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Current State of Research on The Cardiorespiratory System of Athletes

T.T. Seydemetov
Assistant teacher, Nukus State Pedagogical Institute named after Ajiniyaz, Uzbekistan

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Abstract: The article discusses the characteristics of the cardiovascular system during training in an athlete's body.

Keywords: Athlete, training, load, heart, cardiorespirator.

Introduction: Physical activity associated with training and participation in sports competitions places high demands on the athlete’s heart. Therefore, the cardiovascular system is one of the important integral indicators of the functional state of the body, one of the mechanisms of its adaptation to various stimulating factors.

Changes in respiratory function under the influence of exercise are closely related to changes in blood circulation. Physical activity associated with training and participation in sports competitions places high demands on the athlete’s heart.

Enlargement of the heart in athletes is often detected using radiographic studies by determining the borders of the heart using percussion. In trained people, the weight of the heart is up to 400-500 g, and in untrained people only 200-300 g. Exercise increases the number of capillaries in the heart.

To understand the function of blood circulation, it is important to take into account data on the main hemodynamic parameters (heart rate, blood pressure). It consists of 50-60 beats per minute in athletes at rest. This is especially noticeable in long-distance runners, cyclists, skiers, and swimmers.

During physical exercise, a number of electrographic indicators change, which is a sign that the heart muscle is well supplied with oxygen. Pressure within the range of 100-110 mm indicates changes in the vascular beds, creating conditions for the efficient functioning of the heart, since blood is supplied to the vessels with reduced resistance.

Arterial pressure is one of the important indicators of peripheral hemodynamics, reflecting the functioning of the entire cardiovascular system (CVS), and is a relatively constant value.

The stress index (SI) is widely used to assess the functional state of the central nervous system and the regulation of heart rhythm by the autonomic nervous system. The role of the influence of sympathoadrenal influences lies in the constant adaptation of the intensity of metabolic processes and physicochemical interactions in tissues to the functional requirements of the given moment. KI decreases with improvement in functional state, which allows its use in individual dynamic observation.

The state of vegetative tone is characterized by a gradual decrease in sympathetic influence with age, as well as in connection with regular physical education and sports. At the same time, it is important to note the widespread prevalence of this indicator at the age of 11-15, which can be explained by the hormonal restructuring processes occurring during this period.

Not only cyclical, but also in many types of sports, the effectiveness of sports activity is largely determined by the state of the autonomic nervous system, primarily the circulatory system. For assessing the health status and functional capabilities of a young athlete, data on the dynamics of physiological indicators during physical exertion are of particular importance in the timely diagnosis of pathological changes and pathological thresholds not detected during physical activity, as well as in the initial study.

The number of heartbeats is a specific integral indicator of the body’s condition, and its change is closely related to the complex of physiological changes that occur in response to constant physical exertion.

Measuring heart rate using heart rhythm monitors is a relatively simple and convenient way to monitor the intensity of physical activity during sports and physical activity. Heart rhythm monitors not only assist in monitoring physical activity but also allow for analyzing the training process and competition results based on the objective information received.

The use of heart rhythm monitors helps to individualize the training load depending on the athlete's functional state at that time. Only with the help of heart rhythm monitors has it become possible to monitor and analyze the functional capabilities of an athlete during competition. A single value of the average heart rate helps characterize the athlete's current functional state and, accordingly, plan future training loads.

The total indicator of blood circulation intensity - minute capacity - increases by up to 25 l/min compared to a state of rest (about 5 l/min), and in well-trained individuals it can even reach 30-40 l/min.

Despite the importance of this growth, it still lags behind the scale of expansion of the respiratory system. When performing static work, either the VCL remains unchanged or a slight increase is observed. In this case, oxygen consumption practically does not increase, but after the cessation of static load administration, it sharply increases along with an increase in VCL.

In individuals with low heart functional capabilities, the effectiveness of the system's functioning was achieved by enhancing respiratory function and reducing peripheral vascular resistance. Therefore, it is recommended to use a synthetic indicator to characterize the system's effectiveness, which is based on the product of minute respiratory capacity (MRC) and minute circulatory capacity (MCC).

Athletes with a coordination type of adaptation are characterized by a high degree of efficiency of the cardiorespiratory system functioning under maximum physical load, a high or average level of aerobic production, and a high level of aerobic activity. It has a large pulse reserve for CV recovery and a post-traumatic normotonic reaction of the cardiovascular system.

