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FORMATION OF PSYCHOPHYSICAL READINESS OF CADETS DURING APPLIED EXERCISES

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ABSTRACT

Aim: is to study the level and dynamics of the development of physical and psychological qualities of the cadets in the process of engagement in pentathlon classes.

Materials and methods: The research involved 18-23 years old cadets (men) of the first-fourth years of training. The level of the cadets' physical qualities was assessed by their results in the 100 m run, pull-ups, 3 km run, overcoming of the obstacle course. The level of the cadets' psychological qualities was studied using the following methods: well-being-activity-mood methodology; methods of self-assessment of psycho-emotional state; methods of determining the level of the development of volitional self-regulation of the individual.

Results: The positive influence of pentathlon classes on the development of physical and psychological qualities in the cadets and the improvement of their psycho-emotional state was established. The greatest effect was found in exercises aimed at developing endurance and agility as well as coordination skills.

Conclusions: It was found that pentathlon classes are more effective than the traditional physical training classes; they affect the level of the development of all cadets' physical qualities. The high level of physical and psychological qualities of the cadets will help to improve their future professional activities.

KEY WORDS: physical qualities, psychological qualities, pentathlon, cadets

INTRODUCTION

The combat activities of servicemen of the Armed Forces of Ukraine take place in extreme environmental conditions, under significant physical and psychological stress, increasing fatigue and other adverse factors of combat activities against the background of modern hybrid warfare [1, 2]. Such activities are characterized by a significant stressogenic impact (constant controlling by enemy fire), physical loads (deployment of combat materiel and its preparation for fire, performance of duties in full gear, executing large volumes of work, etc.), low motor activities during combat duty, unregulated dietary regime and resting time rules [3, 4, 5, 6]. The outcome of the battle depends on rapid and coordinated actions of servicemen, the level of the development of their physical and psychological qualities, courage and determination [7, 8].

The conditions of the combat situation require servicemen to show psychological resilience, an appropriate level of the development of physical qualities, military-applied motor skills, as well as sufficient reserves of physiological capabilities acquired during their training in higher military educational institutions (HMEI). Compliance of the level of psychophysical training of the cadets with the specified requirements is promoted by the engagement in applied sports in the course of their training, with a significant place occupied by pentathlon [9].

Pentathlon is an applied sport, which includes five different disciplines such as shooting, overcoming the obstacle course, swimming with obstacles, grenades throwing (range and accuracy), cross-country race, which makes it one of the most meaningful and interesting modern sports multiathlon [10, 11]. According to many scientists [12, 13] engagement in pentathlon promotes the development of physical qualities and applied skills, psychological and moral qualities in servicemen, the improvement of their emotional state. Endurance, strength, speed, agility, determination, courage, ability to control oneself and orient in difficult conditions, purposefulness and perseverance are the qualities that are developed in servicemen in the course of
pentathlon classes and the ones the effectiveness of modern professional (combat) activities of servicemen of the Armed Forces of Ukraine depend on [14, 15]. At the same time, the issue of the development of physical and psychological qualities of cadets of HMEI in the process of pentathlon classes has not been examined thoroughly yet.

AIM

The aim is to study the level and dynamics of the development of physical and psychological qualities of the cadets in the process of engagement in pentathlon classes.

MATERIALS AND METHODS

The research involved 18-23 years old cadets (men) of the first-fourth years of training. Two groups of cadets were formed: the experimental group (EG, n = 25), the cadets of which visited pentathlon section in the course of their training, and the control group (CG, n = 25), the cadets of which were engaged in sporting and mass participation events according to the current methodology. The CG and EG were formed by means of random selection. The number of physical training hours per week for the cadets of both groups was identical.

The level of the development of physical qualities of the cadets was assessed by their results in the 100 m run, pull-ups on the horizontal bar, 3 km run, performance of the general muscular endurance test on the obstacle course (400 m). The level of the cadets' psychological qualities was studied using the following methods: well-being-activity-mood methodology ("WAM methodology"); methods of self-assessment of psycho-emotional state; methods of determining the level of the development of volitional self-regulation of the individual (we determined the index of volitional self-regulation (VSR), the index of persistence (P), the index of self-control (SC)).

A set of modern general scientific methods: the method of conceptual and comparative analysis, structural and systematic analysis, synthesis, generalization, testing, pedagogical observation, methods of mathematical statistics. The authenticity of the difference between the cadets' indicators was determined by means of Student's t-test. The statistical significance for all statistical tests was set at $p<0.05$. All statistical analysis was performed with the SPSS software, version 21, adapted to medical and biological researches.

