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CHANGES IN CARDIORESPIRATORY INDICATORS IN THE DEVELOPMENT OF METABOLIC SYNDROME DUE TO PHYSICAL EXERCISES

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Abstract
Over the past decade, the prevalence of metabolic syndrome among the population has been increasing, and it is considered one of the factors posing a serious threat to global health. Metabolic syndrome is formed under the influence of interrelated risk factors such as obesity, insulin resistance, arterial hypertension, and dyslipidemia, as well as a sedentary lifestyle and irregular eating habits. Genetic predisposition exacerbates the negative impact of behavioral factors, leading to the development of metabolic disorders. This article is aimed at preventing the development of metabolic syndrome by assessing cardiorespiratory parameters in certain sports under the influence of physical loads.

Keywords: Heart rate, systolic pressure, diastolic pressure, physical load, metabolic syndrome.

Metabolic syndrome (MS) is a set of chronic metabolic and cardiovascular risk components for central obesity, dyslipidemia, hypertension, and impaired glucose tolerance [1,3]. As a measure against metabolic syndrome, it is recommended to switch to a healthy lifestyle, including changing the diet and

physical activity. However, although it is widely accepted that increasing physical fitness is beneficial for MS, the components of physical fitness that have the greatest impact on MS, including cardiorespiratory ability, muscle strength, agility, and flexibility, remain controversial. Therefore, we conducted a cross-sectional study to study the relationship between MS and physical fitness. In other words, we aimed to determine which physical fitness factor among the physical fitness of the cardiorespiratory system, muscle strength, flexibility, and agility has the greatest impact on MS. For this purpose, we assessed the differences in physical fitness between weightlifters, football players, long-distance runners, and groups not engaged in (normal) physical training[2,4,5].

In our study, the assessment of the functioning of the cardiorespiratory system was defined as an important part of determining the physiological response to physical loads. In the participants, heart rate (HR), arterial blood pressure (BP/DBP), and recovery status after physical activity were constantly recorded as indicators of the cardiovascular system's initial and load response.

Heart rate was measured at rest, under standardized conditions, in the morning hours; this approach is a significant indicator of the activity of the autonomic nervous system, metabolic state, and general cardiovascular activity. Repeated blood pressure measurements made it possible to determine the degree of adaptation of the cardiovascular system to sports loads. For a more complete assessment of cardiovascular function, arterial blood pressure (BP/DBP) was measured twice at all assessment stages. Measurements were taken after the participant rested for 5 minutes, and the values for both hands were compared. Changes in blood pressure over time made it possible to determine the long-term impact of physical activity on the cardiovascular system, as well as to assess hemodynamic risk factors associated with metabolic syndrome. Changes in

SBP/DBP were analyzed as one of the important indicators of load adaptation in athletes.

In order to assess the metabolic components of the cardiorespiratory response, capillary blood lactate after training was determined. This method was used as the main physiological indicator in assessing the intensity of the load, the activity of anaerobic metabolism, and the effectiveness of the recovery process in the participants. Lactate measurements were determined within 3-5 minutes after the end of training and provided important information about changes in the body's energy-producing systems.

In addition, short-term indicators of cardiorespiratory adaptation were recorded as pre-training and post-training respiratory rate, as well as the level of subjective fatigue (RPE). These parameters made it possible to indirectly assess the respiratory response under load and determine the general functional state of the participant. All measurements were carried out at the same time interval, using the same methods and equipment, which reduced individual differences and increased data reliability.

All measurements of the cardiovascular system were performed on the same equipment, with the same instructions, and at the same time interval. This approach reduced the impact of individual differences and increased the reliability and reproducibility of the data. This assessment system provided reliable physiological data necessary for studying the body's integrative response to physical load, determining the effectiveness of the experiment, and developing a metabolically safe training protocol.

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