

ORIGINAL ARTICLE
PRACA ORYGINALNA

IMPROVEMENT OF STUDENTS' MORPHO-FUNCTIONAL DEVELOPMENT AND HEALTH IN THE PROCESS OF SPORT-ORIENTED PHYSICAL EDUCATION

DOI: 10.36740/WLek202001131

Kostiantyn V. Prontenko¹, Grygoriy P. Griban², Ihor G. Bloschynskyi³, Iryna M. Melnychuk⁴, Dariya V. Popovych⁴, Viktor L. Nazaruk⁴, Svitlana O. Yastremska⁴, Dmytro O. Dzenzeliuk⁵, Inesa V. Novitska²

¹S. P. KOROLIOV ZHYTOMYR MILITARY INSTITUTE, ZHYTOMYR, UKRAINE

²ZHYTOMYR IVAN FRANKO STATE UNIVERSITY, ZHYTOMYR, UKRAINE

³BOHDAN KHMELNYTSKYI NATIONAL ACADEMY OF THE STATE BORDER GUARD SERVICE OF UKRAINE, KHMELNYTSKYI, UKRAINE

⁴L. HORBACHEVSKY TERNOPIL NATIONAL MEDICAL UNIVERSITY, TERNOPIL, UKRAINE

⁵ZHYTOMYR ECONOMIC AND HUMANITARIAN INSTITUTE OF THE HIGHER EDUCATIONAL INSTITUTION «UNIVERSITY OF UKRAINE», ZHYTOMYR, UKRAINE

ABSTRACT

The aim is to investigate the influence of sambo wrestling classes on the level of morpho-functional development and health of students during their studying.

Materials and methods: The investigation was conducted in Zhytomyr National Agroecological University in 2017–2019. Ninety four students (51 male and 43 female) took part in the research. Two experimental and two control groups were formed: EG1 (n=25) and CG1 (n=26) involved male students, EG2 (n=21) and CG2 (n=22) – female students. The classes of EG were held according to the authors' methodology, the classes of CG – according to the current physical education program. The analysis of the indicators of weight, height, lungs capacity, handgrip test, heart rate, blood pressure, body mass index, life index, power index and Robinson's index was performed. The interrelation of students of EG and CG was defined according to the health levels at the beginning and at the end of the investigation.

Results: It is determined that sambo wrestling classes had a positive influence on the students' muscles system improvement, increased lung capacity, reduced body mass, improved cardiovascular system, and improved health.

Conclusions: The improvement of the indicators of morpho-functional development and health of students during sambo wrestling classes will have a positive influence on their physical working capacity and the efficiency of their studying and future professional activities.

KEY WORDS: physical education, morpho-functional development, health, sambo wrestling, student

Wiad Lek. 2020;73(1):161-168

INTRODUCTION

According to world standards, the system of reforming higher education in Ukraine forces the transformation of quantitative indicators of educational services into qualitative one that means the review of the content of higher education, its filling with the latest material and the implementation of modern learning technologies, including physical education [1, 2, 3]. According to many scholars [4, 5, 6, 7], physical education and sports should be considered in higher education institutions (HEI) as the basis for the professional health of future professionals, providing them with the competitiveness in the world market of professions. However, despite the improvement of the system of higher education in Ukraine, there is downtrend in health deterioration and physical fitness level of students [8, 9, 10, 11]. Besides, there is an urgent problem to increase students' interest in the quality of studying, to encourage them to systematically perform physical exercises and sports, and to form students' physical development and improvement needs for health and professional longevity [12, 13, 14, 15].

According to many scholars [16, 17, 18], one of the main reasons that prevent most students from engaging in physical health-improving and sports activities is the lack of a free choice of the type of motor activity. The studies of various scientists [18, 19, 20] determine that the number of students who would like to be engaged in sports sections while studying in HEI ranges from 50 to 80 % that proves the need to adjust the educational process of physical education considering interests, motivation and needs of students. Thus, the problem of increasing the motivation of students to perform physical exercises and sports and to comply with healthy lifestyle, increasing their physical fitness, morpho-functional development and health promotion can be solved through the implementation of sport-oriented classes in physical education, taking into account the students' free choice of the sport. In addition, it should be considered the popularity of the sports among students, the possibility of training and sports base of a HEI and the presence of specialists in sports in the teaching staff of the department of physical education.