Researches related to the involvement of cadets were carried out in compliance with all relevant national regulations (Order of the Minister of Defense of Ukraine "On Approval of the Regulation on the Organization of Scientific, Scientific and Technical Activities in the Armed Forces of Ukraine" dated 27.07.16, No. 385), and also the principles of the Helsinki Declaration of the World Medical Association. Informed consent has been obtained from all individuals included in this study.

RESULTS

The comparative analysis of the level of the development of physical qualities of the cadets of the EG and the CG is given in Table 1. The analysis of the development of speed qualities showed that no significant difference was traced between the indexes of the cadets of the EG and the CG during the 1st year of their training ($p > 0.05$). The average results as to the 100 m run in the cadets engaged in pentathlon were significantly better than in the CG from the 2nd to the 4th years of their training. The study of the level of the development of strength qualities of the cadets according to the results of pull-ups shows that the 1st and 2nd year cadets' results of the EG and the CG are reliable ($p > 0.05$); and the 3rd and 4th year cadets of the EG showed significantly better indexes than in the CG ($p <0.05$).

The analysis of endurance and agility development by the results of 3 km run and overcoming the obstacle course showed that both tests have a similar tendencies of results, there is a significant effect of pentathlon starting from the 2nd year of training i. e. the indexes of the

Table 1. Dynamics of the development of physical qualities of the cadets of the EG and the CG in the course of their training (Mean±SD).

Years of training	EG (n=25)	CG (n=25)	Reliability of the difference
100 m run, s			
1st	13.89±0.13	14.08±0.13	t=1.03; p > 0.05
2nd	13.11±0.12	13.79±0.12	t=4.01; p < 0.001
3rd	12.83±0.11	13.45±0.12	t=3.81; p < 0.001
4th	12.72±0.10	13.31±0.11	t=3.97; p < 0.001
Pull-ups on the horizontal bar, times			
1st	14.51±0.59	14.37±0.64	t=0.16; p > 0.05
2nd	17.15±0.58	16.29±0.62	t=1.01; p > 0.05
3rd	19.85±0.59	17.63±0.61	t=2.62; p < 0.05
4th	20.74±0.57	18.91±0.60	t=2.21; p < 0.05
3 km run, s			
1st	714.65±6.51	721.56±6.42	t=0.76; p > 0.05
2nd	684.83±6.47	713.18±6.39	t=3.12; p < 0.01
3rd	645.27±6.41	698.26±6.33	t=5.88; p < 0.001
4th	639.14±6.25	686.72±6.27	t=5.37; p < 0.001
General muscular endurance test on the obstacle course (400 m), s			
1st	121.31±1.32	124.24±1.35	t=1.55; p > 0.05
2nd	113.11±1.24	119.81±1.31	t=3.71; p < 0.01
3rd	108.15±1.18	117.58±1.27	t=5.44; p < 0.001
4th	107.59±1.15	115.27±1.23	t=4.56; p < 0.001

Legend:
n – number of subjects; Mean – arithmetical average; SD – standard deviation; t – t-test value, p – the significance of the difference between the indicators of the EG and the CG

Table 2. Dynamics of the indexes of psycho-emotional state of the cadets of the EG and the CG in the course of their training (Mean±SD), points.

Years of training	EG (n=25)	CG (n=25)	Reliability of the difference
WAM methodology			
Well-being			
1st	6.95±0.29	7.01±0.27	t=0.15; p > 0.05
2nd	7.41±0.26	7.25±0.25	t=0.44; p > 0.05
3rd	7.88±0.23	7.41±0.22	t=1.48; p > 0.05
4th	8.17±0.20	7.58±0.19	t=2.14; p < 0.05
Activity			
1st	6.80±0.31	6.84±0.30	t=0.09; p > 0.05
2nd	7.29±0.28	6.97±0.27	t=0.82; p > 0.05
3rd	7.84±0.25	7.32±0.25	t=1.47; p > 0.05
4th	8.23±0.21	7.60±0.23	t=2.02; p < 0.05
Mood			
1st	6.47±0.28	6.60±0.27	t=0.33; p > 0.05
2nd	7.08±0.26	7.01±0.23	t=0.20; p > 0.05
3rd	7.77±0.24	7.19±0.22	t=1.78; p > 0.05
4th	8.31±0.22	7.67±0.21	t=2.10; p < 0.05
Questionnaire to self-assess the psycho-emotional states of the cadets developed by A. Wessman and D. Ricks (SPS)			
1st	4.23±0.24	4.31±0.23	t=0.24; p > 0.05
2nd	5.48±0.22	5.07±0.21	t=1.35; p > 0.05
3rd	6.44±0.18	5.85±0.19	t=2.25; p < 0.05
4th	7.29±0.16	6.63±0.17	t=2.83; p < 0.05

Legend:
n – number of subjects; Mean – arithmetical average; SD – standard deviation; t – t-test value, p – the significance of the difference between the indicators of the EG and the CG

cadets of the EG significantly exceed the indexes of the cadets of the CG (p < 0.001).

