

THE INFLUENCE OF THE EXPERIMENTAL PROGRAM OF PHYSICAL TRAINING OF STUDENTS ON ANTHROPOMETRIC INDICATORS AND FUNCTIONAL DATA OF THE CARDIOVASCULAR SYSTEM

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The problem of quality training of officers of artillery units of the Land Forces of the Armed Forces of Ukraine at the present stage of development of military equipment, tactics and operational art requires future officers not only a high level of professional training, but also the most effective development of physical and psychological qualities. Ensuring compliance with the appropriate level of professional readiness in conditions of high motor activity in combat situations and in stressful situations. Steady increase in the role and expansion of the range of tasks to be solved during enemy fire destruction, significant increase in firepower of means of destruction (range and accuracy, rapid fire, ammunition power) increases the requirements for professional training of artillery commanders. In peacetime and wartime, the military-professional activity of officers of JI ground artillery units is to develop standards for combat operations and conduct combat shootings, which requires constant maintenance of comprehensive training. Today's educational process in the walls of higher military educational institutions urgently needs to be reformatted and practical professional and applied orientation of all its components to the new mode of study, conditions of military service, recreation, psychological and physical stress of cadets. This is accompanied by the adaptation of the youth organism to innovations, will affect the level of physical development and physical condition of future military professionals, which was a generating factor in the detailed study of this aspect. The *purpose* of our study is to determine the effectiveness of the targeted impact of experimental technology for the acquisition of military-applied motor skills on anthropometric indicators and functional data of the cardiovascular system of cadets. *Material*. Within the framework of functioning of the system of physical training of higher military educational institutions a four-year educational pedagogical experiment with the application of directed technology for acquiring applied motor skills has been carried out. According to the results of approbation of the author's technology, the representatives of the experimental group (n=23) showed a positive (p<0,05 and p<0,001) positive dynamics of the parameters of the cardiovascular system, a more favorable reaction of their organism to the conditions of study at the higher military school and higher functional readiness to further professional activity. *Results*. According to the results of experimental studies with the directed application of experimental methodological influence in the form of targeted technology for the acquisition of military-applied motor skills revealed positive dynamics of functional indicators of the cardiovascular system in EG: heart rate at rest - 8.69 beats / min (11.76 % at t=4.73); systolic blood pressure – 2.61 mm Hg (2.21% at t=1.72); diastolic blood pressure - 3.26 mm Hg (4.17% at t=2.23).

Key words: cardiovascular system, cadet, anthropometric, functional.

Володимир Климович, Артур Одеров, Сергій Романчук, Олег Ольховий, Володимир Андрейчук, Наталія Музика, Євген Іщенко, Леонід Гурман, Андрій Ладіняк, Вадим Гоншовський. Вплив експериментальної програми фізичної підготовки курсантів на антропометричні показники та функціональні можливості серцево-судинної системи

Анотація. Проблема якості підготовки офіцерів артилерійських підрозділів Сухопутних військ Збройних Сил України на сучасному етапі розвитку військової техніки, тактики та оперативного мистецтва вимагає від майбутніх офіцерів не тільки високого рівня професійної підготовленості, але максимально ефективного розвитку фізичних та психологічних якостей, оптимальних показників функціонального та фізичного станів, що забезпечують дотримання належного рівня професійної готовності в умовах високої рухової активності бойової обстановки та в стресових ситуаціях. Неухильне підвищення ролі та розширення кола завдань, що вирішуються під час вогневого ураження противника, значне збільшення вогневої могутності засобів ураження (дальності і точності стрільби, швидкострільності, могутності боеприпасів) зумовлює підвищення вимог до професійної підготовленості фахівців командної ланки артилерійських підрозділів. У мирний та воєнний час військово-професійна діяльність офіцерів підрозділів наземної артилерії СВ полягає у відпрацюванні нормативів з бойової роботи та проведенні бойових стрільб, що потребує постійного підтримання всебічної підготовленості. Сьогоднішній навчально-виховний процес у стінах вищих військових навчальних закладів нагально потребує реформатування та практичної професійно-прикладної спрямованості усіх його складових до нового режиму навчання, умов військової служби, відпочинку, психологічного та фізичного навантажень курсантів. Це супроводжується адаптацією юнацького організму до нововведень, позначиться на рівні фізичного розвитку та фізичного стану майбутніх військових професіоналів, що виступило генеруючим фактором детального вивчення цього аспекту. *Мета нашого дослідження* – визначення ефективності спрямованого впливу експериментальної технології набуття військово-прикладних рухових умінь на антропометричні показники і функціональні дані серцево-судинної системи курсантів. *Матеріал*. У межах функціонування системи фізичної підготовки вищих військових навчальних закладів здійснено чотириохрічний формуючий педагогічний експеримент із застосуванням спрямованої технології набуття прикладних рухових умінь. За результатами апробації авторської технології у представників експериментальної групи (n=23) зафіксовано достовірну (p<0,05÷p<0,001) позитивну динаміку показників серцево-судинної системи. Це засвідчує більш сприятливу реакцію їхнього організму на умови навчання у вищій військовій школі та вищу функціональну готовність до подальшої професійної діяльності. *Результати*. За підсумками проведених експериментальних досліджень із направленим застосуванням дослідного методичного впливу у вигляді спрямованої технології набуття військово-прикладних рухових умінь виявлено позитивну динаміку функціональних показників серцево судинної системи у представників ЕГ: частота серцевих скорочень у спокої – 8,69 ск·хв⁻¹ (11,76% при t=4,73); систолічний артеріальний тиск – 2,61 мм рт.ст. (2,21% при t=1,72); діастолічний артеріальний тиск – 3,26 мм рт. ст (4,17% при t=2,23).

