

Раздел III

ДВИГАТЕЛЬНАЯ АКТИВНОСТЬ КАК ОСНОВА ЗДОРОВОГО ОБРАЗА ЖИЗНИ ОБУЧАЮЩИХСЯ

RESEARCH OF THE IMPACT OF BADMINTON ON THE FUNCTIONS OF NERVOUS AND VISUAL SYSTEMS

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Relevance. Badminton exercises have a complex impact on different organ systems. During regular badminton training, the development of complex psychomotor mechanisms, including coordinated interaction of the visual analyzer and the brain, is characteristic. In this context, the study of the influence of badminton on the nervous and visual systems is of particular interest.

Aim of the research project. To investigate the impact of regular badminton training on the functions of nervous and visual systems and to review its potential in enhancing cognitive functions.

Materials and methods. Badminton is a racket sport that has been an Olympic sport since 1992. Currently badminton is distributed worldwide, included in the curriculum of physical education in various educational institutions. It is known that badminton has a complex effect on the whole organism due to the diversity of movement mechanics, expressed in combination of dynamic elements aimed at developing endurance, coordination, balance, flexibility [1]. However, in addition to the above properties, badminton is distinguished by the specificity of formation of complex psychomotor movements, in particular, movements involving complex spatial interactions, with high precision controlled by the nervous system. This factor is of particular interest in the context of examining the effect of badminton on the visual and nervous systems.

The nervous system is an integrated system of interconnected neural structures, ensuring optimal functioning of all systems of the organism and its interaction with the external environment. Cognitive functions generally refer to the human brain's ability to perceive, analyze, structure and store information [2]. Consider the influence of badminton activities on features and development of cognitive functions. The badminton learning system goes beyond

the development of specific physical indicators and aims at developing integrated properties, including cognitive plasticity and strategic thinking. Cognitive plasticity factor implies the ability of the nervous system to adapt with high precision to changes in the external environment in a stressful situation. Cognitive plasticity also includes rapid change of the strategy of action, transformation of goals according to the current situation. Research in sports psychology shows that athletes with higher levels of cognitive plasticity are more competitive and less emotionally dependent on extracurricular situations. The training of both professional badminton players and amateur players is aimed at increasing stress resistance, as it ensures constant interaction with stressors. In the game of badminton there is a rapid change of environmental factors, situations are modeled in which the necessary prompt decision-making. Thus, badminton training significantly increases cognitive plasticity [2].

The great variation of interaction on the site and the alternation of techniques ensures the development of strategic thinking in badminton players. The structure of strategic analysis during a match can be considered in three dimensions. The first involves targeting, that is, performing a sequence of actions to achieve a certain result; the second implies integrating fragmented pieces of information into a single network; the third implements so-called dynamic adaptability, that is, planning. High-speed reception-response processes and spatial movements on the badminton court create an optimal space for the formation and development of strategic thinking [2].

The cultivation of strategic thinking in badminton teaching achieves a deep integration of technical training and cognitive development, enabling students to develop dynamic decision making and tactical awareness while mastering movement skills.

Psychomotor reactions (psychomotor mechanisms) are a set of actions combining the mobilization of physical skills and resources of the body in response to external stimulus, which is formed by the nervous system. The response to this stimulus is the actions that the body takes. The indicators that allow us to analyze the action of psychomotor mechanisms can be attributed to reaction, concentration and coordination. Consider in detail the relationship of the formation of these traits under conditions of regular training in badminton [3].

One of the significant indicators of the degree of development of psychomotor mechanisms is the speed of reaction. When looking at the speed of reaction indicators, badmintonists often use concepts such as time of reaction of choice and time of reaction to a moving object. It has been proven that regular badminton exercises reduce the rate of selection reaction time (for instance, it increases the speed of pulse formation and response to external effects), increase the accuracy and specificity of the response to external impulses. The reaction to a moving object is an extremely fast formation of impulse in

response to the coupling of several objects moving in space. It can be characterized as a space-time reflex. The formation of this type of reflexes is closely related to processes of parallel processing of information and formation of such mechanism of communication of neurons, as temporal communication. The systematic formation of temporal bonds improves the ability to assimilate information, increases the accuracy of the interaction of the nervous and locomotor (locomotor systems) [3].

Special attention in research in the field of sports medicine is paid to differences in the manifestation of psychomotor reactions in badminton players with a «master of sport» experience compared to less experienced players. Thus, there are significant differences in the performance of auditory and visual-motor reactions, the time interval for which is significantly reduced in the long-term practice of badminton. The development of the visual-motor reaction in badminton players is due to the reduction of the time interval of processing the visual impulse in the corresponding areas of the brain. Also for athletes who are professional badminton players, a higher value of the brake control indicator is characteristic. Inhibitory control implies the ability to reverse a planned movement or action by precisely and promptly coordinating the work of the nervous and locomotor systems [3].

