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INDICATORS OF PHYSICAL AND MILITARY-PROFESSIONAL READINESS OF THE CADETS OF THE AIR DEFENSE FACULTY OF THE GROUND FORCES OF THE KhNUVS NAMED AFTER I. KOZHEDUB

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Purpose: to determine the dynamics of indicators of physical and military-professional training of cadets of the Faculty of Air Defense of the Ground Forces KhNUVS named after I. Kozhedub.

Material and methods: theoretical analysis of scientific and methodical literature, pedagogical testing, methods of mathematical statistics.

Results: the dynamics of indicators of physical and military-professional training of cadets of the faculty of air defense of KhNUVS named after I. Kozhedub. During the experimental period, which lasted one (2019-2020) academic year, that was attended by third-year cadets of the Faculty of Air Defense of the Ground Forces (Ad of GF), there was an improvement in average test scores, which characterizes the speed of movement, endurance, speed and strength abilities. Increasing the level of physical fitness contributed to increasing the level of military training of cadets. Correlation analysis revealed the relationship between reliability in the actions of cadets in the training environment with the level of development of various aspects of physical fitness.

Conclusions: the dynamics of quantitative indicators of physical and military-professional training of cadets is obtained and the correlation analysis of data is carried out, which gives a basis for adjusting the educational process of cadets of the Ad of GF Faculty in the direction of improving physical training taking into account military-professional activity.

Keywords: cadets, physical fitness, military-professional training, indicators.

Introduction

Modern requirements, which are aimed at improving the training of specialists in various fields, fully apply to the training of military personnel for the Armed Forces of Ukraine (AFU). One of the main stages in the development of professional skills of future officers - specialists of the highest rank - is training in military institutions of higher education (MIHE). The cadet must not only qualitatively prepare for the military profession in special disciplines, but also provide him with a high level of physical readiness for combat, the transfer of significant physical exertion, mental stress in extreme situations [4, 13].

In difficult combat conditions, a serviceman must be required not only a high level of professional training in his military specialty, but also the ability to act as an independent "combat unit", skillfully maneuvering fire and movement. The success of these tasks directly depends on the ability of servicemen to own their weapons, to have a high level of development of military-applied skills, physical and moral and psychological qualities. However, today's experience of combat operations in the anti-terrorist operation zone and other local conflicts, the results of inspections of combat readiness of military units and units indicate a lack of physical training of personnel, and, above all, endurance, training in effective use of personal weapons, grenades, ability to overcome natural and artificial obstacles and perform other military-professional techniques and actions [1, 3, 5].

At the same time, solving the problem of effectively improving the combat effectiveness of servicemen by means and methods of physical training, set out earlier in the Manual on Physical Training (NFP-2014) is not always sufficient. There

is a need to develop special, science-based tools and methods of physical training to increase the combat effectiveness of servicemen in accordance with the specific requirements of their military-professional activities. The need for special (including physical) training of servicemen for hostilities is indicated by a number of authors [7, 15]. The experience of combat training and the results of scientific research indicate that an important and most effective means of solving the problems of special physical training of servicemen is the use of physical exercises and sports, which are most positively close in their impact on physical and professional actions of servicemen [1,4,7].

Significant, extreme physical and mental stresses, which have to withstand personnel in the process of modern hostilities, significantly reduce the combat effectiveness of servicemen. This is the most pronounced in the deterioration of fire performance and maneuvering on the battlefield, in reducing the speed and accuracy of action when using military equipment and weapons. The degree of reduction of combat capability of servicemen during combat missions is determined by the magnitude and nature of the load, special skills, level of physical fitness, physical development, health and other factors [9, 14]. The Armed Forces of NATO's leading nations are developing concepts of physical fitness aimed at the early development of personnel 'physical and psychological qualities and military-applied skills, which ensure the performance of combat missions in a variety of, including extreme conditions [8].