The analysis of the indexes of the cadets' emotional state according to the "WAM methodology" showed that all three researched characteristics (well-being, activity and mood) revealed no significant difference in the indexes between the EG and the CG during the 1st – 3rd years of training (p > 0.05) (Table 2).

The examination of the indexes of the cadets' self-assessment of their own emotional state shows that the 3rd and 4th year cadets engaged in pentathlon showed significantly better indexes than the cadets who were trained according to the traditional method of physical training (p < 0.05). The highest indexes of emotional state in the 4th year cadets in both groups indicate a positive effect of both pentathlon and using the traditional methods of physical training, but significantly higher indexes in the EG reveal a more pronounced effect of pentathlon classes on the formation of positive emotional state of the cadets to achieve success in training and their future professional (combat) activities.

Self-regulation is a systemic characteristic of an individual that reflects their ability to function sustainably in training and professional activities, focus on achieving maximum efficiency of their own activities, skills and experience in controlling their own state, behaviour and activity. In general, the level of volitional self-regulation is understood as the degree of personal behaviour mastery in various situations, ability to consciously control their actions, desires and states. High points on the VSR scale are characteristic of emotionally mature, active, independent and self-sufficient individuals. They are characterized by calmness, self-confidence, stability of intentions, realistic views and developed sense of personal duty. The subscale of persistence characterizes the strength of the cadet's intentions i. e. their desire to carry out the launched undertaking. Active, able-bodied people who strive to achieve the planned undertaking are on the positive pole, they are mobilized by obstacles on the way to the goal, they are not averted by alternatives and temptations, their main value is the launched undertaking. Such people are characterized by respect for social norms, desire to completely subordinate their behaviour. The subscale of self-control reflects the level of arbitrary control of emotional reactions and states. High points on the subscale are gained by emotionally stable cadets who have plenty of self-control in a variety of situations. They are characterized by inner peace, self-confidence that free them from fear of the unknown, increase the willingness to perceive the new, unforeseen and, as a rule, are combined with freedom of opinion, with a tendency to innovation and radicalism.

Thus, the analysis of the cadets' testing indexes on the VSR scale showed that the index of volitional self-regulation did not differ significantly in the 1st year cadets of the EG and the CG (p > 0.05). Starting from the 2nd year of training, the cadets who were engaged in pentathlon showed significantly better indexes of volitional qualities than the cadets who were trained according to the traditional method of physical training (Table 3).

The research of the dynamics of the indexes of persistence and self-control shows that their changes have a similar tendency i. e. significant (p < 0.001) improvement during the period of the entire training in both groups under study. Herewith, the indexes of the 1st year

Table 3. Dynamics of the indexes of volitional self-regulation of the cadets of the EG and the CG in the course of their training (Mean±SD), points.

Years of training	EG (n=25)	CG (n=25)	Reliability of the difference
Index of volitional self-regulation			
1st	9.61±0.47	9.24±0.44	t=0.57; p > 0.05
2nd	13.28±0.45	11.37±0.42	t=3.10; p < 0.01
3rd	17.54±0.43	13.81±0.39	t=6.43; p <0.001
4th	20.05±0.39	15.73±0.38	t=7.93; p <0.001
Index on the subscale of persistence			
1st	8.03±0.43	7.91±0.42	t=0.20; p > 0.05
2nd	11.14±0.40	8.32±0.40	t=4.99; p < 0.001
3rd	13.70±0.36	8.84±0.38	t=9.28; p < 0.001
4th	15.18±0.35	9.17±0.36	t=11.97; p < 0.001
Index on the subscale of self-control			
1st	6.12±0.29	5.85±0.30	t=0.65; p > 0.05
2nd	7.72±0.27	6.25±0.28	t=3.52; p < 0.01
3rd	9.35±0.26	7.71±0.27	t=4.38; p < 0.001
4th	11.53±0.27	8.60±0.26	t=7.82; p < 0.001

cadets of the EG and the CG do not reliably differ from each other (p > 0.05) in terms of the index of persistence and the index of self-control, and the indexes of the 2nd, 3rd and 4th year cadets of the EG are reliably better, than in the CG.