Table 1. The dynamics of the weight and height indicators of EG and CG students during the experiment ($\bar{X}\pm m$, $n=94$)

The stages of the experiment	Male students			Female students		
	EG1 (n=25)	CG1 (n=26)	p (EG1-CG1)	EG2 (n=21)	CG2 (n=22)	p (EG2-CG2)
<i>Height, sm</i>						
1 st term	175.9±1.12	176.1±1.04	>0.05	163.1±0.94	162.8±0.87	>0.05
2 nd term	176.4±1.09	176.5±1.03	>0.05	163.5±0.92	163.2±0.85	>0.05
3 rd term	176.6±1.08	176.8±1.01	>0.05	163.6±0.91	163.4±0.84	>0.05
4 th term	176.9±1.06	177.2±0.98	>0.05	163.8±0.91	163.7±0.83	>0.05
p(1-4)	>0.05	>0.05		>0.05	>0.05	
<i>Weight, kg</i>						
1 st term	72.8±1.13	72.5±1.19	>0.05	58.1±0.85	57.9±0.79	>0.05
2 nd term	72.1±1.15	73.1±1.16	>0.05	57.3±0.82	58.7±0.81	>0.05
3 rd term	71.4±1.08	73.3±1.15	>0.05	56.8±0.76	59.6±0.80	<0.05
4 th term	69.2±1.06	73.6±1.13	<0.01	56.1±0.71	60.4±0.82	<0.001
p(1-4)	<0.05	>0.05		<0.05	<0.05	
<i>Body mass index, kg/m²</i>						
1 st term	23.5±0.27	23.4±0.24	>0.05	21.8±0.30	21.8±0.28	>0.05
2 nd term	23.2±0.25	23.3±0.23	>0.05	21.3±0.29	22.1±0.27	>0.05
3 rd term	22.7±0.24	23.4±0.23	<0.05	21.1±0.28	22.4±0.27	<0.01
4 th term	22.1±0.22	23.5±0.24	<0.001	20.8±0.26	22.5±0.28	<0.001
p(1-4)	<0.001	>0.05		<0.001	>0.05	

Notes: p(EG1–CG1) – significance of difference between the indicators of EG1 and CG1 due to the t-test;

p(EG2–CG2) – significance of difference between the indicators of EG2 and CG2 due to the t-test;

p(1–4) – significance of difference between the indicators of each group at the beginning and at the end of the experiment due to the t-test

The analysis of literature showed that a number of studies which consider the effectiveness of the priority use of different sports in the process of physical education in HEI, in particular various types of wrestling sports [21, 22, 23] have been carried out. At the same time, the least investigated is the issue of health promotion and improvement of morpho-functional development of both male and female students by the means of sambo wrestling.

THE AIM

The aim of the article is to investigate the influence of sambo wrestling classes on the level of morpho-functional development and health of students during studying at higher educational institutions.

MATERIALS AND METHODS

To achieve the aim of the investigation we conducted a pedagogical experiment in 2017–2019. Ninety four students (51 male and 43 female) of Zhytomyr National Agroecological University took part in the research. Two experimental and two control groups were formed: EG1 (n=25) and CG1 (n=26) involved male students (n=51), EG2 (n=21) and CG2 (n=22) – female students (n=43). The experimental and control groups included the students of the 1st year of study of the faculty of technology, aged 17–20, who had statistically equivalent in-

dicators of physical fitness, morpho-functional development and health ($p>0.05$). The classes of EG1 and EG2 were held according to the authors' methodology by the means of sambo wrestling with the coaches for this type of wrestling sport, the classes of CG1 and CG2 – according to the current program of physical education at an agricultural HEI with the teachers of the department of physical education. The total number of hours spent on physical education per week for students of both groups was the same and equaled 4 hours. Monitoring of the level and dynamics of the indicators of morphological and functional development and health of students was carried out 4 times during the first and the second years of study (in 1st – 4th terms) – 4 stages of the investigation.

The analysis of the indicators of weight, height, lungs capacity, handgrip test, heart rate at rest, systolic and diastolic blood pressure, body mass index (the ratio of body weight to height), life index (the ratio of vital capacity to body weight), power index (the ratio of the wrist dynamometry to body weight), Robinson's index (a product of heart rate and systolic blood pressure) was performed. The interrelation of the students of EG and CG was defined according to the levels of health at the beginning and at the end of the investigation. The authenticity of the difference in the indicators of the students of EG and CG at the beginning and at the end of the investigation was defined due to the Student's test and the dynamics of the indicators during the research was analyzed.

