ORIGINAL SCIENTIFIC ARTICLE

PECULIARITIES OF FUNCTIONAL AND MOTOR FITNESS OF 1ST–5TH YEAR STUDENTS OF SPECIAL MEDICAL DEPARTMENT

Serhii Chernenko^{1ABCD}, Oleg Oliynyk^{2ABCD}, Iuriy Dolynnyi^{3ABCD},
Oleg Honcharenko^{4ABCD}, Kateryna Hordieieva^{5ABCD}

^{1,2,3,4}Donbas State Engineering Academy

⁵State Higher Educational Institution “Donbas State Pedagogical University”

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Corresponding Author: Serhii Chernenko, E-mail: chernenko.sergey65@ukr.net

Accepted for Publication: December 20, 2020

Published: December 25, 2020

DOI: 10.17309/tmfv.2020.4.03

Abstract

The objective of the study was to determine the age-related peculiarities of functional and motor fitness of students of a special medical department of higher education institutions.

Material and methods. The study participants were 1st year (n = 34); 2nd year (n = 14); 3rd year (n = 58); 4th year (n = 21); 5th year (n = 16) male students. One group was organized in each year of study, which added up to five experimental groups. All the students participated in physical education classes twice a week. To solve the tasks set, the following research methods were used: analysis of scientific literature, pedagogical observation, pedagogical testing, formative experiment, index method, biomedical methods, and methods of mathematical statistics. During classes, the study used the method of strictly regulated exercise (motor density of the class was 50-70%), for developing general endurance – the continuous method with covering a distance of 1,000-2,000 m (heart rate: 120-150 beats per minute), circuit and repetition methods.

Results. The study results show positive changes in the functional state of the respiratory system and speed and strength abilities in the 1st–5th year students of the special medical department ($p < 0.05$).

Conclusions. A successful development of the basic functional body systems and motor abilities in 1st-5th year students can be achieved under the influence of pedagogical conditions, namely: the method of strictly regulated exercise using exercise equipment (motor density of the class was 50-70%); the continuous method with covering a distance of 1,000-2,000 m at a slow pace (heart rate: 120-150 beats per minute); circuit and repetition methods.

By the results of comparative analysis of the functional and motor fitness, the 1st–5th year male students of the special medical department show better results in tests for assessing the cardiovascular and respiratory systems, speed and strength abilities. In the 18-22 age range, according to the Ruffier index, there is an increase in the number of male students of the special medical department with a “good” and “satisfactory” cardiovascular system state and a decrease in the number of students with a “bad” result.

Keywords: male students, Stange test, Genchi test, Ruffier index, breath-hold.

Introduction

The solution to the problem of increasing the recreational process effectiveness in special medical groups is associated with knowing the peculiarities of development of the functional state (Kopeikina, Drogomeretsky, Kondakov, Kovaleva, & Iermakov, 2016; Koryahin, Blavt, Gurtova, & Serbo, 2019; Solohubova, Lakhno, Shyyan, & Shyyan, 2020)

and motor fitness of students (Drozd, 1998; Serorez, 2014; Koryahin, Blavt, & Ponomaryov, 2019).

Studies focus on the organization of pedagogical control in physical education classes (Ivashchenko, 2020; Koryahin, Blavt, & Ponomaryov, 2019), means and methods of influence (Chen, Dai, & Gao, 2017; Ivashchenko, Khudolii, Iermakov, Lochbaum, Cieslicka, Zukow, Nosko, & Yermakova, 2016; Skead & Rogers, 2016), and also on the use of pedagogical techniques of physical education with different nosologies in the educational process (Adyrkhaev, 2016; Bondar, 2000; Orikhovska, Andrieieva, Kashuba, Lazarieva, Lytvynenko, Kirichenko, Arefyiev, & Khrypko, 2020).

© Chernenko, S., Oliynyk, O., Dolynnyi, Iu., Honcharenko, O., Hordieieva, K., 2020.

However, the existing scientific literature pays insufficient attention to studying the peculiarities of functional and motor fitness dynamics of 1st–5th year students of special medical departments, taking into account their age, gender, and type of disease.

The objective of the study was to determine the age-related peculiarities of functional and motor fitness of students of a special medical department of higher education institutions.

Material and methods

Study participants

The study participants were 1st year (n = 34); 2nd year (n = 14); 3rd year (n = 58); 4th year (n = 21); 5th year (n = 16) male students of Donbas State Engineering Academy, Kramatorsk. According to the results of medical examination, the students belonged to a special medical department with nosologies: vision, hearing, musculoskeletal system.

