

PHYSIOLOGY

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BIOENERGY CRITERIA OF ATHLETES' FITNESS FOR COMPETITIVE ACTIVITY

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Annotation. Taking into account the analysis of the functional fitness results, we have developed the bioenergy profiles of athletes of game sports with different roles. The presented bioenergy criteria markers of the fitness of athletes of game sports with different playing roles for competitive activities will help the coach to more effectively regulate the training effect and choose the appropriate strategies for preparing athletes for the main games of the season.

Keywords: bioenergy profile, model characteristics, functional fitness, athlete.

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INFLUENCE OF WATER AEROBICS ON THE BODY OF PREGNANT WOMEN AND PUERPERAS

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Annotation. Water aerobics is a system of strictly apportioned physical exercises in water. It has become widespread and popular among women because of the water, which is a unique natural simulator. Water aerobics, expanding the range of general physiological effects of physical exercises on the body, for pregnant women and puerperas is considered as an option of physical therapy on the water. The main features of water aerobics are taking into account the individual level of health and a personalized approach to the load. It has a large number of various traditional and non-traditional means and their combinations, as well as training methods, forms of arrangement, equipment and devices. Water aerobics classes increase the resistance of the body of pregnant women and puerperas, train it, reduce the risk of complications during pregnancy and the postpartum period.

Keywords: water aerobics, pregnant women, puerperas, physical therapy.

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FEATURES OF FUNCTIONAL RESPONSE IN SKI RACERS DEPENDING ON THEIR SPEED IN THE LOAD TEST

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Annotation. The paper deals with the efficiency of adaptive changes in ski racers depending on their maximum speed on the ski ergometer. Our sample involved 20 skilled ski racers divided into two groups with respect to their relative velocity at the 5th level. In the first group, absolute speed was 8.20% higher compared with the second group. More efficient muscular performance is confirmed by the relationship between power and movement speed, as well as by a greater contribution of stroke volume in blood circulation and efficient external respiration. In the second group, the relationship between absolute velocity and respiratory rate confirms the existence of a compensatory mechanism to satisfy oxygen needs.

Keywords: speed indicators, movement power, functional state, lactate, stroke volume, ski racers, ergometry.

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RESPIRATORY REACTIONS TO MICROINJECTIONS OF THE ANTAGONIST OF GABA_B-RECEPTORS 2-HYDROXYSACLOFEN INTO THE RETROTRAPEZOID NUCLEUS IN RATS

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Annotation. In acute experiments on anesthetized rats, we studied the reactions of external respiration to microinjections of solutions of the GABA_B-receptor blocker 2-hydroxysaclophen into the retrotrapezoid nucleus. Differences in changes of the volumetric and frequency parameters of external respiration pattern were established under the action of low (10⁻⁷ M) and high (10⁻⁴ M) concentrations of the antagonist, while revealing increase of lung ventilation under the influence only high concentration. The results indicate the involvement of the GABA_B-receptors of the retrotrapezoid nucleus in regulation of respiration, but at the same time allow us to speak about the limited representation of this class receptors in the studied compartment of the respiratory neural network.

Keywords: GABA_B-receptors, 2-hydroxysaclofen, retrotrapezoid nucleus, pattern of external respiration.

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INDIVIDUAL AND TYPOLOGICAL FEATURES OF THE RESPONSE OF LABORATORY RATS TO MULTI-COMPONENT STRESS

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Annotation. The study assessed the dynamics of working capacity, psycho-emotional state and corticosterone levels in the blood serum of laboratory rats with different behavioral activity in the open field test (active-searching, passive-defensive and intermediate type) after combined exposure to light deprivation and physical loads. We have discovered that different types of behavior affect the initial performance before the formation of light deprivation, the dynamics of performance within 5 days after desynchronization, as well as the post-stress psycho-emotional state and the corticosterone level in the blood serum. The most resistant to stress factors were laboratory rats with an initially active-searching type of behavior.

Keywords: swimming test, corticosterone, open field, behavior types, experimental exposures, laboratory rats.

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CHANGES IN THE FUNCTIONAL STATE OF STUDENTS WITH THE CARDIOVASCULAR SYSTEM DISORDERS IN THE PROCESS OF PHYSICAL EDUCATION

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Annotation. The response of the cardiovascular system to physical activity in a healthy body is often unpredictable. Under conditions of dysfunction, it is complicated not only by an inadequate response of the body to physical activity, but also by an extended negative physiological trace of body reactions, accompanying this response. In this connection, the process of physical training becomes difficult to implement. The purpose of the study was to test the physical culture means and methods for training students with the cardiovascular system disorders. It has been established that the stages in increasing physical activity and the periodic change in the motor mode increase the functional state of the body and the fitness of the individuals of the studied group.

Keywords: physical education, special medical group, cardiovascular system, motor function, functional state.

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ASSESSMENT OF COMPETITIVE ENDURANCE OF BASKETBALL PLAYERS ACCORDING TO HEART RATE VARIABILITY

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Annotation. In this study, we used the variational pulsometry method, based on the results obtained on the state of regulatory processes, to assess the competitive endurance of basketball players before and after the competition. The latent reserve capabilities of the functional systems of the body were evaluated according to the orthotest results. Players with a high gaming rating have an adequate reaction to orthostasis, those with a low rating have a paradoxical reaction with elements of maladaptation of regulatory mechanisms. Four types of autonomic regulation of the heart rate have been identified, of which moderate dominance of the autonomous regulation mechanism is more common than others. It is shown that competitive endurance is closely correlated with the indicators of the game rating.

