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Changes in the indicators of the physical condition of students under the influence of classes in sports sections

Ihor Sukhenko

Eastern Ukrainian National University. V. Dahl, Severodonetsk, Ukraine

Purpose: *investigate changes in the indicators of the physical condition of students under the influence of classes in sports sections.*

Material & Methods: *to solve the purpose, the following research methods were used: analysis and synthesis of references, methods for determining the functional state of the body, methods for assessing the level of physical health (using the methodology of G. L. Apanasenko), methods for determining motor activity, methods of mathematical statistics. The study involved 50 students of Volodymyr Dahl East Ukrainian National University Severodonetsk.*

Results: *it was found that under the influence of classes in the sports sections of martial arts, the greatest improvement in physical condition indicators was observed. In the experimental groups (in martial arts and athletics) a greater positive trend was recorded than in the control group. An analysis of the practice of martial arts for indicators of the physical condition of students allows us to state that a marked optimization of the work of the cardiovascular and respiratory systems was noted. The positive effect of sectional athletics on physical condition indicators, especially on speed, was recorded. The study confirmed the feasibility of using sectional classes in martial arts and athletics with students.*

Conclusions: *experimental materials presented in this study allowed us to state the pronounced positive effect of classes in athletics and martial arts sports sections on physical condition indicators, namely, on the functional state, level of physical performance and physical health of boys and girls aged 17–18. The most pronounced differences are observed in the indices of Rufe, Stange, Genchi, who significantly ($p<0.01$ (EG-1), $p<0.001$ (EG-2)) improved in both experimental groups.*

Keywords: *physical activity, physical condition, students, healthy lifestyle, physical performance, athletics, martial arts.*

Introduction

Statistical data indicate a deterioration in health, an increase in the incidence of diseases, and various deviations in the state of health of today's young people [10]. Along with an increase in the incidence of students, there is deterioration in physical health indicators, their inconsistency with generally accepted standards. Among the factors affecting the increase in the incidence of students and the low level of physical development, it should be noted the lack of physical activity. The combination of factors determines the level of physical fitness and efficiency, which, in turn, are important indicators of professional training of students.

At present, among students, there is a tendency to deterioration in the level of the general physical state of their body, in particular, physical fitness, as well as the functional state of the leading physiological systems and the level of physical health in general. According to the World Health Organization (WHO), more than 80% of children and adolescents have significant deviations in their health status. At the same time, one of the most promising ways to solve this problem is the development and implementation of health-improving technologies in the educational process [1; 2].

The tasks related to improving physical fitness and improving the health of young people still remain a serious state problem [4; 5; 7].

The specifics of training in institutions of higher education and the age characteristics of a growing organism place high demands on all functional systems [6]. Some researchers indicate that during their studies in institutions of higher education, students' health tends to deteriorate against the background of a decrease in their physical activity [3; 8]. Preserving and strengthening the health of student youth is one of the most important tasks facing universities. Successful training of highly qualified specialists is closely related to improving the health and improving the performance of students.

Only 35–40% of the total daily motor need of students satisfies physical education programs for higher education programs [8]. The fact that most students lack the necessary motivation to exercise further aggravates the situation. Meanwhile, the level of manifestation of the basic motor abilities of young people in higher educational institutions, which is achieved in the process of regulated physical education classes, does not meet the needs of the present [9]. Many researchers note that the existing system of physical education in universities requires further improvement and development. At the present stage, issues related to the development and improvement of basic physical qualities, in particular, speed-strength qualities, are of particular relevance.

There is a contradiction between the growing demands on the training process of physical education and the limited capabilities of the traditional methodology, which does not allow for increasing the level of physical fitness and does not contribute to improving the functional state of students. There is a need to find the most effective means and methods of physical training, corresponding to the functional capabilities of the student's body. Issues related to the use of martial arts to en-

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hance the impact on physical condition and eliminate the adverse effects that characterize the activities of students and, to a greater extent, university students, are highly relevant and have not yet been adequately reflected in the practice of physical education. The lack of consensus on many issues of choice and effectiveness of the methods and methods used to improve the students' physical condition indicates that this issue has not been studied enough.

Purpose of the study: investigate changes in the indicators of the physical condition of students under the influence of classes in sports sections.

Material and Methods of the research

Analysis of the scientific and methodological literature has shown that the recommendations in the literature on the development and improvement of physical qualities among students are divided and contradictory. The choice of training tools, methods, and most importantly, the magnitude of physical activity is empirical. This necessitates research in this area.