Study organization

To solve the tasks set, the following research methods were used: analysis and generalization of scientific and methodological literature, index method and biomedical methods, pedagogical testing, pedagogical observation and formative experiment, methods of mathematical statistics.

One group was organized in each year of study, which added up to five experimental groups. All the students participated in physical education classes twice a week. During classes, the study used methods of strictly regulated exercises using exercise equipment (motor density of the class was 50–70 %). To develop general endurance, the study used the continuous method with covering a distance of 1,000–2,000 m at a slow pace (heart rate: 120–150 beats per minute), sports games (basketball, football), circuit and repetition methods. Various forms of additional independent physical activities, including morning exercises, physical activity breaks, physical education homework became an important part of the SMG students' health improvement.

The testing program included motor tests given in Tables 1–5 (Cooper, 1970; Krucevich & Bezverkhnia, 2011; Romanenko, 1999; Serhiyenko, 2001). The Stange test, Genchi test, and Romberg test were used to assess the functional state (Dubrovskij, 2005).

Testing procedure

Ruffier Index. The test was used to assess the cardiovascular system activity. *Equipment required.* Stopwatch.

Test description. On command, the subject, after 5 minutes of sitting calmly, counts the number of pulses for 15 seconds, then performs 30 squats for 45 seconds. Immediately after squatting, the pulse is measured for the first 15 seconds and the last 15 seconds from the first minute of the recovery period.

The testing result is the Ruffier index (RI), which is calculated by the formula:

$$RI = \frac{4(f_0 + f_1 + f_2) - 200}{10}$$

where f_0 is the heart rate before the load for 15 s; f_1 is the heart rate after the load; f_2 is the heart rate for the last 15 s from the first minute of recovery.

The cardiovascular system activity was assessed according to the index result.

The Ruffier index is less than 0 – athletic heart;

0.1–5 – excellent (very good heart);

5.1–10 – good (good heart);

10.1–15 – satisfactory (heart with moderate insufficiency);

15.1–20 – bad (heart with significant insufficiency).

General instructions and remarks. When measuring the pulse, the student places 2–4 fingers on the inside of his left hand near the thumb and gently presses the artery to the bone or places his hand on the carotid artery (it is comfortable to do this on the right side). Upon the instructor's command and simultaneous start of the stopwatch, the counting begins for 15 seconds with further recalculation for 1 minute.

Romberg test. The test was used to assess static balance. *Equipment required.* Stopwatch.

Test description. On command, the subject is asked to stand steadily on one leg. The other leg is bent, and its heel touches the knee joint of the support leg, hands on hips, head held straight. It is necessary to keep this position as long as possible. The stopwatch starts recording time after the stable position is adopted, and stops at the moment when balance is lost or the eyelids and fingers begin twitching.

General instructions and remarks. The student should do the exercise with his eyes closed. Time is recorded to the nearest 1 second. The stable position is maintained on the right and left legs. The best result is entered in the protocol.

Stange test (voluntary inspiratory breath-hold). The test was used to assess the respiratory system activity.

Equipment required. Stopwatch. The subject stands and does several deep breathing cycles. After a full inhale, he closes his mouth (tightly closes his lips) and pinches the wings of his nose with his thumb and index finger. The stopwatch determines the time from the moment of breath-hold to its recovery. The respiratory system activity was assessed by the indicator of breath-hold duration:

more than 90 s – excellent;

from 60 to 90 s – good;

from 30 to 60 s – satisfactory;

less than 30 s – bad (unsatisfactory).

Genchi test (expiratory breath-hold). The test was used to assess the respiratory system activity. After several breathing cycles, the subject fully exhales, closes his mouth and pinches his nose with his fingers. The stopwatch records the time of breath-hold. The respiratory system activity was assessed by the indicator of breath-hold duration:

more than 50 s – excellent;

from 35 to 50 s – good;

from 20 to 35 s – satisfactory;

less than 20 s – bad (unsatisfactory).

Standing long jump (cm). The test was used to assess speed and strength abilities.

Equipment required. Carpet or gymnastic non-slip mats, tape measure, chalk.

Test description. The subject stands in the starting position with feet shoulder-width apart, toes behind the start line, swings his arms backward, then sharply forward and, taking off with both feet, jumps as far as possible. The test result is the distance jumped, measured in centimeters from the start

line to the nearest point where the heel touched the carpet (mat). Two attempts were allowed (three times each), the best result was recorded.

