

## Original Article

### Innovative approaches for evaluating physical fitness of servicemen in the system of professional training

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#### Abstract

The article proves that the system of assessment and verification of physical qualities of military personnel plays a significant role in the professional skills training of military specialists. To evaluate military applied skills of the military personnel we have validated and implemented a number of physical exercises with the appropriate standards. Forming the complex of exercises we took into account the poll results of combatants who identified the main types of combat missions (march (30%), defense (19.2%), duty at checkpoints and guard (17.0%). The practical results allowed us to clarify that usage of personal protective equipment and weapon contributes to improving the professional skills of military personnel.

**Key words:** standard, physical qualities, professional qualities, personal protective equipment, weapon, effectiveness

#### Introduction

The practice of physical readiness testing is characterized by the confrontation between the method of control exercises selection and the determining ways of individual and total assessment. The need of systematization and transformation of the majority of control exercises in the practical use for selecting the appropriate assessment criteria requires adjustments in the system of governing documents for physical training.

One of the main problems of Military Forces of Ukraine for today is the reformation of training and education process of cadets who are the future officers of this country. Supplying of military elements with sophisticated equipment, its improvement, the necessity of permanent support of military readiness require the careful improvement of combat training. Modern warfare, which are currently under way, increase the value of professionally important qualities of each officer.

The use of physical exercises for improvement of military-professional readiness of soldiers has begun long time ago as historical experience for combat training shows. In spite of the changes of weapons, military equipment, methods and tactics of warfare the value of physical qualities of soldiers for the successful combat activities steadily increased requiring specific differentiation as preceding studies show [1, 2, 5].

The most important function of monitoring is to evaluate the degree of compliance with the requirements for professional education results of military specialists. The test and evaluation system of physical readiness of soldiers took complicated historical way of its development. Each stage of its development has got different concepts for the selection of control exercises and establishing the evaluation standards for the system of physical training [6, 7].

However, it does not offer the possibility to determine the level of physical skills and motor activities, to evaluate it in terms of objectives, to make necessary adjustments in the means and methods of physical training at any stage of the process. Therefore, the theory of physical qualities' transfer should be the leading concept of test and evaluation system of physical readiness of military personnel. It shows positive impact of certain physical qualities to workability in the conditions of warfare.

During the reformation of Military Forces of Ukraine there is an opportunity to refuse the old methods of verification and assessment of physical readiness and to implement the most effective ways of evaluation and verification of the soldiers of Military Forces of Ukraine. Thus the search results allow us to insist on the necessity of development of programs, standards and tests for the Army, which would determine the degree of basic physical qualities of military personnel of various specialties and the degree of their workability according to the chosen specialty [4].

## Materials and methods

According to the requirements of the General Staff of the Military Forces of Ukraine and under the way of improvement and intensification of special physical training of troops we have developed new exercises (Table 1), which are closely related to the actions and movements of troops during combat missions (including head-to-head techniques and obstacles overcoming). From September 2014 to April 2015 at the National Army

Academy we have conducted the testing of elaborated standards of physical readiness with the usage of personal protective equipment ("Corsar"-type body armor and metal or Kevlar helmet) and weapon. During the study analysis methods, questionnaires, interviews and statistical processing were used. Testing was carried out during the scheduled classes on physical training, sports activities, and accompanying physical training in the combination with other items of combat (professional) training. This study involved 698 cadets of the Faculties of Combat Arms, Rocket and Gun Artillery, Combined Arms, and Military Engineering and CBRN Defense.

Table 1

The approximate standards of new exercises, which are closely related to the actions and movements of troops during combat missions (including head-to-head techniques and obstacles overcoming)

Exercise number	Exercise	Men											
		1 year			2 year			3 year			4-5 years		
		5	4	3	5	4	3	5	4	3	5	4	3
2 (1)	Special obstacles overcoming, min.	1,10	1,15	1,20	1,05	1,10	1,15	1,00	1,05	1,10	0,55	1,00	1,05
3 (2)	Shuttle carrying of the caisson of ammunition 30 kg 4x15m, sec.	19,0	19,5	20,0	18,5	19,0	19,5	18,0	18,5	19,0	17,5	18,0	18,5
3a (3)	Shuttle running 10x10 m (along the square) with 40 kg weight, sec.	31,0	32,0	33,0	30,0	31,0	32,0	29,0	30,0	31,0	28,0	29,0	30,0
4 (4)	5 km group running, min.	28,30	29,00	30,00	28,00	28,30	29,30	27,30	28,00	29,00	27,00	27,30	28,30
5 (5)	Adroitness exercise, sec.	35,0	40,0	45,0	34,0	39,0	44,0	33,0	38,0	43,0	32,0	37,0	42,0
6 (6)	Carrying of two caissons (40 kg each) in pairs, sec.	29,0	29,5	30,0	28,5	29,0	29,5	28,0	28,5	29,0	27,5	28,0	28,5
7 (7)	Strength exercise in pairs, min.	8,25	8,30	8,40	8,20	8,25	8,35	8,15	8,20	8,30	8,10	8,15	8,25
8 (8)	Exercise for all body muscles, sec.	24,0	26,0	28,0	23,5	25,5	27,5	23,0	25,0	27,0	22,5	24,5	26,5
9 (9)	Overcoming of obstacle elements along with the performing of head-to-head techniques, min.	1,15	1,20	1,25	1,10	1,15	1,20	1,05	1,10	1,15	1,00	1,05	1,10