Soldiers with a high level of development of strength, endurance, speed, agility in combat prevail in various indicators of military-professional activity of servicemen, in which the level of these qualities is lower (Yu.A. Borodin, 2002; V.V. Payevsky, O.A. Shevchenko, 2004). Researchers Yu.S. Finogenov (2009) and S.V. Romanchuk (2012) argue that military-professional training (mastering a certain amount of military-applied, special skills) cannot be successful without sufficient development of physical qualities necessary for the ability to move quickly on the ground, overcome various obstacles, swim (including in uniform) with weapons, go skiing [10, 11, 12].

The purpose of the reseach is to determine the dynamics of indicators of physical and military-professional training of cadets of the Faculty of Air Defense of the Groung Forces of KhNUPS named after I. Kozhedub.

Material and methods

Pedagogical testing of indicators of physical and military-professional readiness of cadets of the Faculty of Air Defense of the Ground Forces during the 2019-2020 academic years was carried out, with the help of which the dynamics of these indicators was studied. Research methods: theoretical analysis of scientific and methodical literature, pedagogical testing, methods of mathematical statistics.

Results of the research

In the course of classes with cadets of the Faculty of Air Defense of the Ground Forces, methods of selective influence with the use of repeated and interval training methods, frontal and flow methods of performing exercises. Competitive method was used during relay races and mobile games.

The construction of classes did not differ from the conventional one. Each lesson consisted of preparatory, main and final parts. The principle of selection of exercises for the preparatory and final parts remained traditional. The sequence of the program basically corresponded to the program of physical training of cadets of the Faculty of Air Defense of the Ground Forces. The main difference was that 40% of the time of each lesson was devoted to educational issues, and 60% of the time was used to develop the physical qualities necessary for the military-professional activities of cadets of the Ad of GF Faculty. It should be emphasized that a significant amount of endurance work was performed in the process of mass sports and independent work. Since the time spent on the development of physical qualities, exercises have been used that mainly developed the muscles of the lower extremities - 50% of the time, the muscles of the torso - 30% and the muscles of the arms - 20% of the time.

In addition, the classes alternately used exercises to develop the extensor and flexor muscles of the torso. The muscles of the shoulder girdle were less involved. It is also worth considering the use of jumps of maximum intensity (jumping from

significant elevations of more than 2,5 m). It should also be noted the frequent use of special running exercises, especially at the initial stage, which allowed preparing the musculoskeletal system for the next maximum loads of jumping work. The application of the whole set of exercises allowed to focus on the predominant development of the most professionally important muscle groups, providing on the basis of their diverse development the necessary quality orientation, either in the direction of strength or in the direction of speed. During the experimental period, which lasted one (2019-2020) academic year, and which was attended by third-year cadets of the Faculty of Air Defense of the Ground Forces, there was an improvement in the average results of tests that characterizes the speed of movement, endurance, speed and strength abilities and the actual strength abilities (Table 1).

Table 1

Dynamics of indicators of physical fitness of cadets of the AD of GF Faculty at the beginning and end of the experimental period (n = 25)

№	Researched indicators	Beginning $\overline{X_1} \pm m_1$	End $\overline{X_2} \pm m_2$	t	p
1.	100 m run, s	14,2±0,5	13,6±0,6	0,83	>0,05
2.	General control exercise on the obstacle course, s	143,4±4,4	128,3±4,3	2,45	<0,05
3.	Jump up from a place, cm	49,2±1,9	56,3±1,5	3,00	<0,01
4.	Running for 3000 m, s	710,5±13,5	665,2±9,5	2,75	<0,05
5.	Pull-ups on the crossbar, number of times	13,2±1,2	18,7±1,1	3,37	<0,01

Of the five tests of physical fitness, in which a large number of muscle groups are involved in the work, significant changes ($p < 0,05$) in cadets occurred in four tests (general control exercise on the obstacle course, jumping up, running at 3000 m, pull-up on the crossbar). Thus, there were significant improvements in the results of those areas of improvement of physical fitness, which as a result of the experiment were identified as the main.

Improving the reliability of the actions of servicemen is based on increasing the level of physical performance in normal conditions. Table 2 shows the dynamics of

indicators of the level of military professional training of cadets of the AD of GF Faculty.