General instructions and remarks. The test is carried out in accordance with the rules for running long jump competitions. The places of take-off and landing must be at the same level.

Running a distance of 2,500 (meters). The test was used to determine general endurance.

Equipment required. Stopwatches. (One for each time-keeper). Carefully measured distance (it should be measured along the line passing at a distance of 15 cm from the inner edge of the track). Starting pistol or flag.

Test description. For male and female students the testing conditions are the same (the only difference is the distance length). On the "Ready!" command, the subjects stand behind the start line in a standing start position. When everyone is ready, on the "Go!" command (or after the starting shot) they start running. The students should try to run the distance. If necessary, they are allowed to walk. The test result is the time taken to cover the distance to the nearest 1 second.

General instructions and remarks. The track should be smooth and in good condition. Weather conditions should be such that the subjects can show the best results. Only one attempt is allowed.

Statistical analysis

The results obtained were processed using descriptive statistics of the licensed Excel package. The study calculated: arithmetic mean ($\bar{x}$), error in calculating the arithmetic mean (s); significance of difference between mean values (t). The significance of difference between statistical indicators (t) was evaluated using the Student's t -test.

Results

Table 1 shows the results of the analysis of functional and motor fitness of the 1st and 2nd, 3rd, 4th, 5th students. Elementary statistics were analyzed.

In students aged 18 and 20 (1st and 3rd year of study), no statistically significant changes are observed in the set of tests, except for the Stange test (69.8 s) and Standing long jump (220.10 cm), ($p < 0.05$).

Male students aged 18 and 21 (1st and 4th year of study) differ statistically significantly in the set of tests ($p < 0.05$). Significant positive changes in the functional state were observed in the Stange test (74.9 s), Genchi test (46.1 s), and the result of jumping improves (224.5 cm), ($p < 0.05$). This indicates that the men are capable of demonstrating speed and strength efforts and holding their breath for a longer time. The Ruffier index, Romberg test, endurance running are unchanged.

In students aged 18 and 22 (1st and 5th year of study), there is deterioration in Standing long jump (182 cm) and significant improvement in the Genchi test (44.2 s – "good"). The results of Ruffier index, Romberg test, inspiratory breath-hold, running (2,500 m) change statistically insignificantly.

Table 2 shows the results of the analysis of functional and motor fitness of the 2nd and 1st, 3rd, 4th, 5th year students. Male students aged 19 and 20 (2nd and 3rd year of study) show significant changes in the indicators of the respiratory system and motor fitness. Thus, at the age of 20, there is improvement in inspiratory breath-hold (69.8 s), static balance (4.5 s), ($p < 0.05$).

In students aged 19 and 21 (2nd and 4th year of study), no significant changes are observed in the set of tests, except for the Stange test (74.86 s – "good").

At the age of 22, only the indicator of speed and strength abilities considerably deteriorates (199 cm), ($p < 0.05$).

Table 3 shows the results of the analysis of functional and motor fitness of the 3rd and 1st, 2nd, 4th, 5th year students. Male students aged 20 and 21 (3rd and 4th year of study) show no changes in all indicators, except for deterioration in the Romberg test (2.7 s).

In students aged 20 and 22 (3rd and 5th year of study), there is deterioration in the results of Standing long jump (182 cm) and Stange test (54.4 s), significant improvement in the Ruffier index (11.6 s – "satisfactory"), which indicates the dynamics of changes in the cardiovascular system. The indicators of Genchi test, Romberg test, running (2,500 m) change statistically insignificantly.

Tables 4, 5 show the results of the comparative analysis of functional and motor fitness of the 4th and 1st, 2nd, 3rd, 5th, 5th and 1st, 2nd, 3rd, 4th year students.