Athletes with a compensatory type of adaptation have an advantage in parameters reflecting the capacity of the cardiorespiratory system. However, in this case, they are characterized by the expenditure of excess energy after receiving the load in the normotonic reaction of the cardiovascular system, the gradual restoration of the CV.

Athletes with a stressed type of adaptation to the test load are characterized by low mobility of the respiratory system and moderate ventilator reaction, moderate and low level of aerobic production, low pulse reserve, and slow recovery of the heart rate in asthenic, dystonic, or hypertonic cardiovascular (CVS) reactions after the load.

In recent years, studies of the functional state of the external respiratory system, both at rest and under conditions of standard physical activity, have been conducted on an ontogenetic basis. It has been established that when the ratio of the frequency and depth of breathing changes depending on the conditions of performing sports exercises, the diversity of the various forms of breathing movements occurs mainly due to the optimization of the breathing act.

It has been noted that the nature, frequency, and rhythm of breathing during physical activity depend on the intensity of training and physical activity, the athlete's fatigue level, and environmental factors.

Under the influence of regular sports training, athletes experience a pronounced increase in respiratory rate and relatively low lung ventilation indicators compared to untrained individuals. Studies have shown that athletes' breathing levels are lower compared to untrained individuals.

The vital capacity of lungs (VCL) is an important indicator of the respiratory system. This indicator depends not only on the various conditions of upbringing in which sports training takes place, but also on the innate capabilities of a person.

In most cases, physically mature individuals with a vital lung capacity of 7 liters or more become athletes. The vital capacity of athletes' lungs is usually more than 25-30% of the required value.

According to L.N. Batkhina’s co-authored data, athletes (especially men) who prioritize the development of agility physical qualities have significantly higher absolute and relative indicators of external respiration (VCL, etc.) compared to athletes engaged in play and other sports, with a clear emphasis on developing speed and agility. This reflects the degree of positive influence of long-term extensive loads on the external respiratory system.

VCL is not among the indicators that ensure sports success. At the same time, some authors indicate that VCL depends on body size, age, as well as a person's functional state and physical fitness. It is noted that 70% of basketball players have an increase in VCL compared to track and field athletes, weightlifters, and untrained individuals.

There is also data indicating that the larger the vital capacity of the lungs (VCL), the lower the expenditure on the functioning of the external respiratory system. In addition, this indicator is taken into account in another indicator that is important for assessing functional capabilities - the life expectancy index.

It is known that the minute respiratory capacity (MRC) is significantly lower in trained individuals compared to untrained individuals. Observations by some authors indicate a decrease in vital lung capacity in the first days of travel to high mountainous regions. The degree of its decrease depends on the athlete's height and usually does not exceed 8-15%. Coming to high mountain conditions and walking there for several days leads to the restoration of vital lung capacity to its initial value, and after descending the mountain, it even increases.

During physical exertion, the respiratory rate (RR) in athletes reaches 40-60 beats per minute or more. Such a level of RR is considered optimal in the physical activity of many specialists. In well-trained athletes, economy of physiological functions is observed at rest. It has been established that during maximal muscle function, the VCL in a healthy adult increases to 120 l/min due to a threefold increase in respiratory volume (RV) and a fourfold increase in respiratory capacity (RC), while in trained athletes, lung ventilation reaches 150 l/min or more with a threshold load. This indicates the great reserve capacity of the respiratory system.

I.V. Aulik (1980) and A.T. Ketkin, in collaboration (1984), emphasize that speed-training athletes increase their breathing frequency at standard physical loads, while athletes developing agility-like movement qualities increase their breathing depth.

Thus, for athletes with the same level of development of physical qualities and overall work capacity, but with different types of adaptations to loads, different training programs are necessary.

REFERENCE

Agadzhanyan N.A., Kislitsyn A.N. Rezervy organizma i ekstre-mal'nyy turizm. M.: Prosvetitel'. – 2002. – 302 s.

2.A.S.Mozjuxin “Fiziologicheskie rezervi sportsmena “lekciya L.,1979. 79b

Parin V.V., Meyerson F.Z. Napryazheniye miokarda i funktsio-nal'nyy rezerv serdtsa. Izbr. tr. T.1. Krovoobrashcheniye v norme i patologii. – M.: Nauka, 1974. – S. 69-83.

4.E.K.Aydarkin “Funkcionalnoe sostayanie – teoriticheskiy osbekt Valeologiya” 2004,15

5. Yudina T.V., Saarkopel' L.M., Rakitskiy V.N., Yegorova M.V.

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