Keywords: basketball, heart rate variability, game rating.

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CHARACTERISTICS OF THE HEART RATE VARIABILITY IN PROFESSIONAL VOLLEYBALL PLAYERS WITH HEARING IMPAIRMENT FROM THE NORTHERN REGION

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Annotation. The aim of the study was to identify features of the heart rate variability among volleyball players with hearing impairment, who lived in the city of Surgut. The study involved 22 male volleyball players with hearing impairment, who are active players of the Russian national volleyball team and the Khanty-Mansiysk Autonomous Okrug – Yugra in the sport for the deaf. The “Poly-Spectrum-12/E” electric cardiograph was used to assess heart rate, mode, mode amplitude, standard deviation, square root of the mean of the squares of the successive differences between adjacent NNs, range, autonomic balance index, centralization index, index of tension of regulatory systems, spectral analysis of the heart rate variability. Volleyball players had higher values of standard deviation of NN intervals, root mean square of successive differences, mode and range than untrained students, which indicated the heart rate regulation by the autonomic nervous system. Also, the players had a significant decrease of heart rate, mode amplitude and indicator of the adequacy of regulation processes. The structure of the heart rate spectrum was common for both groups: low-frequency components were the main part of total power. However, the part of the high-frequency component in the volleyball players with hearing loss was significantly higher than in the group of students.

Keywords: heart rate variability, cardiovascular system, volleyball players, adaptive sport.

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25(OH)D LEVELS AND CARBOHYDRATE METABOLISM PARAMETERS AND LIPID PROFILE IN CHILDREN

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Annotation. Vitamin D deficiency is widespread in the pediatric population. A study was made of the relationship between the level of 25(OH)D with indicators of carbohydrate metabolism and lipid profile in children of primary school age. The cross-sectional study included 195 apparently healthy junior schoolchildren aged 7 years, of which 105 (53.8%) were boys and 90 (46.2%) were girls. In 85% of children, the level of 25(OH)D is below normal. In the group with 25(OH)D levels below 30 ng/ml, insulin and the HOMA index were significantly higher than in the group with normal 25(OH)D levels. Weak negative correlations between the level of 25(OH)D and insulin ($\rho=-0.261$, $p=0.001$) and the HOMA index ($\rho=-0.296$, $p=0.001$), as well as a weak positive correlation between the concentration of 25(OH)D and high-density lipoprotein cholesterol levels ($\rho=0.194$, $p=0.015$), which indicates that low levels of vitamin D are associated with the risk of developing metabolic disorders.

Keywords: vitamin D, 25(OH)D, children, glucose, insulin, HOMA index, lipid profile, high-density lipoprotein cholesterol.

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TAPPING TEST AS AN INDICATOR OF EFFICIENCY, STRENGTH AND ENDURANCE OF THE NERVOUS SYSTEM IN ATHLETES OF DIFFERENT SPORTS

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Annotation. The purpose of this study was to develop and implement the method of objective and automated evaluation of the effectiveness, strength and endurance of the nervous system in athletes, according to the tapping test results. The method of defining properties of the nervous system with the tapping test should be based on objectively calculated indicators - indices, not on the visual evaluation data. We have suggested indices of efficiency, strength and endurance of the nervous system. However, the conducted study has not identified conclusive relations of calculated indices with the specificity of motor activity in different sports. Possibly, this issue requires more thorough processing. In our opinion, any other test for identifying properties of the nervous system, is more suitable for solving the set tasks.

Keywords: properties of the nervous system, tapping test, Il'in method, psychophysiology, athletes, diagnosis, verification.

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FEATURES OF THE AUTONOMIC STATUS IN STUDENTS WITH DIFFERENT CHRONOTYPES IN THE AUTUMN-WINTER AND THE SPRING-SUMMER PERIODS OF THE YEAR

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Annotation. The purpose of the research was to analyze the daily dynamics of external respiration parameters and heart rate variability in the autumn-winter and spring-summer periods of the academic year in students with morning, afternoon and evening chronotypes. We have revealed chronotypic differences in seasonal changes in the series of heart rate variability diagnostic and spectral parameters, frequency and volumetric indicators of breathing. A more pronounced seasonal dynamics of the autonomic status was found in “dove” students, and the smallest – in “owls”. The data obtained indicate the features of adaptation of the respiratory and circulatory systems to the change of seasons in representatives of different chronotypes.

Keywords: external respiration, heart rate variability, chronotypes, seasons of the year, biorhythms.

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PHYSIOLOGICAL FEATURES OF TIMING AND SPACING OF ELITE WRESTLERS TAKING INTO ACCOUNT FUNCTIONAL HEMISPHERIC ASYMMETRY

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Annotation. The article provides a comparative analysis of the temporal (timing) and spatial (spacing) properties of elite athletes involved in Greco-Roman wrestling, taking into account functional hemispheric asymmetry, as well as untrained peers. To determine the temporal and spatial characteristics, we used the “Researcher of the temporal and spatial properties of a person” software. The individual asymmetry profile was determined using a set of tests according to the scheme: «arm – leg – sight – hearing». It is shown that the studied characteristics of timing and spacing of athletes depend on the functional asymmetry profile. The revealed specificity of timing and spacing in right-handed and left-handed wrestlers reflects a certain strategy of hemispheric analysis of incoming information.