The analysis of average indicators shows that the indicators of male students aged 21 and 22 (4th and 5th year of study) differ statistically significantly in the set of tests. Significant

Table 1. The results of testing the functional fitness and motor abilities development of the 1st and 2nd, 3rd, 4th, 5th year male students of SMD

No	Test	1 st year (n=34)		2 nd year (n=14)		3 rd year (n=58)		4 th year (n=21)		5 th year (n=16)		t_{1-2}	t_{1-3}	t_{1-4}	t_{1-5}
		X	s	X	s	X	s	X	s	X	s				
1	Ruffier index	13.52	0.84	13.29	1.04	14.29	0.43	14.39	1.01	11.63	0.79	0.17	0.82	0.66	1.64
2	Stange test (s)	60.41	3.46	58.43	3.68	69.83	2.44	74.86	3.33	54.44	1.56	0.39	2.22	3.01	1.58
3	Genchi test (s)	37.76	1.91	41.29	3.52	39.78	1.50	46.10	3.37	44.25	1.78	0.88	0.83	2.15	2.48
4	Romberg test (s)	3.59	0.45	3.00	0.44	4.55	0.51	2.67	0.30	3.94	0.28	0.92	1.42	1.70	0.65
5	Standing long jump (cm)	208.38	4.01	216.0	6.13	220.1	3.57	224.52	5.78	182.06	1.99	1.04	2.18	2.30	6.03
6	Running (2,500 m)	14.60	0.49	13.80	0.92	14.26	0.44	13.65	0.64	13.60	0.42	0.77	0.52	1.18	1.64

Table 2. The results of testing the functional fitness and motor abilities development of the 2nd and 1st, 3rd, 4th, 5th year male students of SMD

No	Test	2 nd year (n=14)		1 st year (n=34)		3 rd year (n=58)		4 th year (n=21)		5 th year (n=16)		t ₂₋₁	t ₂₋₃	t ₂₋₄	t ₂₋₅
		X	s	X	s	X	s	X	s	X	s				
1	Ruffier index	13.29	1.04	13.52	0.84	14.29	0.43	14.39	1.01	11.63	0.79	0.17	0.89	0.76	1.27
2	Stange test (s)	58.43	3.68	60.41	3.46	69.83	2.19	74.86	3.33	54.77	1.56	0.39	2.66	3.31	1.00
3	Genchi test (s)	41.29	3.52	37.76	1.91	39.78	1.50	46.10	3.37	44.25	1.35	0.88	0.39	1.18	0.79
4	Romberg test (s)	3.00	0.44	3.39	0.45	4.55	0.51	2.67	0.30	3.94	0.28	0.92	2.30	0.62	1.78
5	Standing long jump (cm)	216.00	6.13	208.38	4.01	220.07	3.57	224.52	5.78	182.06	1.99	1.04	0.57	1.01	5.26
6	Running (2,500 m)	13.80	0.92	14.60	0.49	14.26	0.35	13.65	0.64	13.60	0.42	0.77	0.46	0.13	0.21

Table 3. The results of testing the functional fitness and motor abilities development of the 3rd and 1st, 2nd, 4th, 5th year male students of SMD

No	Test	3 rd year (n=58)		1 st year (n=34)		2 nd year (n=14)		4 th year (n=21)		5 th year (n=16)		t ₃₋₁	t ₃₋₂	t ₃₋₄	t ₃₋₅
		X	s	X	s	X	s	X	s	X	s				
1	Ruffier index	14.29	0.43	13.52	0.84	13.29	1.04	14.39	1.01	11.63	0.79	0.82	0.89	0.09	2.96
2	Stange test (s)	69.83	2.19	60.41	3.46	54.43	3.68	74.86	3.33	54.44	1.56	2.30	2.66	1.09	5.73
3	Genchi test (s)	39.78	1.50	37.76	1.91	41.29	3.52	46.10	3.37	44.25	1.78	0.83	0.39	1.44	1.92
4	Romberg test (s)	4.55	0.51	3.59	0.45	3.00	0.44	2.67	0.30	3.94	0.28	1.41	2.30	3.03	1.06
5	Standing long jump (cm)	220.07	3.57	208.38	4.01	216.00	6.13	224.52	5.78	182.06	1.99	2.18	0.57	0.56	9.31
6	Running (2,500 m)	14.26	0.35	14.60	0.49	13.80	0.92	13.65	0.64	13.60	0.42	0.57	0.46	0.71	1.20

Table 4. The results of testing the functional fitness and motor abilities development of the 4th and 1st, 2nd, 3rd, 5th year male students of SMD