To solve this goal, such research methods were used – analysis and synthesis of literature, methods for determining the functional state of the body, methods for assessing the level of physical health (according to the method of G. L. Apanasenko), methods for determining motor activity, methods of mathematical statistics. Material systematization and initial mathematical processing were performed using Microsoft® Excel tables.

Studies were conducted on the basis of the Volodymyr Dahl East Ukrainian National University. The study involved 50 students EUU them. V. Dahl. Severodonetsk. The presented contingent of students was involved in the study voluntarily with written consent to participate in all stages of the experiment, as well as to further analysis and disclosure of their personal data when reviewing and reporting on the research results.

Results of the research

Physical condition is a combination of indicators such as physical performance, physical development and physical fitness. The level of physical fitness of students is influenced by regular exercise.

Studies of a significant number of authors on this problem have shown the positive effect of systematic physical education and sports on such components of the general physical condition as the level of health and functional state of the body develops [11; 12].

The physical fitness of students is closely related to the level of motor activity and physical fitness. Therefore, physical education classes, which for the majority of students are the only means of increasing motor activity, are of great importance for strengthening and maintaining the health of the younger generation. Students with a higher level of motor activity, physical fitness and work ability have the best ability to mobilize memory, emotional stability and more confidence in their actions. It is known that the most effective for development of motor potential and strengthening of students' health is the use in the process of physical education of means of sports training.
The hypothesis of this study is the assumption of improved indicators of the physical condition of students under the influence of sectional exercises in athletics and martial arts.

For the purpose of the work, an experimental study was conducted of 35 young men and 15 girls aged 17–18 years old for 8 months, students of the 1st course of the EUU V. Dahl. All students and students were divided into three groups: the first experimental group (EG-1) (10 young men and 5 girls), whose representatives, in addition to compulsory physical education, also engaged in athletics in the section (short-distance running), the second experimental (EG-2) (10 boys and 5 girls), representatives of which also additionally, in addition to compulsory physical education classes, were engaged in martial arts, and control (CG) (15 boys and 5 girls), whose representatives were engaged in physical education according to the traditional program for higher educational institutions. Compulsory physical education classes were held once a week. Classes were held in sections three times a week. Testing of motor skills (indicators of physical fitness and physical development) of students was carried out using the following exercises: shuttle running 4x9 m, 100 m run, standing long jump, push-ups in the support lying on the floor (girls), pulling up on the crossbar (young men). A comparative assessment of the cardiovascular and respiratory systems was carried out using

Table 1

Indicators of students' physical condition at the beginning of the experiment (boys), $\bar{X}\pm m$

No. i/o	Test name	CG	EG-1 compared to CG		EG -2 compared to CG	
1.	Standing long jump, cm	217,2±1,72	218,1±1,75	t=0,37 (p>0,05)	215,8±1,69	t=0,58 (p>0,05)
2.	Pulling up on the crossbar, number of times	10,7±0,55	10,5±0,48	t=0,27 (p>0,05)	11,1±0,53	t=0,52 (p>0,05)
3.	Shuttle running 4x9 m, s	10,2±0,12	10,4±0,1	t=1,28 (p>0,05)	10,3±0,11	t=0,61 (p>0,05)
4.	100 m run, s	14,8±0,17	14,6±0,15	t=0,91 (p>0,05)	14,7±0,14	t=0,47 (p>0,05)
5.	Rufie test, c. u.	10,43±0,13	10,36±0,11	t=0,41 (p>0,05)	10,52±0,16	t=0,44 (p>0,05)
6.	Stange test, c. u.	60,36±0,69	61,7±0,61	t=1,45 (p>0,05)	62,17±0,64	t=1,92 (p>0,05)
7.	Genchi test, c. u.	33,1±0,37	32,2±0,38	t=1,7 (p>0,05)	33,5±0,32	t=0,82 (p>0,05)

the Rufie test, the Stange test and the Genchi test. Indicators of physical condition of students at the beginning and at the end of the experiment are reflected in tables 1–4. The students of the control group classes were held 1 time per week, and in the experimental – 4.

At the beginning of the study, no significant intergroup differences between the boys and girls of the experimental and control groups were recorded (Tables 1, 2).

Analysis of test results after 8 months of classes showed that students of experimental groups, compared with the results of students of the control group, have the best performance for all the tested tests (Tables 3, 4).

In the control group after the experiment, indicators of physical condition did not improve significantly. In young men, the indicators significantly improved relative to the initial results in the shuttle run – by 6,25% ($p<0,01$), in the run for 100 m – by 8,03% ($p<0,001$) and Shtange test – by 3,85% ($p<0,05$) (Table 3). At the end of the experiment, for girls in the CG, the indicators significantly improved with respect to the initial results of the Stange test – by 5,88% ($p<0,01$) and the Genchi test by 4,05% ($p<0,05$) (Table 4).