Coordination implies the ability to reasonably control with a certain precision the position and movement of the body in space. Dexterity is a collective characteristic that includes the accuracy of performing motor tasks. Concentration is an opportunity to direct the resources of the nervous system towards a task. Improvement of these qualities is necessary for the harmonious and complete development of the body [4].

The process of playing badminton involves complex spatial interactions in both single and double play. Each reception corresponds to a complex set of movements (response blows). In addition, complex reception – counter-reception (for example, high-distant throw and high-distant strike) implies an operational and coherent coordination of the sequence of actions. Each complex of reception and counter-reception involves such motor elements as jumps, lunges, complex movements of the hand when changing the grip of the racket. According to studies of the South-Ural University, with regular badminton classes there comes a significant increase in the accuracy (coordination) of movements, accordingly, the index of dexterity can also be estimated as increasing. Studies of the South-Ural State University also note a predominance of increased concentration of attention among badminton players [4].

As noted earlier, the most important type of reactions when playing badminton are spectator motor reactions involving a visual analyzer. In the visual analyzer, three components are distinguished: the peripheral department, the conducting department and the central department. The peripheral region is represented by the retina, on which the image is focused, the conductive region

is the optic nerve and the central region of the occipital cortex. The normal operation of the visual analyzer shall be ensured by the optimum condition of all its components [5].

Myopia is a defect of the visual system, in which a person can poorly distinguish distant objects due to incorrect placement of the image on the retina. Thus, in the absence of defects of the visual system, the image is focused on the retina, while for myopia, the focus of the image is in front of the retina. In addition to the genetic predisposition, the causes of myopia include the overstretching of the ciliary muscle, which provides accommodation for the lens. The badminton player must continuously focus on the moving wheel, as well as controlling the position of opponents on the platform. The constant change of focus helps to improve blood supply in the retinal artery of the eye, normalizes the processes of accommodation of the lens. Of particular interest are studies in which the probability of correction or retardation of myopia was investigated through badminton exercises. According to the results, during 1 year of regular training of the visual system, exactly reproducing the mechanism of action of the visual system in badminton exercises, 60% of the subjects were observed to maintain the sharpness of vision at the same level, while 30% of those experiencing acute vision increased. Thus, badminton can be seen as a component of maintaining the normal functioning of the visual system and preventing myopia [5].

Results and conclusions. From the given analysis of the literature, it can be concluded that the influence of badminton on various aspects of the functioning of the nervous and visual systems is important. In the context of development of cognitive abilities badminton develops cognitive flexibility and strategic thinking; in the process of training become more precise actions of psychomotor mechanisms, activating coordination, reaction, concentration. In addition, regular exercises on badminton normalize the work of the visual analyzer and are an effective way to prevent myopia.

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КОМПЛЕКС УПРАЖНЕНИЙ ДЛЯ СТУДЕНТОВ С НАРУШЕНИЕМ РЕФРАКЦИИ ЗРЕНИЯ

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Актуальность. Нарушения рефракции зрения являются одними из самых распространенных заболеваний среди студентов медицинского университета. По частоте встречаемости они стоят на втором месте после патологий опорно-двигательного аппарата, выявляются у каждого третьего студента. Основными причинами развития патологии являются утомление зрительного аппарата из-за учебной нагрузки, гиподинамия, использование электронных устройств для учебы и плохое освещение, а также слабая осведомленность студентов о способах разгрузки и снятия напряжения с органа зрения. Таким образом, разработка универсальных упражнений для коррекции и профилактики нарушений рефракции является актуальной проблемой современности.

Цель. Разработать комплекс упражнений для профилактики и коррекции нарушений рефракции зрения.

Материалы исследования. В исследовании использовались методы теоретического анализа и обобщения данных научно-методической литературы.

Результаты и их обсуждение. Глаз – это сложная оптическая система, осуществляющая преломление световых лучей и их схождение в точке фокуса на сетчатке. Рефракция – это преломляющая способность оптической системы глаза. В норме наблюдается соразмерная рефракция, точка фокуса находится на сетчатке. Несоразмерная же рефракция, или аметропия, наблюдается, если фокус параллельных лучей оказывается не на сетчатке. К аметропиям относятся миопия, гиперметропия, астигматизм. Миопия (близорукость) – самый распространенный вид аметропии [1, 2].