The conditions of exercises performing:

**№ 2 (1):** 134 m distance. Run to the first obstacle on the distance of 30 m, overcome two 1 m high barriers (the distance between them is 10 m), run next 15 m, crawl under 2 m long net obstacle, run 10 m to the flag, run around it and get back to the start.

**№ 3 (2):** 60 m distance. The exercise has to be done by one soldier. Run 15 m with the caisson of ammunition, turn round and run the same distance for three more times to finish. The exercise is failed if the caisson was dropped or the personal equipment was lost.

**№ 3a (3):** 200 m distance. There are three caissons 40 kg each on the start (point number 1). Run 10 m to the point number 2 with the first caisson, turn back and do the same with the rest of the caissons by turns. Do the same between the points number 2 and 3, 3 and 4, and finally between 4 and 1. Time is checked after finishing with the third caisson at the starting point.

**№ 4 (4):** Has to be done in group. The exercise is failed if the personal equipment was lost. Time is checked personally. Mutual help is allowed without carrying someone's personal equipment.

**№ 5 (5):** 70 m distance. Run 10 m, crawl 10 m, run 10 m again, grabble 10 m, run 10 m, run 10 m upon 1 m high deck, 10 m run to finish. Time is checked after finishing the total distance.

**№ 6 (6):** 100 m distance. The exercise has to be done in pairs. Run 25 m with the caissons of ammunition to the flag, turn round and run the same distance for three more times to finish. The exercise is failed if the caissons were dropped or the personal equipment was lost. Time is checked for the pair only.

**№ 7 (7):** Three 30 kg caissons lay on the ground in a line with the distance 1 m between them close to 1 m high barrier. One soldier has to take up the caissons and another one has to put them down in a line from the other side of the barrier by turns. Time is checked for both soldiers when the third caisson is putting down on the ground. Each caisson drop results in 5 sec fine.

**№ 8 (8):** 50 m distance. Run 25 m with 20 kg caisson to the flag, make 10 squats, and run back. The exercise is failed if the caisson was dropped or the personal equipment was lost.

**№ 9 (9):** 150 m distance. Staying in a trench throw 3 grenades by 600 g each for 20 m in the wall or targeting the square (2,6 m per 1 m) in front of the wall. Get out of the trench after, run to the ladder, overcome it, jump down, run back to the trench, jump down into it, jump out after, run 50 m to the head-to-head area, perform 3 certain techniques in three study places there. Time is checked after finishing the last head-to-head techniques. Each grenade miss results in 5 sec fine.

Table 2

Comparative table of usage of general physical qualities and military-applied skills during the different types of combat actions (tasks)

Type of combat action (task)	Number of respondents	Physical qualities, %					Military-applied skills, %				
		Strength	Endurance	Speed	Adroitness	Flexibility	Head-to-head fight	Overcoming of water obstacles	March by feet	Overcoming of obstacles, fences, obstructions	March by machinery
Assault	80	15,6	36,3	25,6	12,5	10	2,9	0	37,1	20	40
Ambush	82	8,0	35	13	15	29	12,5	2,5	17,5	42,5	25
Combat support	105	50,0	29	10	5	6	0	13,3	6,7	38,3	41,7
Defense	92	19,4	29,3	24,4	18,8	8,1	3,1	7	3,6	39,7	46,6
March	91	14,2	51,6	11	12,4	10,8	0,2	1,5	7,3	14,3	76,7
Duty on checkpoints, guard	94	14,3	42,8	18,6	15,7	8,6	2,9	0	10,7	30	56,4
Escape of encirclement	85	18,3	45	16,7	14,2	5,8	0	4,3	14,3	20,7	60,7
Reconnaissance	69	15,0	56,7	10	10	8,3	0	0	38,3	31,7	30

## Results

As a result of analysis of the survey there was found out that the main types of combat tasks (actions) to which respondents were involved are: assault (9.6%) ambush (6.0%), defense (19.2%), march (30.0%), duty at checkpoints and guard of camps or other objects (17.0%), reconnaissance, searching, surveillance, etc. (3.9%), escape of encirclement (8.4%), supporting of combat missions, unloading of ammunition, equipment repair, arrange and engineering equip of the location sites, etc. (6.0%). Thus, it is clearly seen that defense, march, duty on the block-posts are the most often combat missions and tasks carried out by future officers.