No	Test	4 th year (n=21)		1 st year (n=34)		2 nd year (n=14)		3 rd year (n=58)		5 th year (n=16)		t ₄₋₁	t ₄₋₂	t ₄₋₃	t ₄₋₅
		X	s	X	s	X	s	X	s	X	s				
1	Ruffier index	14.39	1.01	13.52	0.84	13.29	1.04	14.29	0.43	11.63	0.79	0.66	0.76	0.09	2.16
2	Stange test (s)	74.86	3.33	60.41	3.46	54.43	3.68	69.83	2.19	54.44	1.56	3.01	3.31	1.26	5.56
3	Genchi test (s)	46.10	3.37	37.76	1.91	41.29	3.52	39.78	1.50	44.25	1.78	2.15	0.99	1.71	0.48
4	Romberg test (s)	2.67	0.30	3.59	0.45	3.00	0.44	4.55	0.51	3.94	0.28	1.70	0.62	3.21	3.85
5	Standing long jump (cm)	224.52	5.78	208.38	4.01	216.00	6.13	220.07	3.57	182.06	1.99	2.30	1.01	0.66	6.95
6	Running (2,500 m)	13.65	0.64	14.60	0.49	13.80	.92	14.26	0.35	13.60	0.42	0.95	0.13	0.83	0.08

positive changes in the functional state were observed in the results of Romberg test (4 s), Ruffier index (11.6); there is deterioration in the result of Standing long jump (182 cm), Stange test (54 s), and Genchi test (46.1 s) ($p < 0.05$). This indicates that in the process of physical education of the special medical department students there is a clear tendency for improvement of the cardiovascular system functional fitness. But conspicuous is the fact that there is considerable deterioration in the indicators of inspiratory breath-hold and speed

and strength abilities. The indicators of Genchi test, running (2,500 m) change statistically insignificantly.

Thus, the study results show positive changes in the functional state of the respiratory system and speed and strength abilities in the 1st–5th year students of the special medical department ($p < 0.05$).

According to the obtained results of Ruffier index, with age, there is an increase in the number of 1st–5th year male students of SMD with a “good” and “satisfactory” cardiovascular

Table 5. The results of testing the functional fitness and motor abilities development of the 5th and 1st, 2nd, 3rd, 4th year male students of SMD

No	Test	5 th year (n=16)		1 st year (n=34)		2 nd year (n=14)		3 rd year (n=58)		4 th year (n=21)		t ₅₋₁	t ₅₋₂	t ₅₋₃	t ₅₋₄
		X	s	X	s	X	s	X	s	X	s				
1	Ruffier index	11.63	0.79	13.52	0.84	13.29	1.04	14.29	0.43	14.39	1.01	1.64	1.27	2.96	2.16
2	Stange test (s)	54.44	1.56	60.41	3.46	54.43	3.68	69.83	2.19	74.86	3.33	1.58	1.00	5.74	5.56
3	Genchi test (s)	44.25	1.78	37.76	1.91	41.29	3.52	39.78	1.50	46.10	3.37	2.48	0.75	1.69	0.48
4	Romberg test (s)	3.94	0.28	3.59	0.45	3.00	0.44	4.55	0.51	2.67	0.30	0.65	1.78	1.06	3.12
5	Standing long jump (cm)	182.06	1.99	208.38	4.01	216.00	6.13	220.07	3.57	224.52	5.78	5.89	5.26	9.31	6.95
6	Running (2,500 m)	13.60	0.42	14.60	0.49	13.80	0.92	14.26	0.35	13.65	0.64	1.56	0.20	1.20	0.08

Table 6. The results of Ruffier index of the 1st-5th year students

No	Cardiovascular system state, %	1 st year (age 18)	2 nd year (age 19)	3 rd year (age 20)	4 th year (age 21)	5 th year (age 22)
		M (n=34)	M (n=14)	M (n=58)	M (n=21)	M (n=16)
1	"Bad"- significant heart insufficiency	81.8	8.3	30.7	14.3	20
2	"Satisfactory"- moderate heart insufficiency	9.1	33.4	38.4	42.8	40
3	"Good"- good heart	9.1	50	30.7	35.7	33.3
4	"Very good"- very good heart	0	8.3	0	7.2	6.7
5	Athletic heart	0	0	0	0	0

system state and a decrease in the number of students with a "bad" result. The results are given in Table 6.

Discussion

The introduction of a pedagogical technique of physical education of students with different nosologies into the educational process involves solving teaching, recreational, and educational tasks. It can be assumed that a successful development of the basic functional body systems and motor abilities in 1st-5th year students can be achieved under the following pedagogical conditions:

- ensuring biomedical control over the state of the cardiovascular and respiratory systems at the beginning and end of physical education classes;
- providing and complicating the content, forms of educational work with students of higher education institutions, and the choice of exercise series with a different focus for the body recovery after diseases and an increase of physical activity during the day;
- ensuring a holistic system of students' motor training, the unity of individual development and means, methods, and forms of pedagogical influence, taking into account the type of nosologies;
- motivating students for motor fitness development and self-improvement.

