



Impact of adaptive physical education on health of students from various nosological groups

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Abstract

Objective of the study was to identify the impact of adaptive physical education on the health of students from various nosological groups.

Methods and structure of the study. In the postoperative period, the students with disabilities, chronic diseases, and injuries were transferred to the adaptive physical education groups for health reasons. They attended adaptive physical education lessons twice a week, just as the main and preparatory groups. The lessons were disease-driven. The groups were formed of 8-10 students with due regard to their nosology, including 2-3 students with disabilities – with the same degree of the motor defect; students with different defects attended one-on-one training sessions.

The physical loads for corrective purposes – to expand the motor sphere of the disabled students – were designed based on the knowledge of the specifics of functioning of the cardio-respiratory, nervous and locomotor systems. At the beginning and at the end of the academic year, 32 students with special needs (19 girls and 13 boys) and 137 students attributed to the special health group (108 girls and 29 boys) were subjected to the health express-tests (as provided by G.L. Apanasenko's health rating method) [1], including the calculation of the Quetelet body mass index (QI), strength index (SI), birth-death ratio (BDR), and Robinson index (RI). The adaptive capabilities of the cardiovascular system in the recovery period were also evaluated by the Martine Probe (20 squats for 30 s).

Results and conclusions. Adaptive physical education classes designed for physically disabled students from various nosological groups were proved to facilitate the improvement of their adaptive capabilities and physical working capacity.

Keywords: *students, adaptive physical education, morbidity, health level.*

Background. In the Russian Federation, the number of persons with health disorders who need special conditions to be provided for their normal physical, mental and social development is increasing from year to year. In most of higher educational institutions, students with special needs are excused from attending physical education lessons and get a credit/exam on the basis of a medical fitness certificate, academic attendance, and essay grades. However, these students need physical education and sports activities that would contribute to the ultimate subsistence and self-realization in society [2, 3].

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Results and discussion. The analysis revealed that in 2017-2018, 155 students from Udmurt State University attended the adaptive physical education lessons, while in 2018-2019 it was 206 students already, which is 41.7% higher, compared to the previous year. It should also be noted that both in 2017-2018 and 2018-2019 academic years, the number of students excused from attending physical education lessons and transferred to the adaptive physical education groups increased from the 1st to the 3rd years of study.

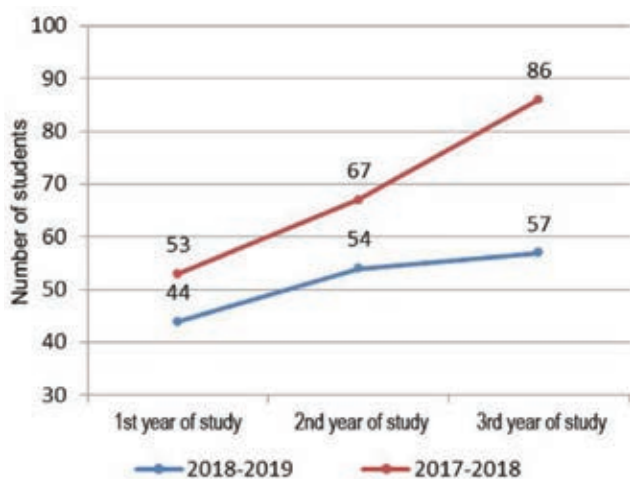


Fig. 1. Number of 1st-3rd-year students involved in the adaptive physical education groups

Based on the nosological characteristics, the students were divided into four groups. The majority of the students (37.5%) were diagnosed with cardio-respiratory disorders, 32.9% - with locomotor disorders, 15.9% - with gastrointestinal and excretory disorders, and 13.7% - with nervous disorders. It should be emphasized that the number of students with disabilities in the 2017-2018 and 2018-2019 academic years was 20.5% of the number of students attending adaptive physical education lessons.

The G.L. Apanasenko's health rating method was used to assess the health level of students transferred to the adaptive physical education groups at the beginning and at the end of the semester to evaluate their somatic health and energy biopotential of each student.

The analysis of the health level revealed low Quetelet index values for both girls and boys at the beginning of the semester, showing poorly developed skeletal muscles or overweight, as well as obesity. Both girls and boys were found to have reduced respiratory function as evidenced by the birth-death ratio.