Table 2. The dynamics of the physical development indicators of EG and CG students during the experiment ($X \pm m$, $n=94$)

The stages of the experiment	Male students			Female students		
	EG1 (n=25)	CG1 (n=26)	p (EG1-CG1)	EG2 (n=21)	CG2 (n=22)	p (EG2-CG2)
<i>Lung capacity, ml</i>						
1 st term	4085.5±96.3	4105.8±93.9	>0.05	2873.5±89.1	2891.6±85.7	>0.05
2 nd term	4192.6±95.1	4112.3±93.5	>0.05	2981.4±88.7	2907.3±85.4	>0.05
3 rd term	4307.1±92.4	4117.4±92.8	>0.05	3092.2±88.5	2916.1±85.9	>0.05
4 th term	4396.3±91.8	4122.1±92.5	<0.05	3206.7±88.3	2921.5±86.1	<0.05
p(1-4)	<0.05	>0.05		<0.05	>0.05	
<i>Life index, ml/kg</i>						
1 st term	55.8±1.23	56.4±1.27	>0.05	49.4±1.37	49.8±1.42	>0.05
2 nd term	58.2±1.28	56.2±1.26	>0.05	51.9±1.35	49.5±1.40	>0.05
3 rd term	60.3±1.26	56.1±1.27	<0.05	54.3±1.33	49.1±1.41	<0.05
4 th term	63.5±1.25	56.0±1.28	<0.001	56.8±1.31	48.4±1.43	<0.001
p(1-4)	<0.001	>0.05		<0.001	>0.05	
<i>Handgrip test, kg</i>						
1 st term	38.6±0.79	39.1±0.72	>0.05	22.4±0.62	22.6±0.57	>0.05
2 nd term	41.4±0.76	39.6±0.70	<0.05	26.1±0.57	22.8±0.58	<0.001
3 rd term	44.6±0.75	40.5±0.71	<0.001	28.5±0.53	23.1±0.56	<0.001
4 th term	47.7±0.70	40.9±0.69	<0.001	30.8±0.51	23.2±0.55	<0.001
p(1-4)	<0.001	>0.05		<0.001	>0.05	
<i>Power index, %</i>						
1 st term	53.1±1.05	52.9±1.13	>0.05	38.5±1.16	39.1±1.18	>0.05
2 nd term	57.4±1.01	54.1±1.12	<0.05	45.5±1.14	38.8±1.17	<0.001
3 rd term	62.5±0.97	55.2±1.10	<0.001	50.1±1.13	38.8±1.18	<0.001
4 th term	68.9±0.95	55.6±1.11	<0.001	54.8±1.10	38.5±1.19	<0.001
p(1-4)	<0.001	>0.05		<0.001	>0.05	

Notes: p(EG1–CG1) – significance of difference between the indicators of EG1 and CG1 due to the t-test;

p(EG2–CG2) – significance of difference between the indicators of EG2 and CG2 due to the t-test;

p(1–4) – significance of difference between the indicators of each group at the beginning and at the end of the experiment due to the t-test

The methods of investigation: theoretical analysis and generalization of scientific and methodological literature, pedagogic observation, questionnaire survey, biomedical methods, and methods of mathematical statistics.

RESULTS

In accordance with the normative documents regulating the organization of the educational process in physical education at HEI of Ukraine, the training sections of the department of physical education and the relevant training groups are completed in the first year of study at the beginning of the academic year taking into account the sports interests of students, their health state, physical fitness, sports qualification. Data necessary for the recruitment of the department's training sections can be obtained by questioning the students [2, 3]. The students who are interested in their sports skills improvement of this section were related to the training section of sport improvement

of the department of physical education. The number and type of training groups is determined by the department of physical education taking into account material opportunities and staff [2, 4].

Having questioned students at the beginning of the 1st year of study in 2017, we determined that 29.8 % male students and 31.5 % female students were interested in sambo wrestling. Referring to the works of leading scientists [5, 7, 12, 22, 24, 25] and considering the results of personal researches [11, 26], we created the authors' methodology of the students' of HEI of Ukraine health and morpho-functional development improvement by the means of sambo wrestling. The main tasks of authors' methodology are determined to be increasing the interest and desire of students to take physical education lessons; improving morphological and functional development and improving student health. In order to verify the effectiveness of authors' methodology, we conducted a pedagogical experiment.

The analysis of the students' height showed no authentic difference in the indicators of EG and CG at the beginning

Table 3. The dynamics of the functional state indicators of EG and CG students during the experiment ($\bar{X} \pm m$, $n=94$)