The obtained results supplement the data of Dovzhenko (2002), Sukharev, (1991), Warburton, Nikol, and Bredin (2006) on the physical health of students of higher education institutions. The study confirmed the data of Smirnov and Dubrovskij (2002) about the body involution at a young age. When determining the informative value of well-known

methods of quantitative health assessment (Romanenko, 1999; Baevskii, 2003; Baevskii & Chernikova, 2016), it was found that the index method had the greatest diagnostic efficiency. The study confirmed the data of Matveev (1991), Ilin (2003), who found that students' physical education has characteristic features of the well-known patterns of motor abilities development, namely heterochrony, multidirectionality, and sensitive periods. The study found that starting from the age of 20, there is improvement in inspiratory breath-hold (69.8 s), static balance (4.5 s), and a clear dynamics of changes in the cardiovascular system from the age of 18-22.

Thus, a comparative analysis made it possible to determine the peculiarities of 1st-5th year students' motor abilities development, functional state of the cardiovascular and respiratory systems, which enables the instructor to effectively plan the educational process of a special medical group.

The prospect for further research is to determine the peculiarities of development of the functional state and motor fitness in female students aged 18-22 with different nosologies under the influence of pedagogical conditions.

Conclusions

A successful development of the basic functional body systems and motor abilities in 1st-5th year students can be achieved under the influence of pedagogical conditions, namely: the method of strictly regulated exercise using exercise equipment (motor density of the class was 50-70 %); the continuous method with covering a distance of 1,000-2,000 m at a slow pace (heart rate: 120-150 beats per minute); circuit and repetition methods.

By the results of comparative analysis of the functional and motor fitness, the 1st–5th year male students of the special medical department show better results in tests for assessing the cardiovascular and respiratory systems, speed and strength abilities. In the 18–22 age range, according to the Ruffier index, there is an increase in the number of male students of the special medical department with a “good” and “satisfactory” cardiovascular system state and a decrease in the number of students with a “bad” result.

Conflict of Interest

The authors declare that there is no conflict of interest.