Ключові слова: серцево-судинна система, курсант, антропометричний, функціональний.

Introduction

The problem of quality training of officers of artillery units of the Land Forces of the Armed Forces of Ukraine at the present stage of development of military equipment, tactics and operational art requires from future officers not only a high level of professional training, but also the most effective development of physical and psychological qualities. compliance with the appropriate level of professional readiness in conditions of high motor activity in combat situations and in stressful situations [5; 9].

Steady increase in the role and expansion of the range of tasks to be solved during the enemy's fire defeat, significant increase in the firepower of the means of destruction (range and accuracy, rate of fire, ammunition power) increases the requirements for professional training of artillery commanders. In peacetime and wartime, the military-professional activity of officers of JI ground artillery units is to work out standards for combat operations and conduct combat shootings, which requires constant maintenance of comprehensive training [3].

Today's educational process in the walls of higher military educational institutions urgently needs to be reformatted and practical professional and applied orientation of all its components to the new mode of study, conditions of military service, recreation, psychological and physical stress of cadets [7]. This is accompanied by the adaptation of the youth organism to innovations, will affect the level of physical development and physical condition of future military professionals, which was a generating factor in the detailed study of this aspect [8].

The plane of consequences of influence of separate stages of educational process in high school on an organism of young men within the system of AF is investigated in detail by scientists A. Oderov (2014); O. Olkhovyi (2016); S. Romanchuk (2016); Korchagin M. (2019); V. Klymovych (2019) [1; 2; 4; 6]. However, researchers have not fully characterized the dynamics of indicators that characterize the adaptation processes occurring in the body of those who study in military education, to transfer the loads of the educational system and promising conditions of professional activity by means of AF throughout the academic period.

Given the above, it is assumed that one of the important reasons for the lack of clear definition of the content and ways of acquiring future officers adapted to modern requirements aspects of combat readiness of military-applied skills, methods and technologies of special physical qualities in the current system of physical training of military educational institutions. concerning the reaction of the functional systems of the youth organism to the military-applied conditions of study in the higher military school. Which prompted this study.

Materials and methods

Determining the effectiveness of the directed influence of the experimental technology of acquiring military-applied motor skills on anthropometric indicators and functional data of the cardiovascular system of cadets. Selective groups (control (KG) – n=24 and experimental (EG) – n=23) were formed from the general population of freshmen who entered the National Academy of Land Forces Hetman Peter Sagaidachny.

The study of functional data of CG and EG was performed according to generally accepted methods: heart rate (HR) was determined using a heart rate monitor (analog heart rate monitor) SIGMA PC-15 at rest; systolic and diastolic blood pressure was determined using an SBM 07, SANITAS tonometer according to the rules established by the World Health Organization (1996) [5].

Results

The problem of quality training of officers of artillery units of the JI of the Armed Forces of Ukraine at the present stage of development of military equipment, tactics and operational art requires from future officers not only a high level of professional training, but also the most effective development of physical and psychological qualities. compliance with the appropriate level of professional readiness in conditions of high motor activity in combat situations and in stressful situations [5; 9].

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Discussion

Comparative statistical analysis of input and output controls of the average level of anthropometric indicators and functional data of the cardiovascular system in adolescents EG (Table 1) showed a positive dynamics of all indicators, except for length and body weight ($p > 0.05$).

Table 1 – Dynamics of anthropometric indicators and functional data of CCC CG (n = 24) and EG (n = 23) according to the results of the experiment