The stages of the experiment	Male students			Female students		
	EG1 (n=25)	CG1 (n=26)	p (EG1-CG1)	EG2 (n=21)	CG2 (n=22)	p (EG2-CG2)
<i>Heart rate at rest, beats/min</i>						
1 st term	73.2±0.72	72.8±0.69	>0.05	70.1±0.73	69.9±0.77	>0.05
2 nd term	72.9±0.70	72.7±0.68	>0.05	69.4±0.72	70.1±0.78	>0.05
3 rd term	71.5±0.69	72.7±0.67	>0.05	68.1±0.71	70.2±0.79	>0.05
4 th term	69.8±0.68	72.9±0.68	<0.01	67.2±0.69	70.0±0.78	<0.01
p(1-4)	<0.01	>0.05		<0.01	>0.05	
<i>Systolic blood pressure, mmHg</i>						
1 st term	121.5±0.87	122.1±0.92	>0.05	116.6±0.13	116.5±0.85	>0.05
2 nd term	121.2±0.86	121.9±0.91	>0.05	116.1±0.82	116.7±0.86	>0.05
3 rd term	120.3±0.86	121.8±0.80	>0.05	115.7±0.81	116.5±0.86	>0.05
4 th term	119.7±0.85	121.9±0.80	>0.05	115.3±0.81	116.6±0.85	>0.05
p(1-4)	>0.05	>0.05		>0.05	>0.05	
<i>Diastolic blood pressure, mmHg</i>						
1 st term	74.2±0.76	73.9±0.81	>0.05	71.1±0.84	70.8±0.87	>0.05
2 nd term	73.5±0.75	74.1±0.79	>0.05	70.7±0.82	71.1±0.88	>0.05
3 rd term	73.3±0.74	74.0±0.78	>0.05	70.1±0.84	71.0±0.86	>0.05
4 th term	72.9±0.73	74.2±0.80	>0.05	69.2±0.80	71.3±0.88	>0.05
p(1-4)	>0.05	>0.05		>0.05	>0.05	
<i>Robinson's index, c.u.</i>						
1 st term	88.9±1.32	88.8±1.28	>0.05	81.7±1.39	81.4±1.35	>0.05
2 nd term	88.3±1.31	88.6±1.28	>0.05	80.5±1.38	81.8±1.35	>0.05
3 rd term	86.1±1.30	88.5±1.30	>0.05	78.9±1.36	81.8±1.36	>0.05
4 th term	83.6±1.29	88.8±1.31	<0.01	77.5±1.35	81.6±1.34	<0.05
p(1-4)	<0.05	>0.05		<0.05	>0.05	

Notes: p(EG1-CG1) – significance of difference between the indicators of EG1 and CG1 due to the t-test;

p(EG2-CG2) – significance of difference between the indicators of EG2 and CG2 due to the t-test;

p(1-4) – significance of difference between the indicators of each group at the beginning and at the end of the experiment due to the t-test

of the experiment ($p > 0.05$) (Table 1). A similar trend is observed at all other stages of the study. The students' height dynamics analysis also indicates that the indicators were increased during the experiment, but there was no significant difference in the initial and final data in both groups ($p > 0.05$). It proves the lack of influence of both the classes according to the authors' methodology, and the classes according to the current physical education program on the height of male and female students.

The indicators of the body weight of EG and CG students do not have a significant difference at the beginning of the experiment ($p > 0.05$) (Table 1). The body weight of EG students (both male and female) is lower than the one of the CG students at the 2nd and the 3rd stages of the experiment, but the difference is not authentic ($p > 0.05$). At the last stage of the experiment, the EG students' body weight is lower authentically than the one of the CG students – the difference in the indicators of EG1 and CG1 is 4.4 kg ($p < 0.01$); the difference in the indicators of EG2 and CG2 is 4.3 kg

($p < 0.001$). The indicators of EG were decreased authentically during the experiment – the difference in body weight at the beginning and at the end of the experiment is 2.1 kg for EG1 and 2 kg for EG2 ($p < 0.05$). The body weight of the students of CG has downtrend during the research: the body weight of the CG1 students is 1.1 kg higher at the 4th stage than at the beginning of the experiment ($p > 0.05$), the CG2 students – 2.5 kg higher ($p < 0.05$). It proves the efficiency of the authors' methodology – the sambo wrestling classes provide authentic body weight decrease of the EG students (both male and female). The analysis of body mass index showed no authentic difference in the indicators of EG and CG at the 1st and the 2nd stages of the experiment ($p > 0.05$) (Table 1). At the 3rd and the 4th stages, the students of EG were noted to have significantly higher indicators than CG: the indicators of male students were for 0.7 kg/m² higher at the 3rd stage ($p < 0.05$), and for 1.4 kg/m² at the 4th stage ($p < 0.001$); the indicators of female students were for 1.3 kg/m² higher at the 3rd stage ($p < 0.01$), and for 1.7 kg/m²

Table 4. The interrelation of EG and CG students concerning the health level during the experiment ($\bar{X} \pm m$, $n=94$, %)

Health levels	Stages of the experiment			
	The beginning	The end	The beginning	The end
<i>Male students</i>				
	EG1 (n=25)		CG1 (n=26)	
Low	64.0	8.0	65.4	57.7
Below the middle	20.0	16.0	15.4	19.2
Middle	12.0	52.0	11.5	15.4
Above the middle	4.0	24.0	7.7	7.7
High	-	-	-	-
<i>Female students</i>				
	EG2 (n=21)		CG2 (n=22)	
Low	57.1	14.4	59.0	50.0
Below the middle	23.8	19.1	18.2	22.7
Middle	19.1	52.4	18.2	22.7
Above the middle	-	19.1	4.6	4.6
High	-	-	-	-

at the 4th stage ($p < 0.001$). The dynamics of the students' body mass index is characterized by the EG students' up-trend and CG students' downtrend of the indicator. Thus, the final indicator of the male students of EG1 is for 1.4 kg/m² better than the initial one authentically ($p < 0.001$), the final indicator of the female students of EG2 – for 1 kg/m² ($p < 0.05$). The body mass index of CG students was not changed authentically during the experiment ($p > 0.05$).