References

- Kopeikina, E., Drogomeretsky, V., Kondakov, V., Kovaleva, M., & Iermakov, S. (2016). Modification of Harvard step-test for assessment of students' with health problems functional potentials. *Physical Education of Students*, 20(4), 44–50. <https://doi.org/10.15561/20755279.2016.0405>
- Koryahin, V., Blavt, O., Gurtova, T., & Serbo, E. (2019). Technological Principles of Formation of Motor Competence in The Physical Education of Students With Chronic Health Conditions. *Teoriâ ta Metodika Fizičnogo Vihovannâ*, 19(4), 193–199. <https://doi.org/10.17309/tmfv.2019.4.05>
- Solohubova, S., Lakhno, O., Shyyan, V., & Shyyan, O. (2020). The Assessment of Physical Fitness and Morphofunctional State of Female First-Year Students in Non-Linguistic Higher Education Institutions. *Teoriâ ta Metodika Fizičnogo Vihovannâ*, 20(3), 157–164. <https://doi.org/10.17309/tmfv.2020.3.05>
- Drozd, O. V. (1998). *Physical condition of students in the Western region of Ukraine and its correction by means of physical education*. Cand. Diss. Lutsk. (in Ukrainian)
- Serorez, T. (2014). The indicators of the physical health of students on the characteristics of the physical fitness, aerobic and anaerobic productivity of their body. *Pedagogics, Psychology, Medical-Biological Problems of Physical Training and Sports*, 18(9), 54–59. <https://doi.org/10.5281/zenodo.10129>
- Koryahin, V., Blavt, O., & Ponomaryov, S. (2019). Innovative Intestification of Testing of Strength Endurance in Physical Education of Students With Chronic Diseases. *Teoriâ ta Metodika Fizičnogo Vihovannâ*, 19(3), 116–122. <https://doi.org/10.17309/tmfv.2019.3.02>
- Ivashchenko, O. (2020). Research Program: Modeling of Motor Abilities Development and Teaching of Schoolchildren. *Teoriâ ta Metodika Fizičnogo Vihovannâ*, 20(1), 32–41. <https://doi.org/10.17309/tmfv.2020.1.05>
- Chen, H., Dai, J., & Gao, Y. (2017). Measurement invariance and latent mean differences of the chinese version physical activity self efficacy scale across gender and education levels. *Journal of Sport and Health Science*, 8(1), 46–54. <https://doi.org/10.1016/j.jshs.2017.01.004>
- Ivashchenko, O., Khudolii, O., Iermakov, S., Lochbaum, M., Cieslicka, M., Zukow, W., Nosko, M., & Yermakova, T. (2016). Intra-group factorial model as the basis of pedagogical control over motor and functional fitness dynamic of 14–16 years old girls. *Journal of Physical Education and Sport*, 16(4), 1190–1201. <https://doi.org/10.7752/jpes.2016.04190>
- Skead, N. K., & Rogers, S. L. (2016). Running to well-being: A comparative study on the impact of exercise on physical and mental health of law and psychology students. *International Journal of Law and Psychiatry*, 49(Part A), 66–74. <https://doi.org/10.1016/j.ijlp.2016.05.012>
- Adyrkhaev, S. G. (2016). Modern technology of physical education of disabled students in the conditions of inclusive education. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 20(1), 4–12. <https://doi.org/10.15561/18189172.2016.0101>
- Bondar, I.V. (2000) *Physical education of students with a low level of physical fitness*. Cand. Diss. Lutsk. (in Ukrainian)
- Orikhovska, A., Andrieieva, O., Kashuba, V., Lazarieva, O., Lytvynenko, Y., Kirichenko, V., Arefyiev, V., & Khrypko, I. (2020). Social Integration of Hearing-Impaired Students by Means of Health-Enhancing and Recreational Activities. *Teoriâ ta Metodika Fizičnogo Vihovannâ*, 20(2), 86–94. <https://doi.org/10.17309/tmfv.2020.2.04>
- Cooper, K. (1970). *The New Aerobics*. M.Evans and C, New York.
- Kruevich, T. U. Bezverkhnia G. V. (2011). *Controlling of physical education of children, teenagers and youth*. Kiev: Olympic Literature. (in Ukrainian)
- Serhiyenko, L. P. (2001). *Testing of motor abilities of schoolchildren*. Mykolaiv: UDMTU. (in Ukrainian)
- Dubrovskij, V. I. (2005). *Sports medicine*. Moscow: VladoPress. (in Russian)
- Dovzhenko, L. (2002). Morbidity and motor activity of students with different levels of somatic health. *Theory and methods of physical education and sports*, 2–3, 21–23. (in Ukrainian)
- Sukharev, A. G. (1991). *Health and physical education of children and adolescents*. Moscow: Medicine. (in Russian)
- Warburton, D., Nikol, C., & Bredin, S. (2006). Health benefits of physical activity: The evidence. *Canadian Medical Association Journal*, 174(6), 801–809. <https://doi.org/10.1503/cmaj.051351>
- Smirnov, V. M., & Dubrovskij, V. I. (2002). *Fiziologija fizicheskogo vospitaniya i sporta*. Moskva: VLADOS-PRESS, 346–366.
- Romanenko, V. A. (1999). *Human's moving abilities*. Donetsk: Novyi mir. (in Ukrainian)
- Baevskii, R. M. (2003). Concept of physiological norm and criteria of health. *Rossiiskii fiziologicheskii zhurnal imeni I.M. Sechenova / Rossiiskaia akademiia nauk*, 89(4), 473–487.
- Baevskii, R. M., & Chernikova, A. G. (2016). Assessment of adaptation risk in an individual prenosological monitoring system. *Neuroscience and Behavioral Physiology*, 46(4), 437–445. Scopus. <https://doi.org/10.1007/s11055-016-0255-4>
- Matveev, L.P. (1991) *Teoriya i metodika fizicheskoy kultury*. M.: Fizkultura i sport, 543. (in Russian)
- Ilin, E. P. (2003). *Psihomotornaja organizatsiya cheloveka: Uchebnik dlja vuzov*. SPb.: Piter. 384 s. (in Russian)

ОСОБЛИВОСТІ ФУНКЦІОНАЛЬНОЇ І РУХОВОЇ ПІДГОТОВЛЕНOSTІ СТУДЕНТІВ СПЕЦІАЛЬНОГО МЕДИЧНОГО ВІДДІЛЕННЯ 1–5-ГО КУРСІВ

Сергій Черненко^{1ABCD}, Олег Олійник^{2ABCD}, Юрій Долинний^{3ABCD},
Олег Гончаренко^{4ABCD}, Катерина Гордієва^{5ABCD}

^{1, 2, 3, 4}Донбаська державна машинобудівна академія

⁵Державний вищий навчальний заклад «Донбаський державний педагогічний університет»

Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 7 с., 6 табл., 26 джерел.

