observation groups and after 3 months of jogging, that is, at the end of the study. In all cases, the value of the vital capacity of the lungs, the value of the pulse, and the level of blood pressure were recorded (Skoryatina and Zavalishina 2017; Makurina et al. 2020). In the subjects of both observation groups, the state of physical capabilities was determined using a number of dosed physical loads. We took into account the results of a 12-minute run test (called the Cooper test), the results of a run at a distance of 20 meters, the results of a test for flexion and extension of the arms while staying in an emphasis on a bench for 10 seconds and the result of a test for throwing a ball weighing 1 kg from vertical position. Statistical processing of the results found during the study was carried out by the Student's t-test.

## RESULTS AND DISCUSSION

The observed young men, who made up both study groups, in the course of regular jogging, demonstrated an improvement in their general well-being. In all cases, their feeling of fatigue decreased by the end of the day, headaches stopped, emotional instability subsided, and sleep normalized. Frequent episodes of destabilization of the blood pressure level in the form of its increase, which initially existed in all representatives of the experimental group, ceased to arise by the end of the study. In both groups, by the end of the observation, a feeling of cheerfulness and high performance throughout the day became habitual. The results obtained during the study are presented in Table 1.

Systematic physical activity in the form of jogging in both groups of young men led to the normalization of their pulse values. During the observation period, this indicator for the representatives of the control group decreased by 10.9%, and for the young men of the experimental group by 40.7%. The level of systolic blood pressure decreased in boys of the control group by 2.6%, in representatives of the experimental group by 15.1%. The value of diastolic blood pressure also decreased in both groups by 3.4% and 19.6%, respectively. The obtained dynamics of these indicators indicates the elimination of the phenomena of vegetative-vascular dystonia in the young men of the experimental group as a result of regular three-month runs. Systematic jogging for three months led to an increase in the volume of vital lung capacity in young men. In the control group, this indicator increased by 25.7%, in the experimental group, it increased by 34.9%. At the same time, an increase in the degree of physical fitness was noted in all those observed.

In both groups of young men, speed-power characteristics significantly increased, and endurance increased. In the control group, there was an acceleration of running at a distance of 20 m by 32.3%, the number of flexions and extensions of arms in a position with an emphasis lying during 10 seconds increased by 54.2%, the distance at which it was possible to throw the ball weighing 1 kg from an upright position increased by 39.7%, the value of the

Cooper's test result increased by 43.8%. The indicators of the physical capabilities of the young men in the experimental group improved more significantly and by the end of the observation they tended to be higher than in the control group. For young men in the experimental group, the

acceleration of running at a distance of 20 m was 43.7%, the number of flexions and extensions of the arms in a prone position for 10 seconds increased by 52.9%, the distance of throwing the ball from a vertical position increased by 34, 3% with an increase in the Cooper test by 44.4%.

**Table 1. The results of the observation in both study groups**

Indicators of physical condition	At the start of the study, M±m		At the end of the study, M±m	
	Control group, n=23	Experimental group, n=25	Control group, n=23	Experimental group, n=25
Pulse rate, beats / minute	80.1±0.28	88.9±0.22 p<0.05	66.3±0.32 p <sub>1</sub> <0.001	63.2±0.29 p <sub>1</sub> <0.001
The value of systolic blood pressure, mm Hg.	125.6±0.86	138.1±0.60 p<0.05	128.4±0.76	120.0±0.94 p <sub>1</sub> <0.05
Diastolic blood pressure, mm Hg	83.0±0.32	92.6±0.78 p<0.05	80.2±0.43	77.4±0.34 p <sub>1</sub> <0.05
Lung vital capacity, l	2.88±0.24	2.81±0.19	3.62±0.17 p <sub>1</sub> <0.001	3.79±0.14 p <sub>1</sub> <0.01
Running time for a distance of 20 m, s	4.5±0.05	4.6±0.07	3.4±0.06 p <sub>1</sub> <0.001	3.0±0.09 p <sub>1</sub> <0.01
The number of flexions and extensions of the arms in the lying position for 10 s, the number of times	4.8±0.39	5.7±0.36	7.4±0.27 p <sub>1</sub> <0.001	7.8±0.37 p <sub>1</sub> <0.001
Distance of throwing a ball weighing 1 kg from a vertical position, cm	342.7±1.75	344.4±2.16	458.1±1.92	462.6±2.16
Cooper's test value, m	1360.1±2.62	1372.2±2.46	1956.7±3.02	1981.0±21.1

Legend: p - reliability of the initial differences between the indicators of both observation groups; p<sub>1</sub>-reliability of differences in the dynamics of observation.

The results obtained indicated a clear healing effect of regular jogging in a free mode in adolescents suffering from vegetative-vascular dystonia. Such training successfully normalizes the functioning of the heart, vascular tone, and increases the level of physical fitness (Zavalishina 2018g). Despite the presence of initial dysfunction in the experimental group, by the end of the observation, a slightly more preferable level of indicators recorded in the study was achieved. Apparently, this is largely due to the more responsible approach of young men in this group to jogging because of the desire to overcome their existing disorders in the work of the cardiovascular system (Zavalishina 2018h; Zavalishina 2018i). According to the results of the study, regular jogging has reason to be considered as one of the most effective means of overcoming dysfunction of the cardiovascular system in adolescence.

## CONCLUSION

The study suggests that the systematic muscle activity in the form of jogging among young people is always accompanied by general recovery. With dysfunctions of

the cardiovascular system in adolescence, they contribute to the normalization of heart rate and blood pressure levels. As a result of regular and feasible running loads in young men who previously had dysfunction of the cardiovascular system, an increase in the volume of the pulmonary vital capacity occurs. This is accompanied by a significant increase in the observed level of physical fitness, an increase in speed-power properties and the level of general endurance. The achieved effects allow us to speak about the presence of great health-improving opportunities for regular jogging. Especially for persons with vegetative-vascular dystonia. Regular jogging exercises stabilize heart activity and optimize vascular tone. Increases the level of physical fitness. It becomes clear that regular jogging is a very effective means of optimizing the work of the cardiovascular system in young men with functional disorders (Karpov et al. 2021e).

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