Keywords: space, spacing, time, timing, athletes, Greco-Roman wrestling, individual asymmetry profile, right-handers, left-handers.

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DYNAMICS IN FUNCTIONAL STATE OF THE RESPIRATORY SYSTEM AND PHYSICAL PERFORMANCE OF 11-19 YEARS OLD BOYS DURING DIFFERENT MODES OF MOTOR ACTIVITY

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Annotation. The research is dedicated to the evaluation of the effect on systematic sports classes on physical performance and functional state of the respiratory system of 11-19 years old boys, based on the longitudinal study. We have identified dynamics, in accordance with which the process of developing reserve capabilities of the external respiration system in young athletes is implemented. We have also discovered a higher level of physical performance in boys, engaged in sports, compared with non-athletes.

Keywords: vital capacity, physical performance, young athletes, 11-19 years old boys.

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DYNAMICS THE HEART ACTIVITY OF YOUNG MEN UNDER PHYSICAL LOADS, DEPENDING ON THE LEVEL OF MOTOR ACTIVITY

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Annotation. In our work, we examined the chronotropic and inotropic response of the heart of young men to increasing physical loads, depending on their physical activity. We divided subjects into groups, considering their physical activity. The first group included students, engaged in physical culture elective courses, with a low level of physical activity. Students with an average level of physical activity, enrolled in the “Physical Education” program, made up the second group. The third group involved student-athletes with a high level of physical activity, who are constantly involved in athletics and have sports categories. As a physical loads test, we used a bicycle ergometer. The results of our study demonstrated a different contribution of the chronotropic and inotropic response to the heart activity of the subjects. It was influenced by the motor activity of the students. In the first and second groups, the cardiac output parameters increased due to the heart rate, in the third group – due to the stroke volume increase. The data obtained has broadened our concept of the heart response to physical loads, depending on a physical activity level.

Keywords: chronotropic and inotropic response, level of physical activity, physical loads.

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AGE CHANGES IN THE HARMONY OF PHYSICAL DEVELOPMENT INDICATORS WITHIN THE SEGMENT OF ASCENDING 11-19-YEAR ONTOGENESIS, DEPENDING ON THE LEVEL OF MOTOR ACTIVITY

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Annotation. The article is dedicated to the assessment of the influence of various sports on the mutual correspondence (harmony) of the physical development indicators in boys and young men aged 11-19 years. To identify the harmony of physical development, we consistently used the anthropometric and calculation methods for identifying proper body mass, deviations from proper body mass, specific body mass, body surface, Quetelet index, Erismann index, proper basal metabolism, i.e. a set of indicators that allow assessing the proportionality of physical development. It was found that in the group of athletes, the rate of development of body length and chest girth is more even (if we consider the hypothesis of rational energy expenditure to ensure constructive metabolism as the reason for the manifestation of sensitive periods, then it can be argued that sports provide a higher level of energy supply, which at the same time allows developing a number of signs of physical development). It has been determined that age transitions from the predominant development of one sign of physical development to another in athletes occur less intensively, with smaller differences (13-17 years old). The athletes also did not show inversion of values, as is manifested in those who do not engage for sports. It has been determined that the use of physical exercises creates prerequisites for the even development of such components of physical development as body length and chest girth and provides a sustainable advantage for athletes in the formation of their own body mass.

Keywords: physical development, harmony of physical development, young athletes, proper body mass, deviations from proper body mass, specific body mass, body surface, Quetelet index, Erismann index, proper basal metabolism, effect of playing sports.

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ASSESSMENT OF THE FUNCTIONAL STATE OF THE BODY OF THE NATIVE AND NEWCOMER POPULATION UNDER CONDITIONS OF THE FAR NORTH

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Annotation. The analysis of the functional state of the organism of 160 residents of the Yamalo-Nenets Autonomous Okrug at the age of 26-45 years was carried out, among which 83 people (45 women and 38 men) were native, and 77 were newcomers, who lived in the region for 5 years (43 women and 34 men). The assessment of the functional state level was carried out using the DgKTD-01 diagnostic complex. We have discovered that the native population of the Yamalo-Nenets Autonomous Okrug had an autonomic index of 3.41 ± 0.23 c.u. that was significantly higher than that of the newcomer population – 2.36 ± 0.21 c.u. ($p \leq 0.05$). In the native population group, individuals with vagotonia prevailed – 62 people (74.70%), 14 people had normotonia (16.87%), 7 people – sympathicotonia (8.43%). Comparative analysis in the group of the newcomer population revealed 1.86 times fewer people with vagotonia – 40.6% (31 people), 1.46 times more people with normotonia (24.68%, 19 people) and 4.16 times more individuals with sympathicotonia (35.06%, 27 people). It should be noted that for the native people of the North, the shift in autonomic regulation towards vagotonia is an adaptation mechanism that is genetically fixed, which is also confirmed by a number of studies. A significantly smaller number of people

with vagotonia and a high percentage of people with sympathicotonia, which should be attributed to signs of tension in adaptation mechanisms, characterizes the newcomer population.

Keywords: adaptation, functional state of the body, conditions of the Far North, native and newcomer population.