Table 2

Dynamics of indicators of the level of military professional training of cadets of the AD of GF Faculty at the beginning and end of the experimental period (n = 25)

№	Researched indicators	Beginning $\overline{X_1} \pm m_1$	End $\overline{X_2} \pm m_2$	t	p
1.	Landing in a combat vehicle (armored personnel carrier), s	27,7±0,5	26,3±0,4	2,19	<0,05
2.	Disembarkation from a combat vehicle (armored personnel carrier), s	14,7±0,3	13,8±0,3	2,12	<0,05
3.	Excavation and camouflage of trenches for military equipment (ZU-23), s	7817,0±54,6	7657,9±53,2	2,09	<0,05
4.	Rolling of ZU-23 by service forces at a distance of 100 m from the combat position with bringing to the combat position at a new firing position (medium-rough terrain), s	235,5±8,9	212,3±5,8	2,19	<0,05
5.	Charging of the combat vehicle "Arrow-10M" with four missiles, s	137,7±2,3	130,6±2,4	2,14	<0,05
6.	Discharge of the combat vehicle "Arrow-10M", s	135,9±1,0	133,9±1,0	1,41	>0,05
7.	Preparation for shooting from different positions (lying down, from a knee, standing, from behind shelter) at actions on foot, s	8,3±0,6	6,6±0,5	2,07	<0,05
8.	Discharge of the AK-74 store, s	19,2±1,4	15,3±1,3	2,07	<0,05
9.	Equipment store AK-74 cartridges, s	40,1±2,7	32,8±2,3	2,08	<0,05
10.	Shooting with a PM on a stationary target during the day (exercise №1), s	19,2±3,2	21,6±3,5	0,51	>0,05
11.	Throwing an F-1 grenade at a distance, m	35,5±2,1	36,6±1,8	0,42	>0,05
12.	Throwing an F-1 grenade from a place on accuracy, points	26,9±3,1	36,8±3,4	2,15	<0,05

Thus, out of twelve tests of military professional training, significant changes ($p<0,05$) in cadets occurred in nine tests (landing, disembarkation in a combat vehicle (armored personnel carrier), digging and camouflage of trenches for military equipment (ZU-23) , rolling of ZU-23 by service forces at a distance of 100 m from the combat position with bringing into combat position at a new firing position

(medium terrain), loading of the combat vehicle "Arrow-10M" with four missiles, preparation to firing from different positions (lying down, from a knee, standing, from behind shelter) at actions on foot, discharge, equipment of shop AK-74, throwing of the grenade F-1 from a place on accuracy.

Table 3

Correlation between special performance indicators and cadets' physical fitness indicators (n = 25)

№	Indicators of special working capacity	Physical fitness				
		Running on 100 m	Pull-ups on the crossbar	Jump up from the place	Running 3000 m	General control exercise on the obstacle course
1.	Landing in a combat vehicle (armored personnel carrier), s	0,54	0,38	-0,42	0,31	0,50
2.	Disembarkation from a combat vehicle (armored personnel carrier), s	0,61	0,40	0,50	0,43	0,59
3.	Excavation and camouflage of trenches for military equipment (ZU-23), s	0,58	0,41	0,26	0,23	0,24
4.	Rolling of ZU-23 by service forces at a distance of 100 m from the combat position with bringing to the combat position at a new firing position (average terrain), s	0,59	-0,18	0,39	0,35	0,53
5.	Charging of the combat vehicle "Arrow-10M" with four missiles, s	-0,63	0,49	0,49	-0,11	-0,39
6.	Discharge of the combat vehicle "Arrow-10M", s	-0,53	0,46	0,22	-0,37	-0,51
7.	Preparation for shooting from different positions (lying down, from a knee, standing, from behind shelter) at actions on foot, s	-0,47	-0,21	0,20	0,01	-0,30
8.	Discharge of the store, s	0,60	-0,31	-0,38	0,34	0,42
9.	Equipment store AK-74 cartridges, s	0,61	-0,38	-0,48	0,54	0,57
10.	Shooting with a PM on a stationary target during the day (exercise №1), points	-0,18	-0,36	-0,10	0,11	-0,38
11.	Throwing an F-1 grenade at a distance, m	0,21	-0,35	0,11	0,19	0,12
12.	Throwing an F-1 grenade from a place on accuracy, points	0,16	0,34	0,21	0,04	0,14