DISCUSSION

The scientists [16] claim that the battlefield engagement is won by the one who uses his weapons more effectively, who has a higher level of development of moral and volitional qualities, who is better prepared for the combat psychologically and physically, who is able to orient in the situation rapidly, analyse it and make correct decisions quickly. Therefore high-quality physical and psychological training of personnel is the determining component within the structure of combat training.

The anaof the literature [17] shows that modern combat activities are accompanied by many factors that are stressful in nature and that negatively affect the psyche of servicemen, causing feelings of fear, severe mental stress, insecurity and fatigue. The determining psycho-traumatic factors of combat activities according to the scientists [18, 19] are: conscious sense of threat to one's own life, the so-called biological fear of death, injury, pain, permanent disability; death of comrades in front of one's very eyes or the need to mortally strike the enemy; lack of time, accelerating the pace of actions, suddenness, uncertainty, novelty (factors of the combat situation); lack of adequate sleep, features of the regime of hygiene, nutrition; fatigue, etc. Significant changes in the motor activities of servicemen take place in the state of stress; they begin to perform actions uneconomically, with much greater effort than usually; a serviceman begins to make much more mistakes when performing certain military and professional tasks. Significantly high levels of stress can result in his complete inability to control himself, respond to the demands and orders of commanders, to act in accordance with the situation. Under such conditions, stress can cause complete incapacity of a serviceman and sometimes result in the death of servicemen or the unit.

According to many scientists [4, 12, 20], physical training plays an important role in shaping the psychological readiness of servicemen to act in extreme conditions, increasing their psychological resilience to combat stress. This is due to the fact that the means of physical training ensure the development and improvement of not only human physical but also mental nature. When used correctly, the means of physical training can significantly improve all components of moral and psychological readiness of servicemen such as spiritual welfare, volitional qualities, emotional stability and mental capacity. The scientists [16, 20] note that physical exercises, similar in their effect on the professional actions and physical activities of servicemen of different military specialties, can serve as an important means of improving their special physical fitness. Further, the scientists point out that applied exercises can be used with great success among the means that promote the development of the necessary physical and psychological qualities, the formation of applied skills. They allow improving professional skills and field training in the conditions of specific physical and psychological loads. The scientists [9, 22] analysed the impact of pentathlon exercise on the work of the body systems of servicemen and revealed the relationship between the features of military and professional activities of servicemen and their results in performing pentathlon exercises. Our analysis of the development level of physical qualities of the cadets of the EG and the CG showed a more positive impact of pentathlon classes, compared with the traditional method of physical training, on the level of the development of physical qualities in the cadets, especially in the tests aimed at endurance (3 km run) and agility and coordination skills (overcoming obstacles). According to the results of the research on psychological qualities, we can conclude about the positive impact of pentathlon on the development of volitional qualities in the cadets, improving their psycho-emotional state, which will ensure the effectiveness of their educational activities, and their professional (combat)

activities in the future. It was found that the cadets engaged in pentathlon are characterized by calmness, self-confidence, stability of intentions, developed sense of personal duty, ability to distribute efforts and control their actions, proactive attitude, desire to carry out the launched undertaking, control of emotional reactions and states, emotional stability. The results of the research expand the conclusions of many scientists in the field of physical training and sports of servicemen [5, 6, 21, 23] and complement them.

CONCLUSIONS

The high efficiency of pentathlon training in the development of all physical qualities under study in the cadets was proved: the results of the cadets of the EG in the 100 m run were significantly ($p<0.05$-0.001) better at the end of the training period than in the cadets of the CG by 0.59 s; in pull-ups – by 1.83 times; in 3 km run – by 47.58 s; in overcoming the obstacle course – by 7.68 s.

The positive influence of pentathlon training on the development of psychological (volitional) qualities in the cadets and the improvement of their psycho-emotional state was established; the indexes of the 4th year cadets of the EG turned out to be significantly better ($p < 0.05$-0.001) than in the CG according to all the parameters under study. This will ensure the effectiveness of their professional (combat) activities in the future.

Prospects for further research are to investigate the effect of applied exercises on the health of cadets.

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CONFLICT OF INTEREST
The Authors declare no conflict of interest.

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