The analysis of the Robinson index rates also revealed a low cardiovascular functionality in the students exempted from physical education lessons for health reasons, indicating dysregulation of the cardiovascular system. The strength index in this student population was also rated as low, indicating their low strength fitness level.

The recovery period after 20 squats indicated the reserve capacity of the cardiovascular system. Thus, it took the students quite long to recover, proving the low cardiovascular system functionality.

The analysis of the health indicators in the students exempted from physical education lessons and transferred to the adaptive physical education groups showed that 41% of the students had an average health level, while 35.9% and 23.1% - below average and low health levels respectively. The above

Table 1. Health rates in students involved in adaptive physical education groups

Sex	Period	Quetelet index, gm/cm	Birth-death ratio, ml/kg	Strength index, kg*100%	Robinson index, bpm*mmHg/100	Recovery time, s	Health level, points
Girls	Beginning of semester	385.6±4.7	43.6±1.2	41.2±0.9	100.4±3.8	106.3 ±4.2	4.8±0.7
	End of semester	350.4± 3.3*	47.2±1.6*	43.7±1.1	92.6±4.7	98.5±3.8*	6.4±0.9
Boys	Beginning of semester	423.3 ±5.4	41.1±2.1	55.1 ±3.7	108.3± 2.8	124.1 ±3.6	4.4±0.8
	End of semester	411.82±4.6*	48.5±2.8*	57.3±4.1	92.4±2.9*	112.7±3.2*	8.2±1.2*

* - significance of differences between the indices at p≤0.05

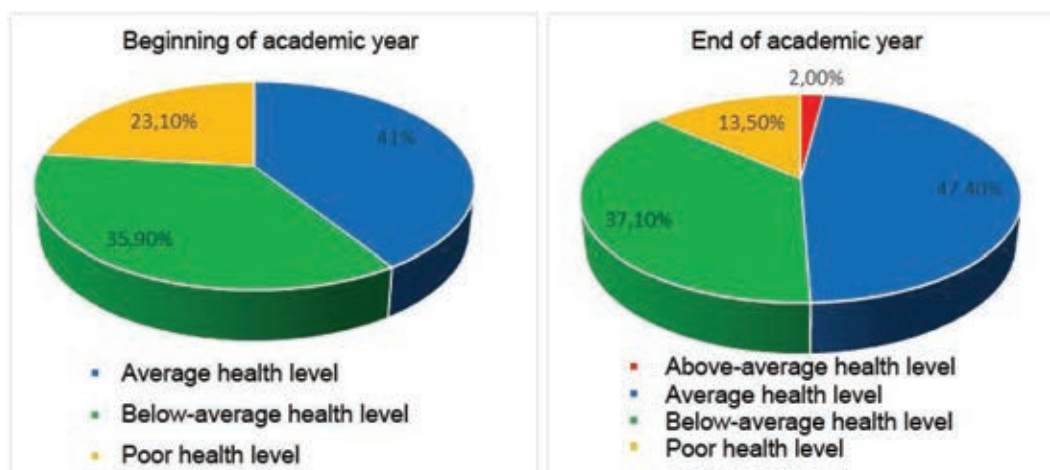


Fig. 2. Health rates in students involved in adaptive physical education activities at the beginning and end of the academic year

average and high health levels were not detected, which indicated that this category of students had reduced adaptive capabilities and functional state of the body. Therefore, by exempting such students from physical education lessons, we condemn them to develop serious pathologies at young age.

At the end of the academic year a shift in the health level of both girls and boys at $p \leq 0.05$ was detected. For example, a significant increase was observed in the Quetelet index, which indicated a weight reduction and a risk of developing overweight-related diseases. The birth-death ratio and Robinson index rates increased, showing an increase in the body's reserve capacity, improvement of economization and regulation of cardiovascular activity. There was also a positive tendency in the students' hand strength, and the strength index increased slightly in both boys and girls.

These small shifts may indicate that physical loads are insufficient to develop strength in this category of students, which should be brought to the teachers' attention, who should correct physical loads by including dosed strength and resistance exercises. The overall health level of the students

transferred to the adaptive physical education groups improved, with the physical development level being above average in 2% of the students, average level – in 47.4%, below average – in 37.1%, and low – in 13.5% of the students.

Conclusion. Adaptive physical education classes designed for physically disabled students from various nosological groups were proved to facilitate the improvement of their adaptive capabilities and physical working capacity.

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