At the same time, positive dynamics took place in the indicators of discharge tests of the combat vehicle "Arrow-10M", firing from a PM on a stationary target during the day (exercise №1), throwing an F-1 grenade at a distance, however, the probability was not found ($p>0,05$). Thus, increasing the level of physical fitness

helped to increase the level of military training of cadets. As a result of correlation analysis (Table 3), the relationship between reliability in the actions of cadets in the training environment with the level of development of various aspects of physical fitness is revealed. The analysis of the correlation matrix allowed determining the factors of reliability of military-professional activity. Factors in this case are different aspects of the physical fitness of servicemen. Correlation analysis allowed determining the degree of significance of physical fitness in connection with the manifestation of qualities: strength in various manifestations, speed, endurance, ensuring reliability in the actions of AD of GF cadets.

The density of the relationship between reliability indicators in actions and tests that reflect the level of development of strength, speed and strength qualities, speed qualities, endurance, shows a high dependence of the level of combat capability on all aspects of physical fitness of cadets. However, there is a difference in the level of correlations, which allows us to talk about the importance of the development of certain motor skills to ensure reliability in the actions of cadets. The highest correlations are found in combat performance and 100 m running, as well as in high jumps, which reflect the level of development of speed and speed-power capabilities. In the results of the 100 m run, the level of four correlation coefficients from twelve at the level of 0,60 and above. In jumps up from a place also four correlation coefficients have sizes 0,42-0,50. Slightly lower correlations of the results in pull-ups on the crossbar, which reflect the actual strength capabilities, with some indicators of special performance, which are at the level of 0,40-0,49. Slightly higher correlation coefficients are observed between the indicators of reliability in special actions and the results of the general control exercise on the obstacle course, which characterizes the level of development of speed endurance, where five correlation coefficients - 0,5 and more. At the same time, there is a slightly lower relationship between combat performance and the results of the 3000 m run, which are at the level of 0,31-0,43 with a single factor of 0,54.

Analysis of the correlation matrix allows us to consider in detail the importance of the development of a quality for each of the groups of professional techniques and

actions. Thus, the mathematical analysis allowed identifying the most important aspects of physical fitness of cadets of the AD of GF Faculty.

The analysis of the correlation matrix allowed determining the system of physical fitness by the most professionally important physical qualities with their selection in the form of factors of reliability of military-professional activity. According to the level of correlation coefficients, we can say that the reliability of the actions of AD of GF cadets in extreme conditions has a specific qualitative basis, which determines the nature of the special direction of physical training. Thus, the generalization of the results of correlation analyzes shows that the factors of reliability of military-professional activity in the system of physical training of cadets are certain motor abilities (qualities), namely: the degree of development of speed, speed, strength and endurance. At the level of physical fitness of the studied contingent, there is a good relationship between the degree of development of individual physical qualities (on average, the correlation coefficients are at the level of 0,5-0,6).

The level of development of speed and strength qualities and endurance (on average correlation coefficients at the level of 0,5-0.65) acquires the greatest value for reliability of military-professional actions. In the system of strength and speed-strength training, the most professionally important is the ability to show high results in exercises with the development of high-speed cyclic type of muscle tension.

Conclusions / Discussion

From the first year of training in MIHE it is necessary to emphasize the use of exercises that develop the most professionally important muscle groups, which contributes to morpho-functional changes in the body under the influence of military-professional activities. During the experimental period, the cadets' physical fitness tests changed significantly ($p < 0,05$) for four out of five tests. Thus, there were significant improvements in the results of those areas of improvement of physical fitness, which as a result of the experiment were identified as the main.

Of the twelve military training tests, significant changes ($p<0,05$) occurred in the cadets in nine tests. At the same time, the positive dynamics occurred in the

indicators of discharge tests of the combat vehicle "Arrow-10M", firing from the PM at a stationary target during the day (exercise №1), throwing a grenade F-1 at a distance, however, the probability was not found ($p > 0,05$). Thus, increasing the level of physical fitness helped to increase the level of military training of cadets.

Prospects for further research in the study are in improving physical fitness through sports and moving games.

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