The examination of lung capacity indicates that the indicators of EG and CG students are not significantly different at the 1st – 3rd stages of the experiment ($p > 0.05$) (Table 2). At the 4th stage of the experiment the lung capacity of EG1 is for 274.2 ml better than the one of CG1 authentically ($p < 0.05$), and the indicator of EG2 is for 285.2 ml better than the one of CG2 authentically ($p < 0.05$). The analysis of the lung capacity dynamics showed that the indicators of EG1 and EG2 were for 310.8 ml and 333.2 ml improved respectively during the experiment authentically ($p < 0.05$), and the indicators of CG were not changed authentically ($p > 0.05$). The investigation of life index proves that the indicators of EG and CG are the same authentically at the 1st and the 2nd stages of the experiment ($p > 0.05$). The life index of EG1 is for 4.2 ml/kg better than the one of CG1 authentically ($p < 0.05$) at the 3rd stage and 7.5 ml/kg better at the 4th stage ($p < 0.001$). The difference in the indicators of EG2 and CG2 is 5.2 ml/kg at the 3rd stage ($p < 0.05$) and 8.4 ml/kg at the 4th stage ($p < 0.001$). The life index dynamics of the students of EG has a positive character – the difference in the indicators at the beginning and at the end of the experiment is 7.7 ml/kg for EG1 and 7.4 ml/kg for EG2 ($p < 0.001$) that shows the improvement of the functional abilities of the students' respiratory system (both male and female) during the sambo wrestling classes. The life index indicators of CG were worsened but not changed authentically ($p > 0.05$) (Table 2).

The handgrip test analysis shows that the indicators of EG and CG students do not differ authentically just at the

1st stage of the investigation ($p > 0.05$). The indicators of the arm muscles power of EG1 are for 1.8 kg better than the ones of CG1 at the 2nd stage, for 4.1 kg at the 3rd stage, for 6.8 kg at the 4th stage authentically ($p < 0.05$ – 0.001). The indicators of handgrip test of EG2 are for 3.3 kg better than the ones of CG2 at the 2nd stage, for 5.4 kg at the 3rd stage, for 7.6 kg at the 4th stage authentically ($p < 0.001$) (Table 2). The power characteristics of EG students are being improved during all stages of the experiment – they are for 9.1 kg better for EG1 and for 8.4 kg better for EG2 at the end of the experiment than at the beginning of the experiment authentically ($p < 0.001$) that proves the efficiency of the authors' methodology. The indicators of the handgrip test of CG were not changed authentically during the pedagogical experiment ($p > 0.05$).

The examination of power index proves that the indicators of EG and CG are not authentically different at the beginning of the experiment ($p > 0.05$). The next stages shows the significant influence of the classes according to the authors' methodology: the difference in the indicators of EG1 and CG1 is 3.3 % at the 2nd stage ($p < 0.05$), 7.5 % at the 3rd stage ($p < 0.001$), 13.3 % at the 4th stage ($p < 0.001$). The difference in the indicators of power index of the female students of EG2 and CG2 is also authentic at the 2nd – 4th stages ($p < 0.001$) and it equals 6.7 %, 11.3 % and 16.3 % respectively (Table 2).

The analysis of heart rate showed that the indicators do not differ authentically at the 1st – 3rd stages of the investigation ($p > 0.05$). The difference in the indicators of EG1 and CG1 is 3.1 beats/min, EG2 and CG2 – 2.8 beats/min at the end of the research ($p < 0.01$) (Table 3). The dynamics of heart rate of EG is characterized by authentic decrease of heart rate during the experiment – the indicators of the 4th stage are for 3.4 beats/min and 2.8 beats/min lower for EG1 and EG2 respectively than the ones of the 1st stage authentically ($p < 0.01$). The heart rate of the students of

CG was not changed authentically during the research ($p>0.05$). The analysis of blood pressure showed that the indicators of EG and CG were not authentically different at all stages of investigation ($p>0.05$) (Table 3). The dynamics of the blood pressure indicators of EG have downtrend that indicates the improvement of the cardiovascular system activity of the students who were training according to the authors' methodology. The difference in the initial and the final indicators of the systolic blood pressure of EG1 is 1.8 mmHg, EG2 – 1.3 mmHg ($p>0.05$); diastolic blood pressure of EG1 – 1.3 mmHg, EG2 – 1.9 mmHg ($p>0.05$). The blood pressure indicators of CG students stayed almost not changed during the experiment ($p>0.05$).