PSYCHOPHYSIOLOGY

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MONITORING OF THE PSYCHOEMOTIONAL STATE OF STUDENTS ON PHYSICAL CULTURE CLASSES

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Annotation. The article presents an analysis of the monitoring of the state of student youth studying in humanitarian and technical specialties at universities during the session period. Our data was obtained from studies conducted a week before the end-of-term exams and a week after. We analyzed the results, taking into account gender differences. Monitoring was carried out, based on an assessment of well-being, activity and mood (the WAM method), as well as using the anxiety diagnosis method (the Ch.D. Spielberger – Yu.L. Khanin questionnaire). As a result, we identified the current psychoemotional state of student youth during the end-of-term exams, and prospects for work in the researched direction were also proposed.

Keywords: monitoring, psychoemotional state, activity, mood, anxiety, trigger, physical culture, stress resistance, students.

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ELECTRICAL RESISTANCE OF THE SKIN AS AN INDICATOR OF AUTONOMOUS SELF-REGULATION OF MENTAL FUNCTIONS IN BOXERS

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Annotation. The aim is to study the dynamics of indicators of electrical resistance of the skin in the pre-start, competitive and post-competitive period, in relation to the efficiency of the boxing match outcome. In 26 boxers aged 19.26 ± 0.3 years, among which 12 athletes were prize winners and 14 did not win, the electrical resistance indicators were studied during the first weigh-in (background), before and after the fight. We analyzed the intergroup features of the dynamics of mental states in connection with victory or defeat. It is shown that on the day of the first weigh-in, the winners had an electrical resistance of 12.97 kOhm, the losers – 14.65 kOhm. Before the fight, the mental tension increases in all the subjects, the winners – up to 14.65 ± 0.4 kOhm, the losers – up to 21.50 ± 0.3 kOhm. Therefore, the pre-start fitness of the winners occurs in a timely manner, fitness of the losers – prematurely, the difference amounted to 16.21% ($p < 0.01$). After the competition, the winners' psychoemotional tension tends to increase, the electrical resistance of the skin increases by 19% ($p < 0.05$), which indicates the need for additional health and rehabilitation measures.

Keywords: electrical resistance of the skin, autonomic nervous system, athletes, boxers.

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PSYCHOPHYSIOLOGICAL TESTING VERIFICATION ON THE HARDWARE AND SOFTWARE COMPLEX “SPORTS PSYCHOPHYSIOLOGIST”

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Annotation. Currently, there is a large selection of diagnostic hardware and software systems and software products for studying psychophysiological indicators. However, the proposed complexes and software products do not always meet the requirements for the reliability of the results obtained. We have developed the hardware and software complex (HSC) “Sports psychophysiologicalist”. Its distinguishing feature is a certain set of tests that allow for a comprehensive assessment of psychophysiological properties important for sports activity. The complex also allows assessing the neuromotor abilities of both the upper and lower extremities. The purpose of this work was the verification of psychophysiological testing on the “Sports psychophysiologicalist” with its foreign analogue. With the help of the “Sports Psychophysiologicalist” and “Vienna test system” (Schuhfried company, Austria), tests were carried out to determine the time of a simple visual-motor reaction and a complex choice reaction. The results of the study did not reveal statistically significant differences between the test scores both for the time of simple and for the time of complex sensorimotor reactions between the “Sports psychophysiologicalist” and “Vienna test system”. Thus, the absence of significant differences and similar results in the HSC test indicate the relevance of testing on a specially developed HSC “Sports Psychophysiologicalist”.

Keywords: neurodynamics, sensorimotor reactions, psychophysiology, athletes, diagnostics, verification.

BALNEOLOGY AND REHABILITATION

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STUDY OF CHRONOBIOLOGICAL INDICATORS OF THE ROBINSON INDEX IN WOMEN WITH CORONARY HEART DISEASE IN CONDITIONS OF INACTIVITY, WHO HAD THE NEW CORONAVIRUS INFECTION

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Annotation. The article presents the results of studying the chronobiological indicators of the Robinson index (c.u.), which reflects the level of hemodynamic loads on the cardiovascular system in a prospective open non-comparative study of 48 women of the second period of the middle age (47.4±1.7 years), who are on inpatient treatment for the chronic course of coronary heart disease without clinical signs of heart failure, in conditions of hypodynamia, after being infected with COVID-19. It was found that as the stated age increases, the systolic blood pressure significantly rises and is at the upper limit of the norm, the heart rate decreases as well. The Robinson index indicators indicated that all women consistently demonstrated signs of the cardiovascular system activity's dysregulation.

Keywords: women of the second period of middle age, coronary heart disease, COVID-19, Robinson index.

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DESCRIPTION OF PATIENTS WITH TYPE 2 DIABETES WITH DIABETIC DISTAL POLYNEUROPATHY, ADMISSIONING FOR SANATORIUM AND RESORT TREATMENT

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Annotation. Patients with diabetic polyneuropathy were examined and a comparative analysis of indicators with healthy individuals was carried out. The results obtained indicate various disorders in the clinical, functional and neurological characteristics of the examined individuals, data from biochemical analyses, scales. Application of neurological studies, according to the Neurological Symptoms Score, Neuropathy Disability Score, Visual analogue scale and electroneuromyography at the resort stage will allow diagnosing diabetic polyneuropathy at stages 1a and 1b and thereby contribute to earlier and more effective treatment of this serious complication.

Keywords: type 2 diabetes mellitus, diabetic polyneuropathy.