The greatest improvements in physical indicators in the Rufie, Stange and Genchi samples at the end of the experiment were found in a group of students engaged in martial arts, which indicates that the functions of the cardiovascular and respirato-

Table 2

Indicators of students' physical condition at the beginning of the experiment (girls), $\bar{X}\pm m$

No. i/o	Test name	CG	EG-1 compared to CG		EG-2 compared to CG	
1.	Standing long jump, cm, cm	170,3±1,93	169,4±2,11	t=0,31 (p>0,05)	171,4±1,85	t=0,41 (p>0,05)
2.	Push-ups in the support lying on the floor, number of times	15,1±1,06	15,7±1,18	t=0,38 (p>0,05)	15,8±1,25	t=0,43 (p>0,05)
3.	Shuttle running 4x9 m, s	11,2±0,12	11,1±0,15	t=0,52 (p>0,05)	11,4±0,17	t=0,96 (p>0,05)
4.	100 m run, s	17,4±0,16	17,6±0,19	t=0,26 (p>0,05)	17,3±0,18	t=0,42 (p>0,05)
5.	Rufie test, c. u.	11,9±0,14	11,57±0,13	t=1,73 (p>0,05)	11,63±0,12	t=1,46 (p>0,05)
6.	Stange test, c. u..	54,25±0,61	55,94±0,57	t=2,02 (p>0,05)	55,71±0,55	t=1,78 (p>0,05)
7.	Genchi test, c. u.	28,7±0,33	28,6±0,31	t=0,22 (p>0,05)	28,3±0,28	t=0,92 (p>0,05)

Table 3

Indicators of students' physical condition at the end of the experiment (boys)

No. i/o	Test name	CG at the beginning and at the end of the experiment	EG-1 compared to CG		EG -2 compared to CG	
1.	Standing long jump, cm	219,5±2,15 t=0,84 (p>0,05)	228,4±2,03	t=3,01 (p<0,01) Δ=3,8%	224,8±1,95	t=1,83 (p>0,05)
2.	Pulling up on the crossbar, number of times	11,3±0,39 t=0,89 (p>0,05)	11,4±0,41	t=0,18 (p>0,05)	12,1±0,45	t=2,35 (p<0,05) Δ=12,4%
3.	Shuttle running 4x9 m, s	9,6±0,12 t=3,54 (p<0,01) Δ=6,25%	9,2±0,1	t=3,2 (p<0,01) Δ=5,5%	9,1±0,09	t=2,67 (p<0,05) Δ=4,2%
4.	100 m run, s	13,7±0,14 t=5,17 (p<0,001) Δ=8,03%	13,4±0,17	t=2,27 (p<0,05) Δ=3,8%	13,2±0,15	t=1,46 (p>0,05)
5.	Rufie test, c. u.	10,15±0,11 t=1,64 (p>0,05)	9,47±0,1	t=4,57 (p<0,001) Δ=7,2%	8,93±0,12	t=7,49 (p<0,001) Δ=12,02%
6.	Stange test, c. u.	62,78±0,63 t=2,59 (p<0,05) Δ=3,85%	66,22±0,65	t=3,8 (p<0,01) Δ=5,2%	71,14±0,72	t=8,74 (p<0,001) Δ=13,32%
7.	Genchi test, c. u.	33,61±0,32 t=1,04 (p>0,05)	35,51±0,38	t=3,82 (p<0,01) Δ=5,4%	37,24±0,35	t=7,65 (p<0,001) Δ=10,8%

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Table 4

Indicators of students' physical condition at the end of the experiment (girls)