The analysis of the students' Robinson's index showed no authentic difference in the indicators of EG and CG during the 1st – 3rd stages of investigation ($p>0.05$) (Table 3). The Robinson's index of EG1 is for 5.2 c.u. better than the one of CG1 authentically and the indicators of EG2 are for 4.1 c.u. better than the ones of CG2 authentically ($p<0.05$) at the 4th stage of the investigation. The examination of the students' Robinson's index dynamics proves that the classes according to the authors' methodology improve the cardiovascular system activity of the students of EG – Robinson's index of EG1 and EG 2 was authentically for 5.3 c.u. and for 4.2 c.u. improved respectively ($p<0.05$). The Robinson's index indicators of CG1 and CG2 were not authentically different at the beginning and at the end of the research ($p>0.05$). It emphasizes the positive influence of the classes according to the authors' methodology on the indicators of the functional abilities of the EG students' cardiovascular system.

The analysis of the students' interrelation concerning the levels of their health showed that at the beginning of the experiment the majority of the students (both male and female) had low and below the middle health levels: the students of EG1 – 84 %, CG1 – 80.8 %, EG2 – 80.9 %, CG2 – 77.2 % (Table 4).

At the end of the experiment, 52 % male students of EG1 had a middle health level; 24 % – above the middle; 52.4 % female students of EG2 were determined to have a middle level of health, 19.1 % – above the middle. 76.9 % male students of CG1 and 72.7 % female students of CG2 were defined to have a low and below the middle health levels at the end of the research.

DISCUSSION

The scientists [1, 8, 12, 27] mention that the students' unsatisfactory health level is related to the state of health of the population of Ukraine. The investigations [7, 9, 10, 28] prove that the average expected life duration of men was for 2.4 years decreased, of women – for 0.9 years decreased. The difference in life expectancy in Ukraine and in Western Europe is 12.8 years for the male population, and 7.8 years for the female population. Cardiovascular pathology is increased for 1.9 times in average, bronchial asthma for 35.2 %, and diabetes for 10.1 %. It is primarily conditioned by the way of life of modern youth and, in

particular, the low level of their motor activity. It confirms the low level of morpho-functional development and health of students. Besides, the specialists [5, 6, 13, 14] claim that the insufficient health level of students is also caused by a decrease in their interest in physical education and sports. The students' low motivation is reflected in the attendance of scheduled physical education classes. The most of students attend physical education classes only to fulfill the requirements of the curriculum to pass an exam. According to the data of many scientists [16, 17, 18], one of the perspective directions for solving these problems is the implementation of the sport-oriented physical education classes, taking into account the students' free choice of sport.

The results of our research show that the classes in physical education according to the authors' methodology influenced the strengthening of the body of students positively. Thus, systematic sambo wrestling classes influenced the improvement of the muscular system of both male and female students, the increase of the lung capacity, the decrease of their body weight, and the improvement of cardiovascular system performance concerning the indicators of heart rate and blood pressure. The improvement of these indicators will influence the physical capacity of the students, their state of health, well-being and the effectiveness of educational activities at senior courses of study and future professional activity positively.

CONCLUSIONS

1. Both male and female students of EG are determined to have authentically better ($p<0.05$ – 0.001) indicators of morpho-functional development at the end of the experiment, in contrast to the students of CG: body weight – for 4.4 and 4.3 kg; lung capacity – for 274.2 and 285.2 ml; handgrip test (wrist dynamometry) – for 6.8 and 7.6 kg; heart rate – for 3.1 and 2.8 beats/min; body mass index – for 1.4 and 1.7 kg/m²; life index – for 7.5 and 8.4 ml/kg; power index – for 13.3 and 16.3 %; Robinson's index – for 5.2 and 4.1 c.u.
2. It is defined that the number of the male students of EG who have middle and above the middle health level was increased from 16 to 76 %, the female students of EG – from 19.1 to 81.5 % at the end of the investigation that proves a positive influence of the authors' methodology.
3. The implementation of the authors' methodology ensured the engagement of students in systematic exercises that allowed improving their level of morpho-functional development and health. It will improve the effectiveness of their studying and future professional activities.

The prospects of future investigations involve the research of the studying the motivation of students of higher educational institutions of different specialties to healthy life style.

REFERENCES

1. Kharchenko O., Kharchenko N., Shaparenko I. et al. Analysis of the physical development of youth and the state of its health. *Wiad Lek.* 2019; 72(4):575–578.