Метадослідження – визначити вікові особливості функціональної і рухової підготовленості студентів спеціального медичного відділення вищих навчальних закладів.

Матеріал і методи. У дослідженні взяли участь чоловіки 1-го курсу (n = 34); 2-го курсу (n = 14); 3-го курсу (n = 58); 4-го курсу (n = 21); 5-го курсу (n = 16). Було організовано по 1 групі на кожному курсі, що складало 5 дослідних груп. Всі студенти займалися фізичною культурою двічі на тиждень. Для вирішення завдань були застосовані такі методи дослідження: аналіз наукової літератури, педагогічне спостереження, педагогічне тестування, формуючий експеримент, метод індексів, медико-біологічні методи та методи математичної статистики. В процесі проведення занять застосовувався метод суворо-регламентованої вправи (рухова щільність заняття складала 50-70%), для розвитку загальної витривалості – рівномірний метод з подоланням дистанції 1000-2000 метрів (ЧСС 120-150 уд/хв), круговий та повторний метод.

Результати. Наведені результати дослідження свідчать про позитивні зміни функціонального стану дихальної системи та швидко-силових здібностей у студентів 1-5 курсів спеціального медичного відділення (p < 0,05).

Висновки. Успішність розвитку основних функціональних систем організму та рухових здібностей у студентів 1-5 курсів може бути досягнута під впливом педагогічних умов, а саме: методу суворо-регламентованої вправи з використанням спортивних тренажерів (рухова щільність заняття складала 50-70%); рівномірного методу з подоланням дистанції 1000-2000 метрів в повільному темпі (ЧСС 120-150 уд/хв); кругового та повторного методів.

За результатами порівняльного аналізу функціональної та рухової підготовленості спеціального медичного відділення чоловіки 1-5 курсу демонструють кращі результати в тестах на оцінювання серцево-судинної і дихальної системи, швидко-силових здібностей. У віковому діапазоні 18-22 років за показниками індексу Руф'є спостерігається збільшення кількості студентів серед чоловіків спеціального медичного відділення, які мають показник стану серцево-судинної системи з оцінкою «добре» та «задовільно» і зменшення кількості студентів з результатом оцінювання «погано».

Ключові слова: чоловіки, проба Штанге, проба Генчі, індекс Руф'є, затримка дихання.

Information about the authors:

Chernenko Serhii: chernenko.sergey65@ukr.net; <https://orcid.org/0000-0001-9375-4220>; Department of Physical Education and Sports, Donbas State Engineering Academy, Akademichna St, 72, Kramatorsk, 84313, Ukraine.

Oliynyk Oleg: olegoliynyk@ukr.net; <http://orcid.org/0000-0002-9197-1034>; Department of Physical Education and Sports, Donbas State Engineering Academy, Akademichna St, 72, Kramatorsk, 84313, Ukraine.

Dolynnyi Iuriy: mr.dya69@gmail.com; <https://orcid.org/0000-0002-6495-6066>; Department of Physical Education and Sports, Donbas State Engineering Academy, Akademichna St, 72, Kramatorsk, 84313, Ukraine.

Honcharenko Oleg: o.h.honcharenko@gmail.com; <https://orcid.org/0000-0001-7101-1880>; Department of Physical Education and Sports, Donbas State Engineering Academy, Akademichna St, 72, Kramatorsk, 84313, Ukraine.

Hordieieva Kateryna: katrinzz83@gmail.com; <https://orcid.org/0000-0002-2558-8539>; Department of Theory and Methods Physical Education and Rehabilitation, State Higher Educational Institution "Donbas State Pedagogical University", G. Batyuka St, 19, Sloviansk, 84116, Ukraine.

Cite this article as: Chernenko, S., Oliynyk, O., Dolynnyi, Iu., Honcharenko, O., & Hordieieva, K. (2020). Peculiarities Of Functional And Motor Fitness Of 1st–5th Year Students Of Special Medical Department. *Teoriâ ta Metodika Fîzičnogo Vîhovannâ*, 20(4), 212-218. <https://doi.org/10.17309/tmfv.2020.4.03>

Received: 15.09.2020. Accepted: 20.12.2020. Published: 25.12.2020

This work is licensed under a Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0>).