Functional control in physical education of medical students

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Abstract

Objective of the study is to theoretically substantiate and develop operational functional monitoring of the physical condition of medical university students based on their heart rate in a standing position (at rest), which will allow for a differentiated approach to regulating students' physical activity during physical education.

Methods and structure of the study. The study was conducted from 2024 to 2025 at the Krasnoyarsk State Medical University. The sample size was 800 1st-2nd year students. The following research methods were selected to collect scientific data: analysis of scientific and methodological literature, questionnaires, physical fitness testing, pedagogical observation, surveys, measurement of heart rate while standing during practical classes and in general over the course of a year, mathematical statistics, etc.

The collected and systematised scientific and practical material contributed to the development of levels of functional readiness of medical university students based on heart rate in a standing position (at rest), which allows for the rapid monitoring and regulation of students' physical activity during physical education.

Results and conclusions. Based on the results of scientific and practical work, levels of functional readiness (high, medium, and low) of students for physical activity were developed based on monitoring heart rate in a standing position (at rest). This functional monitoring allows for the rapid assessment of students' psychophysical condition during physical education classes and timely adjustments to the teaching process. All this contributes to a differentiated approach to students' physical activity depending on their initial functional condition and timely adjustment of the physical condition of those involved in physical education.

Keywords: *functional control, physical education, medical university, students, heart rate, differentiated approach, levels.*

Introduction. Physical education for students is of great importance in the overall structure of professional education. The modern educational process in higher education is quite multifaceted, intensive and places high psychophysical demands on the mental and physical working capacity of students. In the educational process, professional competencies are effectively developed in students with an adequate level of physical fitness, which is formed in physical education classes at the university. At the same time, as shown by theoretical and practical analysis of the physical fitness of modern students, the following unfavourable trends in physical fitness indicators are noted: more than 50% of young men and 70% of young women have low physical fitness results; systematically engage in physical culture and sports (at least 3 times a week) 15% of young men and 7% of young women. Up to 70% or more of their total time is spent by modern youth on various electronic devices and gadgets, which leads to low physical activity, overloading of visual analysers, various psychological stresses, etc., which in general has a negative impact on the overall psychophysical state of modern students. All this generally prevents students from performing the necessary physical activity in physical education classes and, accordingly, from developing the necessary physical fitness. Particular attention should be paid to

medical university students, who, due to their specialised medical training, undergo a fairly intensive and lengthy educational process, leading to various mental and psychological stresses. All this leads to the fact that in physical education classes, medical university students experience psychophysical inconsistency, unwillingness to perform physical exercises, and low motor motivation. In this regard, it is important to assess the initial psychophysical readiness of medical university students to perform physical activities and their emotional readiness for motor recreation. To quickly determine the level of students' readiness for classes, functional monitoring of heart rate is proposed, which will allow for a selective and differentiated approach to the pedagogical process of physical education of young people in accordance with their functional and emotional readiness. This work is presented in this direction.

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Results of the study and discussion. Upon completion of the work, levels of functional readiness of students for physical education classes were developed based on operational monitoring of heart rate in a standing position (at rest).

This was based on statistical data that included more than 2,000 measurements of heart rate in a standing position (at rest) per minute. Measurements were taken from students throughout the academic year during physical education classes. The statistical data collected contributed to the development of functional status levels: high, medium, low. Calculations were made based on the average group values of the sample, and then the functional levels were calculated according to the sigma deviations – ($\bar{X} \pm \sigma$) Table 1.

Table 1 – Levels of functional readiness of students based on heart rate in a standing position (at rest) per minute

Heart rate while standing (at rest) per minute	Functional readiness levels
75 – 80 bpm	High
82 – 90 bpm	Medium
93 – 110 > bpm	Low

Table 2 – Content of practical classes for students with different levels of functional readiness.

Functional readiness levels	Content of practical training sessions	Permissible HR (heart rate)
High	Walking, running exercises, general developmental exercises, strength and speed-strength exercises, agility and coordination exercises, sports games, athletics exercises, etc. 80% of exercises are dynamic and 20% are performed in a standing or sitting position.	130 – 180 bpm
Medium	Walking, running exercises, general developmental exercises, strength training, developing mobility of the musculoskeletal system, playful exercises. 50% of exercises are dynamic and 50% are performed in a standing or sitting position	120 – 160 bpm
Low	Walking, measured running exercises, development of musculoskeletal mobility, general developmental exercises, exercises in pairs, at the wall bars, various exercises with objects (gymnastic stick, ball, etc.). 85% of the exercises are performed in a standing and sitting position and 15% in a dynamic position.	120 – 140 > bpm

Based on operational monitoring of students' functional condition before the start of physical education classes, the teacher distributes students into groups according to their initial level of functional readiness: high, medium and low. In accordance with the level of functional readiness, the teacher organises the physical education process in groups in a differentiated manner.

Table 2 shows the content of practical physical education classes for students with different levels of functional readiness (high, medium and low).

Table 2 presents a set of physical exercises for students depending on their functional readiness, as well as the acceptable heart rate during these classes and the percentage ratio of dynamic and static exercises.

Conclusions. The levels of functional readiness of students in medical universities, developed on the basis of heart rate in a standing position (at rest), contribute to the operational control and management of the physical condition of students, a differentiated approach to regulating physical activity in classes, and a more effective and progressive formation of the proper physical fitness of future doctors. These scientific and methodological developments can be recommended for students at other universities in the country.

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