2. Domashenko A. V. Orghanizacijno-pedagoghichni zasady systemy fizychnogho vykhovannja students'koi molodi Ukrainy [Organizational-pedagogical principles of the system of physical education of student's youth of Ukraine]. Extended abstract of candidate's thesis. Lviv: LDIFK; 2003, 20 p. (In Ukrainian).
3. Kozibrocjkyj S. P. Prohramno-normatyvni osnovy fizychnogho vykhovannja studentiv (istoryko-metodologhichnyj analiz) [Program-normative bases of physical education of students (historical and methodological analysis)]. Extended abstract of candidate's thesis. Lviv: LDIFK; 2002, 16 p. (In Ukrainian).
4. Krylychenko O. V. Stan i perspektyvy rozvytku systemy fizychnogho vykhovannja u vyshhykh navchalnykh zakladakh Ukrainy [The state and prospects of the development of the system of physical education in higher educational institutions of Ukraine]. Pedagoghika, psykholohija ta medyko-biologhichni problemy fizychnogho vykhovannja i sportu. 2011; 7: 45–49. (In Ukrainian).
5. Bolotin A., Bakayev V. Structure and content of the educational technology of managing students' healthy lifestyle. Journal of Physical Education and Sport. 2015; 15(3):362–364. doi:10.7752/jpes.2015.03054.
6. Futornyj S. M. Dvyghatel'naja aktyvnostj y ee vlyjanye na zdorov'je y prodolzhytel'nostj zhyzny cheloveka [Motor activity and its effect on human health and longevity]. Fyzycheskoe vospytanye studentov. 2011; 4: 79–84. (In Russian).
7. Bulatova M. M. Fitnes i dvigatel'naya aktivnost': problemy i puti resheniya [Fitness and physical activity: problems and solutions]. Teoriya i metodika fizychnogho vykhovannja i sportu. 2007; 1:3–7. (In Russian).
8. Gruzjeva T., Galienko L., Pelo I. et al. Health and lifestyle of students' youth: status, problems and ways of solution. Wiad Lek. 2018; 71(9):1753–1758.
9. Apanasenko G., Dolzhenko L. Rivenj zdorov'ja i fiziologhichni rezervy orghanizmu. [The level of health and physiological reserves of the organism]. Teoriya i metodyka fizychnogho vykhovannja i sportu. 2007; 1: 17–21. (In Ukrainian).
10. Zavydivska O, Zavydivska N., Khanikiants O. Self-management as a condition for creating a health culture among students. Journal of Physical Education and Sport. 2016; 16(1):592–597. doi:10.7752/jpes.2016.s1093.
11. Hryban H. P. Zhyttiedialnist ta rukhova aktyvnist studentiv [Life activity and mobility of students]. Zhytomyr: Ruta; 2009, 593 p. (In Ukrainian).
12. Muntjan V. S. Analiz faktorov, opredelajushhykh zdorov'je cheloveka y okazyvajushhykh na negho vlyjanyja [Analysis of factors that determine human health and influence it]. Fyzycheskoe vospytanye studentov. 2010; 6: 44–47. (In Russian).
13. Batilani T. G., Belem I. C., Both J. Different profiles in terms of motivation and concerns of physical education students. Movimento. 2018; 24(2):619–632. doi:10.22456/1982-8918.74947.
14. Cucui A. I. Study on sports activities in the free time of gymnasium cycle students. Revista Românească pentru Educație Multidimensională. 2018; 10(4):82–91. doi:https://doi.org/10.18662/rrem/74.
15. Leuciu F. Perception on physical education among students. Revista Românească pentru Educație Multidimensională. 2018; 10(2):134–143. doi:https://doi.org/10.18662/rrem/51.
16. Baribyna L. N., Cerkovnaja E. V., Blynyn Y. Ju. Rezultati prymerenyja sportyvno-oryentirovannoj formi orghanyzacyj zanjatyj v visshem uchebnom zavedenyy tekhnicheskogho profylja [The results of the application of a sports-oriented form of organization of classes in a higher educational institution of technical profile]. Slobozhanskyj naukovo-sportyvnyj visnyk. 2008; 4: 35–37. (In Russian).
17. Montesano P., Mazzeo F. Sports activities in obese teenagers improve social inclusion and health. Sport Mont. 2019; 17(1):55–60. doi 10.26773/smj.190210.
18. Temchenko V. A., Syrenko R. R. Sekcyonnaja forma orghanyzacyj fizycheskogho vospytanyja studentov [Sectional form of organization of students' physical education]. Fyzycheskoe vospytanye studentov. 2010; 3: 99–101. (In Russian).
19. Ghoncharenko M. S., Novykova V. Je. Valeologhichni aspekty formuvannja zdorov'ja u suchasnomu osvittjans'komu procesi [Valeology aspects of the formation of health in the modern educational process]. Pedagoghika, psykholohija ta metodyko-biologhichni problemy fizychnogho vykhovannja i sportu. 2010; 6:45–51. (In Ukrainian).
20. Prysiazhniuk S., Tolubko V., Oleniev D. et al. The influence of physical activities on biological age parameters of the first-year female students from the special medical department. Journal of Physical Education and Sport. 2018; 18(2):561–564. doi:10.7752/jpes.2018.02081.
21. Jaremenko V. V., Malyns'kyj I. J., Kolos M. A. et al. Zastosuvannja elementiv jedynoborstv u fizychnomu vykhovanni students'koi molodi [Application of elements of martial arts in the physical education of student youth]. Pedagoghika, psykholohija ta medyko-biologhichni problemy fizychnogho vykhovannja i sportu. 2011; 5: 121–124. (In Ukrainian).
22. Semenov A. G. Razvytye ghreko-rymskoj borjbi v studencheskom sporte y fizycheskom vospytanyj [The development of Greco-Roman wrestling in the student sport and physical education]. Doctor's thesis. Sankt-Peterburg: RSPU; 2001, 487 p. (In Russian).
23. Ghrjazev M. V., Lotarev A. N., Afonyna Y. P. Sambo kak sredstvo fizycheskogho vospytanyja studencheskoj molodezhy [Sambo wrestling as a means of physical education of students]. Tula: Yzd. TulGhU; 2006, 112 p. (In Russian).
24. Trojanov K. V. Metodyka nachalnoj podghotovky po borjbe sambo v processe fizycheskogho vospytanyja studentov [Methods of initial training in sambo wrestling in the process of physical education of students]. Candidate's thesis. Moskva; 2002, 170 p. (In Russian).
25. Balushka L. M. Vdoskonalennja rivnja fizychnoi pidghotovlenosti uchniv licejiv z posylenoju vijs'kovo-fizychnoju pidghotovkoju zasobamy sportyvnoji borotjby [Improvement of the level of physical preparedness of students of lyceums with increased military-physical training by means of sport wrestling]. Pedagoghika, psykholohija ta medyko-biologhichni problemy fizychnogho vykhovannja i sportu. 2016; 5: 4–11. (In Ukrainian).
26. Dzenzeliuk D. O. Navchaljna prohrama z borotjby sambo dlja studentiv vyshhykh navchalnykh zakladiv [Sambo training program for students at higher educational institutions]. Zhytomyr: ZNAEU; 2015, 56 p. (In Ukrainian).
27. Bulych E. Gh., Muravov Y. V. Zdorov'je cheloveka: Byologhicheskaja osnova zhyznedejatel'nostj y dvyghatel'naja aktyvnostj v ee stymuljacyj [Human health: the biological basis of vital activity and motor activity in its stimulation]. Kyev: Olympijskaja lyteratura; 2002, 424 p. (In Russian).
28. Maghlyovanyj A. V. Osnovy informacijnogho polja zdorov'ja osobystosti [Basics of information field of personality health]. Visnyk Chernighiv's'kogho nacional'nogho pedagoghichnogho universytetu imeni T. Gh. Shevchenka. Serija: Pedagoghichni nauky. Fyzichne vykhovannja ta sport. 2010; 81: 285–289. (In Ukrainian).