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CONTENT FEATURES OF SENSORIMOTOR STIMULATION PROGRAMS FOR CHILDREN BORN PREMATURELY IN THE FIRST YEAR OF LIFE

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Annotation. The article considers the types of autonomic regulation and types of adaptation to physical activity of children born at 32-35 weeks of gestation. We examined 122 premature babies of the first year of life. With proper organization of nursing, treatment and correction of sensorimotor disorders based on adaptive capabilities, the disability rate of children decreases. The highest restorative effect is provided by corrective measures carried out in the first year of life of a premature newborn. The method of spectral and mathematical analysis of the cardiorythmogram, as well as methods of mathematical statistics were used to assess the heart rate variability. There was a pronounced predominance of central regulation of heart rate and a mixed type of adaptation to physical activity in premature infants of the first year of life. The maximal saturation of the program with the inclusion of passive and active stimulation made it possible to achieve values, typical to the age-related physiological norm only in children with a sympathetic type of adaptation. In premature infants with asthenic type of adaptation, the greatest effectiveness of exposure was observed when implementing the program that includes two types of stimulation (active and passive). For children with vagotonic type of adaptation, programs with more than two effects allowed to achieve the greatest effectiveness. When arranging the program for children with the mixed type of adaptation to physical activity, it is important to take into account the type of autonomic regulation at rest and the age of the child.

Keywords: premature babies, heart rate variability, sensorimotor stimulation programs.

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MODERN POSSIBILITIES OF EXPERIMENTAL DATA VISUALIZATION TO IDENTIFY HIDDEN PATTERNS

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Annotation. In this study, we have carried out an analytical literature review of various methods of visualization of the results obtained from biological and laboratory studies. The possibilities of using visualization methods and techniques to identify patterns of metabolic processes modification in the study of the mechanisms of action of weak natural healing factors of the Caucasian Mineral Waters region were analyzed.

Keywords: experiment, databases, visualization, metabolism, mineral waters.

SPORTS MEDICINE

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COVID-19: RELEVANT ISSUES OF REHABILITATION STAGES IN ATHLETES

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Annotation. We have carried out a theoretical analysis of published domestic and foreign materials on the rehabilitation tactics for athletes who had a new coronavirus infection. Based on the study of etiopathogenesis, clinical manifestations of individuals, infected with the SARS-CoV-2 virus, medical guidelines for the diagnosis, treatment and rehabilitation of patients with COVID-19 are being updated. Experts in the field of sports medicine have determined the clinical tactics for returning to training for athletes who had COVID-19. Currently, medical observations (clinical studies) are being carried out for athletes who have returned to sports activities. The few results of such studies convincingly demonstrate the need to correct training and carry out rehabilitation measures until the respiratory function of the lungs is fully restored in athletes with identified respiratory system dysfunctions.

Keywords: athletes, new coronavirus infection COVID-19, rehabilitation.

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PROGRAM OF COMPREHENSIVE APPLICATION OF RECOVERY MEANS FOR BASKETBALL PLAYERS OF THE STUDENT TEAM

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Annotation. The article presents the results of a study of the impact of the integrated use of various means of recovery in the training of qualified basketball players. The study was conducted

in an annual training cycle, taking into account the focus and volumes of training load in the preparatory and competitive periods. The development of a comprehensive recovery program was aimed at increasing the adaptation mechanisms of athletes to training and competitive loads by speeding up and increasing the efficiency of recovery processes. The testing of the program for the integrated use of recovery tools was carried out in the Volga State University of Physical Culture, Sports and Tourism men's team, including 20 basketball players with master of sports, candidate for master of sports and 1 category qualifications. The recovery processes were evaluated using the breathing on inhale, exhale and Ruffier functional tests. As a result, we have found that the developed program for the integrated use of recovery means has a positive effect on the processes of restoration of the cardiovascular, respiratory systems of the body of basketball players and the performance of athletes in general.

Keywords: rehabilitation, qualified athletes, basketball, annual cycle, training.

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HIDDEN DISORDERS OF POSTURAL STABILITY IN BOXERS OF VARIOUS SPORTS QUALIFICATIONS

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Annotation. Repetitive traumatic effects on brain structures, including subclinical significance, can affect the postural stability of athletes. In this study, the Balance Error Scoring System was used to evaluate the balance function of 22 male boxers aged 17 to 24 years, of various sports qualifications. Sports experience in boxing was at least 5 years old. The examination was carried out in six standard positions, including soft surface. According to the data obtained, with the growth of sports qualifications, there is a hidden decrease in the postural stability of boxers, which is most clearly manifested when conducting the test in complicated conditions.

Keywords: concussion, boxing, postural stability, Balance Error Scoring System.

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CUMULATIVE EFFECT OF THE BETA RHYTHM NEUROBIOFEEDBACK COURSE ON THE FUNCTIONAL STATE OF THE CARDIOVASCULAR SYSTEM OF ATHLETES

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Annotation. The article describes the features of the cumulative effect of the course of neurofeedback on the functional state of the cardiovascular system of athletes, depending on the nature of sports activity, which occurred by the middle of the course after passing 5 sessions of the beta rhythm neurofeedback. The features of changes in indicators reflecting systemic pressure, cardiac efficiency, peripheral circulation, types of cardiovascular regulation and types of blood circulation regulation were revealed. In all studied groups, a positive reaction of the cardiovascular system to the session was noted, which is reflected in the optimization of the values of the parameters under consideration. The obtained information about the cumulative adaptive effects in the of the cardiovascular system's functioning from the beta rhythm neurofeedback course, depending on

the direction of sports activity, will make it possible to identify the occurrence of adverse conditions of the cardiovascular system, carry out their timely correction, and prevent the occurrence of conditions associated with fatigue through neurofeedback in the course of their professional activities.