Indexes (Unit)	Period research	Group	\bar{x}	S	m	Changes %	to the experiment after the experiment	CG - EG	
								to the experiment	after the experiment
								t	t
Body weight (kg)	to the experiment	CG	75,63	4,56	0,93	0,57	-0,29	0,47	1,55
	after the experiment		75,25	4,19	0,86				
	to the experiment	EG	76,22	4,03	0,84	1,07	0,72		
	after the experiment		77,04	3,71	0,77				
Body length (cm)	to the experiment	CG	179,08	6,16	1,23	0,05	0,07	1,97	1,94
	after the experiment		179,17	5,59	1,21				
	to the experiment	EG	176,17	4,12	0,86	0,13	0,18		
	after the experiment		176,39	3,93	0,82				
Frequency cardiac abbreviations (beats / min)	to the experiment	CG	71,83	6,38	1,3	4,4	-1,89	1,05	2,28
	after the experiment		68,67	5,19	1,06				
	to the experiment	EG	73,91	7,12	1,49	11,76	-4,73		
	after the experiment		65,22	5,18	1,08				
Arterial pressure systolic (mm Hg)	to the experiment	CG	117,5	4,66	0,95	0,18	0,19	0,21	2,38
	after the experiment		117,71	2,94	0,6				
	to the experiment	EG	117,83	5,99	1,25	2,21	-1,72		
	after the experiment		115,22	4,12	0,86				
Arterial pressure diastolic (mm Hg)	to the experiment	CG	78,75	5,76	1,18	1,33	-0,79	0,29	2,64

According to the results of experimental studies with the directed application of experimental methodological influence in the form of directed technology of acquiring military-applied motor skills revealed positive dynamics of functional indicators of the cardiovascular system in EG: heart rate at rest – 8.69 beats / min (11, 76 % at $t=4.73$); systolic blood pressure – 2.61 mm Hg (2.21 % at $t=1.72$); diastolic blood pressure – 3.26 mm Hg (4.17% at $t=2.23$).

In order to study in more detail the consequences of the application of targeted technology for the acquisition of EG military-applied motor skills, we conducted a comparative statistical analysis of anthropometric and functional data of the initial control of this group of CG. According to the results of comparative analysis, there is no statistically significant difference between the anthropometric data of

the two study groups. The total body size of the subjects corresponds to the sex and age indicators, which indicates the harmony of the physical development of young men. However, the functional parameters of the cardiovascular system were significantly better in EG: heart rate at rest – by 3.45 beats/min at $t=2.28$; systolic blood pressure – 2.49 mm Hg (at $t=2.38$); diastolic blood pressure – 2.71 mm Hg (at $t=2.64$).

The study identified a more favorable response of the body of EG representatives to the conditions of study in higher military school. The positive dynamics of the indicators of the cardiovascular system confirmed their higher functional readiness for professional activity at the initial stage of training in a military educational institution.

Conclusions

The obtained statistical data confirm the assumption that the experimental methodical action with the targeted application of the technology of acquiring military-applied motor skills indirectly had a positive effect on the dynamics of Cardiovascular system performance of young men EG according to the results of higher military education.

In the future, the study of the effectiveness of the system of higher education institutions based on the results of the application of targeted technology for the acquisition of applied motor skills will continue.

Conflict of interest. The authors declare no conflict of interest.

References

1. Klymovych, V., Olkhovyi, O., & Romanchuk, S. (2016). Adoption of youth's bodies to educational conditions in higher educational institutions. *Journal of Physical Education and Sport*, 3 (1), pp. 620-622.
2. Oderov A. (2014). System analysis and control of the physical training of the Armed forces servicemen. *Lviv*, 5 (2), pp. 90-93.
3. Klymovych V., Korchagin M., Olkhovyi O., Romanchuk S. & Oderov A. (2019). Motivation of forming students healthcare culture on principles of interdisciplinary integration. *SportMont Journal*, 17 (3), pp. 79-83. Doi: 10.26773/smj.191017
4. Oderov A. & Klymovych V. (2020). Theoretical components of the project activity of a teacher of physical training and sports of a higher military educational institution. *Scientific Journal of the Black Sea Research Institute of Economics and Innovation*, 22 (1), pp. 165-169.
5. Klymovych V., Oderov A. and all. (2019). The Influence of the System of Physical Education of Higher Educational School on the Level of Psychophysiological Qualities of Young People. *SportMont Journal*, 17 (2), pp. 93-97. doi: 10.26773/smj.190616
6. Korchagin M., Kurbakova S., Olkhovyi O. (2017). Dependence of the success of professional activity of servicemen-operators on the level of psychophysiological qualities. *Sports Gazette of Prydniprov'ia*, 5 (3), pp. 65-68.
7. Oderov A., Klymovych V., Korchagin M., Olkhovyi O., Romanchuk S. (2019). Optimization of the content of the physical training program of cadets gunners. *International Journal of Recent Scientific Research. India*, 10 (№ 7), pp. 33340-33343.
8. Oderov A. M., Klymovych V.B., Turchinov A. V., Shemchuk V. A., Samorok M. (2020). Pedagogical model formation of skills of hand-to-hand combat of future officers to actions in extreme conditions. *Current issues of the humanities*, 4 (№ 28), pp. 190-198.
9. Romanchuk, S., Anokhin, E., Tychyna, I., Dobrovolskii, V., Pidleteichuk, R., Homanyuk, S., Kirpenko, V., Oderov, A., Klymovych, V. (2020). The impact of mass sports work in educational institution on the formation of cadets' value attitude towards the physical education. *SportMont Journal*, 18 (1), pp. 81-86. doi: 10.26773/smj.200214

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