The investigation is conducted under the topic of the research activity of the Department of physical education of

Zhytomyr National Agroecological University in 2016–2020
«Theoretically methodological aspects of the improvement of
the system of physical education of the students of Ukrainian
higher educational institutions» (state registration number
0116U004203).

ORCID and contributionship:

Kostiantyn V. Prontenko – 0000-0002-0588-8753 ^{A,D}

Grygoriy P. Griban – 0000-0002-9049-1485 ^{E,F}

Ihor G. Bloschynskyi – 0000-0003-1925-9621 ^{A,F}

Iryna M. Melnychuk – 0000-0001-5527-0655 ^{B,D}

Dariya V. Popovych – 0000-0002-5142-2057 ^C

Viktor L. Nazaruk – 0000-0002-2833-3072 ^E

Svitlana O. Yastremska – 0000-0001-6124-4285 ^C

Dmytro O. Dzenzeliuk – 0000-0003-1925-9621 ^B

Inesa V. Novitska – 0000-0003-0780-0580 ^F

Conflict of interest:

The Authors declare no conflict of interest

CORRESPONDING AUTHOR

Kostiantyn V. Prontenko

Department of Physical Education, Special Physical Training and Sport,
S. P. Koroliov Zhytomyr Military Institute, Zhytomyr, Ukraine

tel: +380675069142

e- mail: prontenko-kostya@ukr.net

Received: 18.05.2019

Accepted: 25.11.2019

A – Work concept and design, **B** – Data collection and analysis, **C** – Responsibility for statistical analysis,

D – Writing the article, **E** – Critical review, **F** – Final approval of the article