Keywords: athletes, adaptation, cardiovascular system, neurofeedback, cumulative effect.

PHYSICAL CULTURE AND SPORTS

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FEATURES OF TECHNICAL AND TACTICAL ACTIONS OF SKATERS AGED 14-15 YEARS AT A DISTANCE OF 1000 METERS

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Annotation. The article presents the parameters of technical and tactical actions that affect the result of competitive activity of skaters when running at a distance of 1000 meters. In the course of pedagogical observation, it was revealed that in competitive conditions athletes increase the distance due to the following parameters: the amplitude of the transverse movement, the number of steps, the transition point from running in a straight line to running on a turn, the radius of the turn run. Based on the measurements carried out, an increase in the distance, traveled by athletes, and the time spent on overcoming the increased distance at a distance of 1000 meters was obtained.

Keywords: speed skating, movement trajectory, tactics, technical and tactical actions, speed skating.

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COMPARATIVE CHARACTERISTICS OF THE DEVELOPMENT OF SPECIFIC COORDINATION ABILITIES IN YOUNG SWIMMERS AND SOCCER PLAYERS

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Annotation. The article deals with the development of coordination abilities in the educational and training process in 8-9 years old children, specializing in game and cyclic sports. In accordance with the hypothesis of the study, we assumed that different forms, methods and means are used in the training sessions of elementary training in swimming and soccer, which influences the development of specific coordination abilities of young swimmers and soccer players in different ways. The aim of the study is to compare the results of the development of specific coordination abilities in young swimmers and young soccer players.

Keywords: physical qualities, educational and training process, movement coordination, swimmers, soccer players.

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IMPROVEMENT OF THE COORDINATION TRAINING METHOD FOR YOUNG ATHLETES IN RHYTHMIC GYMNASTICS

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Annotation. The purpose of the study is to improve the methodology for the development of coordination abilities in 7-year-old female athletes involved in rhythmic gymnastics. It was revealed that most often gymnasts make mistakes when performing technical elements associated with an insufficient level of development of coordination abilities (the ability to orient in space, maintain balance, rhythm, reaction, accuracy of differentiation of spatial and power parameters of movement). We have determined following methods for improving the methodology for developing the coordination abilities of beginner athletes in rhythmic gymnastics: the composition of the means was expanded through the use of exercises using auxiliary equipment (Bosu platform, rotating disk, limiters), outdoor games with increased coordination loads, exercises with objects that differ from the standard ones for gymnastics by weight and shape (tennis balls, plastic cubes and other equipment), the time of coordination training has been increased, the ratio of means of different directions has been selected with an emphasis on the weak spots of coordination training.

Keywords: coordination abilities, rhythmic gymnastics, motor errors, coordination training.

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SELF-CONTROL OF THE FUNCTIONAL STATE OF STUDENTS DURING CLASS HOURS AND INDIVIDUAL STUDIES OF PHYSICAL CULTURE

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Annotation. The purpose of the study was to justify the process of control over the functional state of students during physical culture classes, to develop evaluation criteria and the algorithm of implementing self-observation results. The research materials consider aspects of this process' content within physical training. The main result was the justification of this process among students. We identified functional state indicators, obtaining which does not require complicated equipment. We also described significance of evaluating morphofunctional state, the cardiorespiratory system and the neuromuscular apparatus indicators. As a result, the self-observation algorithm was developed.

Keywords: physical culture, functional state, self-control, students.

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ANALYSIS OF STUDENTS' AWARENESS ABOUT THE MEANS OF FUNCTIONAL STATE SELF-CONTROL IN THE PROCESS OF PHYSICAL EDUCATION

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Annotation. The purpose of the study is to identify and analyze the level of awareness of students of a technical university about the ways of self-control of the functional state during physical culture and sports classes. In the process of the study, we examined the degree of students' awareness of the means of implementing the functional state self-control during physical culture classes. It was revealed that the level of motivation for conducting introspection among students is formed, however, the necessary knowledge and skills for the implementation of this work are practically absent. Ways of creating pedagogical conditions for organizing and implementing the process of self-control of the functional state of students during physical culture classes are outlined.

Keywords: physical culture, functional state, self-control, students.

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ON THE QUESTION OF SAFE BEHAVIOR BASICS DURING PHYSICAL CULTURE CLASSES IN HIGHER EDUCATION INSTITUTIONS

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Annotation. The article presents an analysis of the monitoring of students' knowledge about the safe behavior basics during physical culture classes. We have analyzed the results of a survey of physical culture teachers and students, attending their classes, on the topic of injury prevention, knowledge of the self-protection and first aid basics in some life-threatening conditions during physical culture classes. The monitoring was carried out among students of physical culture and non-physical culture specialties in the Siberian Federal District universities. The prospects for work in this direction were suggested.

Keywords: monitoring, safe behavior, prevention, injury rate, first aid, physical culture, self-protection, students.

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ANALYSIS OF SPORTS PERFORMANCE OF GRECO-ROMAN WRESTLERS AGED 13-14 YEARS AND THEIR RELATIONSHIP WITH PHYSICAL FITNESS INDICATORS

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Annotation. The article analyzes the competitive activity of young wrestlers. The technical actions are presented in the form of the average number of made attempts in stances and ground work. The analysis of correlation between the results of physical fitness obtained during the performance by young Greco-Roman style wrestlers of general physical (running, gymnastic exercises) exercises and special physical exercises (throws of a dummy with a turn, rerunning around the head and back overturns, etc.) exercises, with technical and tactical actions used by young Greco-Roman wrestlers in wrestling. An analysis of the level of these relationships is presented.