No. i/o	Test name	CG at the beginning and at the end of the experiment	EG-1 compared to CG		EG-2 compared to CG	
1.	Standing long jump, cm, cm	174,6±1,83 t=1,62 (p>0,05)	180,3±1,95	t=2,13 (p>0,05)	178,7±1,76	t=1,61 (p>0,05)
2.	Push-ups in the support lying on the floor, number of times	17,9±0,62 t=2,28 (p>0,05)	18,7±0,45	t=1,04 (p>0,05)	20,1±0,57	t=2,61 (p<0,05) Δ=12,3%
3.	Shuttle running 4x9 m, s	11±0,12 t=1,18 (p>0,05)	10,7±0,13	t=4,69 (p<0,01) Δ=8,9%	10,6±0,15	t=2,26 (p>0,05)
4.	100 m run, s	17,1±0,18 t=1,25 (p>0,05)	16,5±0,17	t=3,74 (p<0,01) Δ=5,6%	16,2±0,16	t=2,42 (p>0,05)
5.	Rufie test, c. u.	11,6±0,13 t=1,57 (p>0,05)	10,9±0,12	t=3,96 (p<0,01) Δ=6,4%	10,3±0,11	t=7,63 (p<0,001) Δ=11,21%
6.	Stange test, c. u.	57,64±0,57 t=4,06 (p<0,01) Δ=5,88%	61,32±0,65	t=4,26 (p<0,01) Δ=6%	63,83±0,68	t=6,98 (p<0,001) Δ=10,74%
7.	Genchi test, c. u.	29,91±0,31 t=2,67 (p<0,05) Δ=4,05%	31,9±0,34	t=4,33 (p<0,01) Δ=6,2%	33,78±0,35	t=8,28 (p<0,001) Δ=12,94%

ry systems work better in them. In the EG boys, in the control exercises, the indicators significantly improved in relation to the control group of the Rufie test – by 12,02% (p<0,001), the Shtange test – by 13,32% (p<0,001) and the Genchi test – by 10,8% (p<0,001) (Table 3). At the end of the experiment, the girls in the group of oriental martial arts significantly improved relative to the control group of the Rufй test – by 11,21% (p<0,001), the Stang's test – by 10,74% (p<0,001) and the Genchi test – by 12,94% (p<0,001) (Table 4).

Martial art is a universal sport that positively affects the state of the whole organism. Regular martial arts exercises have a positive effect on the nervous and cardiovascular systems; they are an effective means of developing the respiratory system. Exercises from the arsenal of martial arts should not replace the program lessons, but only supplement them, provide an opportunity to update and expand their content, increase the level of physical activity for a young body.

An analysis of the data presented showed that, although not essential for boys and girls, only by 4,2% (boys), but reliably (p<0,05), the results from the shuttle run improved, indicating a significant improvement in speed performance (Table 3). Studies have shown that to a greater extent, there were changes in the indicators for pulling up on the crossbar by 12.4% (boys, p<0,05) and by 12,3% by flexing and push-ups in the support lying on the floor (girls, p<0,05), indicating significant improvement of strength quality (Table 3, 4).

Boys and girls who were systematically engaged in the sections on athletics, there was a positive dynamics of the studied parameters. So, for students there was a tendency towards a more pronounced rate of improvement of the level of physical condition, physical performance, functional state of the external respiration system, as well as the level of physical health. Significant improvement in performance at the end of the experiment in EG-1 compared with the CG was observed:

– at a boys: in standing long jump – by 3,9% (p<0,01), in shuttle run – by 5,5% (p<0,01), in running at 100 m – by 3,8 % (p<0,05), in the Rufie test, by 7,2% (p<0,001), in the Strange test, by 5,2% (p<0,01), in the Ghency test, by 5,4% (p<0,001) (Table 3);

– at a girls: in shuttle run – by 8,9% (p<0,01), in running at 100 m – by 5,6% (p<0,01), in the Rufie test – by 6,4% (p<0,01), in the Strange test – by 6% (p<0,01), in the Ghency test – by 6,2% (p<0,01) (Table 4).

Conclusions / Discussion

The study confirmed the results of the authors [3, 8; 10] about the need to study changes in the indicators of the physical condition of students under the influence of various sports, and deepens the data of scientists [3; 9; 11] for that matter.

The conducted studies allowed establishing reliable changes in the indicators of physical condition and physical development in students of the experimental and controlling groups. The most pronounced differences were observed in the indices of Rufie, Stange, Genchi, who significantly (p<0,01 (EG-1), p<0,001 (EG-2)) improved in relation to the CG indicators.

Under the influence of classes in the martial arts sections, a pronounced optimization of the functioning of the cardiovascular and respiratory systems was established. The study

confirmed the feasibility of classes in the sections of martial arts for students.

The presented experimental materials allowed to ascertain the positive effect of sectional exercises in athletics on the indicators of the functional state of the cardiovascular and respiratory systems, the level of physical performance and physical health of boys and girls.

Prospects for further research in this direction will be the possibility of improving indicators of the physical condition of students through sectional classes in other sports.

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Information about the Authors

Ihor Sukhenko: *Eastern Ukrainian National University. V. Dahl: Central 59th Avenue, Severodonetsk, 93400, Ukraine*.
ORCID.ORG/0000-0002-7319-1085
E-mail: sukhenkoihor@gmail.com

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