Keywords: Greco-Roman wrestling, physical training, technical and tactical training, development of physical qualities, correlation analysis.

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ANALYSIS OF STANDARD TACTICAL POSITIONING OF HOCKEY PLAYERS OF DIFFERENT QUALIFICATION IN COMPETITIVE ACTIVITY

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Annotation. In competitive activity of hockey players, there are constant changes in the positioning and the number of players. Rapidly changing situations force players to switch promptly from offensive actions to defense and vice versa. Moreover, situations, in which the athletes find themselves, have similar conditions and their own features. We assume that the analysis of frequently repeating group positioning of players would allow us to identify their geometric form and create the corresponding types of offence and defense. In our opinion, identification of geometric forms, made with the positioning of players, will allow us to broaden the pattern of tactical actions of hockey players and use these results in theoretical and practical training.

Keywords: standard situation, tactics, technique, standard forms, hockey.

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THE USE OF MODERN EDUCATIONAL TECHNOLOGIES IN THE PRE-PROFESSIONAL TRAINING OF SOCCER PLAYERS

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Annotation. The purpose of the study is the theoretical justification of the use of modern educational technologies in the process of pre-professional training of soccer players in state institutions of sports training. Based on the results of the study, gaps in the regulatory framework governing the long-term sports training of soccer players are identified, associated with the lack of competence orientation, while the pre-professional training of a coach is focused on the development of certain competencies that contribute to the effective performance of labor functions. We have also identified necessary elements of modern educational technologies and proposed for use in the

training process, which make it possible to establish competence-based relations when evaluating the effectiveness of pre-professional training of young soccer players.

Keywords: pre-professional training, soccer players, educational technologies, competence-based approach, the metadisciplinarity principle.

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ESPORT: FROM SIMPLE GAMES TO THE PROFESSIONAL SPORT

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Annotation. The digitalization of the modern world contributes to the development of new sports and new opportunities. Esport is gaining popularity among both those who sit at the computer and those who keep watch over the game. This article provides information about esport, about its implementation in the educational process. Its features of development in the world and Russia, the positive and negative aspects of using it within the learning process. We have carried out the comparative analysis between soccer players and esport athletes. We also presented information on the esport development at the Kuban State Agrarian University.

Keywords: esport, video games, sport, physical activity, health, computer sport, esport athlete, Kuban State Agrarian University.

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ASSESSMENT OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR OF STUDENTS DURING COVID-19 SELF-ISOLATION PERIOD

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Annotation. The purpose of the study was to assess level and structure of students' physical activity and duration of sedentary behavior before and during self-isolation using the International Physical Activity Questionnaire. The survey was conducted among students of the Institute of Economics and Management of the Surgut State University before self-isolation (n=192, age 19.3±10.3 years) and during self-isolation (n=167, age 19.7±1.6 years). Self-isolation caused a decrease in physical activity when working from 1619 to 749 MET-min/week (p=0.0001), when moving – from 1301 to 974 MET-min/week (p=0.0013) during leisure – from 2159 to 1202 MET-min/week (p=0.0000). It also provokes an increase in the duration of sedentary behavior from 2755 to 3277 min/week (p=0.0260). Urgent measures are needed to correct low physical activity and rising level of sedentary behavior during the COVID-19 pandemic.

Keywords: physical activity, sedentary behavior, students, coronavirus infection, digital transformation of education.

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CONTENT OF MODELING AND VISUALIZATION OF TACTICAL AND TECHNICAL ACTIVITIES IN SPORTS GAMES AND SINGLE COMBATS

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Annotation. The article discusses the issues of increasing the level of tactical and technical fitness in sports games and single combats by means of variable tasks. Among the main approaches and means aimed at improving tactical and technical actions, there are: combination of attacking and defensive motor actions in the training process; operational change of motor actions of attacking and defensive nature and their combinations in environment of rapid change of the situation and at the command of the coach; combinations of exercises. Receiving feedback through visualization of tactical and technical actions in the modeling process largely determines the quality of the training process and competitive activity of athletes.

Keywords: modeling, visualization, tactics, technical actions, situation.

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FEATURES OF LANGUAGE TRAINING OF FUTURE EXPERTS IN THE FIELD OF PHYSICAL CULTURE AND SPORTS

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Annotation. The object of the research is the conceptual apparatus of the terminology system of yoga sublanguage, the processes of formation and development its constituent units, the ways and means of its replenishment are revealed. The systematic and structural-semantic features of yoga sublanguage terminology are analyzed, the most typical models of term combinations formation are given, and the meanings of term combinations are also given. This analysis helps to determine the course of growing process of the terminology in yoga sublanguage, which allows improving communication between specialists in the field of physical culture and sports and other close fields. In pedagogical activity, the systematization of term combinations helps to correct the process of using the terms of yoga sublanguage in speech. As well as by working with the terminology of various spheres, there is a formation of the design type of thinking among future experts in physical culture and sports.

Keywords: yoga sublanguage terminology, structural-semantic analysis, term combinations, cultivating teaching, design type of thinking, models of term formation.

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PSYCHOLOGICAL ASPECT OF MASTERING AND IMPLEMENTING BASIC MOTOR ACTIONS IN THE PROCESS OF TECHNICAL AND TACTICAL TRAINING OF TAEKWONDISTS

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Annotation. The purpose of the research was to study the influence of the psychological aspect on the effectiveness of mastering basic motor actions by taekwondo practitioners in the process of technical and tactical training. The assessment and analysis by the expert commission, including three judges of the highest category, of the technical and tactical actions of taekwondo athletes with first-class sports qualifications and a candidate for master of sports, revealed a significant number of errors in their implementation, while the most significant increase was observed in conditions of mental stress. The results of the study made it possible to put forward an assumption about the possibility of increasing the effectiveness of the implementation of technical and tactical actions, including in conditions of mental stress, by improving the psychological aspect that determines the process of mastering basic motor actions by taekwondists, which made it possible to significantly improve the studied indicators in the experimental group of taekwondists aged 8-9 years, who do not have sports categories.

Keywords: taekwondo practitioners, technical and tactical training, psychological aspect of teaching basic motor actions.

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POSSIBILITIES OF USING BREATHING EXERCISES IN THE PHYSICAL EDUCATION OF STUDENTS

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Annotation. The purpose of the study was to identify the possibilities of using breathing exercises in the process of physical education of students. The review article presents the materials of a theoretical study on the issue of increasing the functionality of the respiratory system to increase the adaptive potential of a student's body. We have revealed the directions of improving the respiratory function of students, based on the improvement of processes associated with the development of respiratory regulation reserves and the build-up of the respiratory system's power reserves, using both general means of physical training of various direction, and with the use of special breathing exercises, systems, based on voluntary breathing regulation. The directions of scientific research in the field of application of breathing exercises when working with students in physical culture and sports classes have been determined.

Keywords: breathing exercises, students, respiratory system, possibilities, physical education.

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PHYSICAL ACTIVITY IN THE SOCIO-CULTURAL PARADIGM OF SOCIETY: A RETROSPECTIVE ANALYSIS

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Annotation. This scientific and theoretical study is devoted to the issue of the relationship between the formation of a culture of physical activity and key aspects of the development of society. Having carried out a detailed retrospective analysis, we have shown the main characteristics of societies that are certain triggers in the formation of a motor culture as such. This work can serve as a basis for further research in the field of physical education, as it gives a broad idea of the history of physical culture as a subject and as a special kind of culture related to each stage of the development of society.

Keywords: history of physical education, culture of physical activity, theory of post-industrialism, information society.

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STUDY OF THE PHYSICAL ACTIVITY CULTURE VALUES

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Annotation. This scientific and theoretical work is devoted to the consideration of physical culture as a socio-cultural phenomenon. Based on the concept of Pitirim Sorokin and a number of other theoretical studies, a look at the axiological theory of the physical activity culture is presented and interaction systems, where these values are formed, are considered. This work expands the idea of the possibilities of implementing the "physical culture" subject and proposes to consider a physical culture teacher as an agent of socialization, who builds contacts not only in the real world, but also in the virtual one.

Keywords: physical activity culture, physical culture values, axiology, Maslow's hierarchy of needs.

BIOMECHANICS AND BIOENGINEERING

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INTERPRETATION OF SURFACE ELECTROMYOGRAPHY PROFILES IN NORMAL WALKING

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Annotation. This article presents a review of the literature on the interpretation of surface electromyography profiles during normal walking. Examples of graphs comparing the kinematics, kinetics and surface electromyography profile of healthy subjects were demonstrated.

The studies were carried out in the Gait Analysis Laboratory of the Ilizarov Centre. Kinetic and kinematic data were recorded with Oqus 7+ optical cameras (8 cameras from Qualisys) using passive reflective markers. Camera system was synchronized with six KISTLER dynamometric platforms (Switzerland). Muscle activity (m. Biceps femoris, Gluteus maximus, m. Gastrocnemius, m. Tibialis ant, m. Rectus femoris) was recorded using the TeleMyo Desktop DTS EMG system (Noraxon USA). When analyzing the results, it was necessary to take into account the form of muscle activity and its distribution during the step cycle, comparing it with the data of the kinematics and kinetics of the joints during walking, because the surface electromyography scaling algorithm was used in the standard clinical gait video analysis block.

Keywords: gait video analysis, surface electromyography, gait kinetics and kinematics.

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CHARACTERISTICS OF POSTURAL MOTION CONTROL OF ATHLETES OF VARIOUS SPORTS FROM THE POSITION OF DYNAMIC MOTOR STEREOTYPE FORMATION

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Annotation. The purpose of the study was to examine characteristics of postural motion control in athletes of various sports with different features of forming the dynamic motor stereotype. The study included 35 athletes, specialized in following sports: track-and-field (running), martial arts, soccer. The instrumental testing of stabilometric indicators was made with stabilometric platforms on the BTS Motion System. The results of the study have revealed that statokinetic characteristics of athletes are defined by the specificity of forming the dynamic motor stereotype during sports activity. In cyclic sports, they are defined by the formed and stable dynamic stereotype of the motor skill, the component of which is the posture, in martial arts – by the lability of the dynamic stereotype, related to constant changes in the position of the body mass center regarding the support surface, in sports games – by the labile motor skills with appropriate training of the vestibular function, in regard to turns and changes in movement direction.

Keywords: statokinetic stability, postural control, athletes, motor skill, motor dynamic stereotype.