The respondents drew their attention to the specificity of each type of combats in relation to the priority of development of general and special physical qualities, formation of military-applied motor skills and the degree of physical and mental stress. The relative distribution of usage of physical qualities and military-applied motor skills during combat missions in terms of "personal feelings" and "acts of subordinates" in the questionnaires was carried out.

Processing of the results made it possible to detect some dependencies in usage of physical qualities and skills for different types of combat missions (tasks) (Table 2).

So, the ratio of usage of general physical qualities in all of the types of combat operations shows the leading role of the endurance level in forming of high degree readiness of troops for combat activity. The high level of endurance is defined by experts as a leading physical quality in all cases (except combat support). The level of strength is rated for second position (mainly due to the carrying out of some actions that are inherent in not only special but also all other military divisions). In addition, more detailed analysis shows relatively balanced distribution of the rest of physical qualities with slight predominance of speed and agility over flexibility.

## Discussion

It was found out that the respondents didn't mention the cases of overcoming of water obstacles and head-to-head battles in their interviews. But they consider not to exclude them from the system of training, just to change their focus and use for psychological stability or self-reliance training in extreme conditions. So, in our opinion, the existence of these exercises in the system of physical training should be left on the primary level for all troops, but the adaptation of these skills for the conditions of combat missions should be combined with psychological and tactical preparation.

The increasing part of machinery marches in the structure of military actions reduced the role of marches by feet, but in total it is still actual, especially along with a training of high endurance of soldiers. The respondents drew a significant attention to the exercises with different types of obstacles to overcome. In

addition, these exercises are usually connected with quick and coordinated movements to overcome the obstacles (dug-outs, embarkation, etc.) instead of long period of overcoming of different obstacles, fences, ruins and depressions against the background of tiredness. So, the obstacle overcoming was concerned mostly not with the speed-strength endurance of troops, but with their coordination and speed abilities improving physical qualities of troops.

The study shows that the vast majority of combat actions are connected with different movements of machinery both on- and off-roads. About 90% of the respondents confirmed the negative impact of rolling, noise and air pollution on performing combat tasks associated with the movement on the machinery. Unfortunately, the physical training guidance, programs and documentation for different categories of military personnel don't include special exercises or tools to help soldiers to adapt for the mentioned negative factors of combat activities. For example, all the governing documents of physical training just include the counteraction to machinery acceleration, but jumping on a trampoline and turns on gymnastic wheel etc. are the special exercises for air force personnel only. The studies aimed to explore the nature of motions and actions of military personnel in the performance of combat missions allowed to clarify the theory of special orientation of physical training. The differentiation of evaluation standards implemented in the exercises in it reflects the development of applied physical qualities of soldiers of various military specialties [1, 3, 7].

So, when combat activity requirements for physical and mental duties, movement activity regime, and other conditions are defined, the combat activities of different military specialties are different. It has a significant influence on the requirements for the physical and mental status of soldiers.

Analyzing the results of verification of new exercises and the specific scientific and methodical literature we can affirm that the use of personal protective equipment and weapons (total weight is approximately 25-30 kg) during the movement activity, in our opinion, let us define the correlation between professional employability and the development level of physical qualities. It will also shorten the preparation time of soldiers for the possible actions in protective equipment during the combats or similar tasks.

However, military physical training in its physiological essence is manageable process of enhancing the functionality of the body to the necessary level for the successful implementation of military tasks in combat conditions. Special physical exercises are elaborated and used to achieve the aim [3, 8].

The main difference of physical exercises from other motor activities (housekeeping, industrial or military-professional ones) is the possibility of dosing the duty according to the tasks, physical readiness and individual capabilities. The use of individual protection equipment and weapon during the training decreases this possibility. The intensity of physical exercises for soldiers is equal for all military personnel (this mainly applies to the impact on kinetic and cardiovascular systems). However, adaptive reaction of every soldier to the physical exercises is individual: the same motor skill or exercise (running, jumping, etc.) has different impact on them. For some soldiers these duties are executable, and for others – extreme as they exceed the adaptive capacity of the organism. Duty intensity that is close to extreme leads to a progressive increase of tiredness or excessive tiredness of organs and systems at its frequent repetition. In such cases only the partial restoration of organism performance after training takes place.

The efficiency dynamics of the most used organs and systems during the training process reveals a steady downward trend. This is fully confirmed by the theory of V.M. Platonov, who proved that excessive stress of organs and body systems and inadequate recovery of them lead to their progressive deterioration.

The analysis of our study concerning the effectiveness of the current system of physical training of cadets let us say that it doesn't resolve its task in full. We believe that the preparation of kinetic system of military personnel for high static and dynamic duties combined with the performance of military professional activity in combat in the protective equipment needs an improvement of exercises and standards, inspection methods, and the development of new special programs reflecting the status of physical qualities, readiness to perform professional tasks [9]. Therefore, we propose to reorganize the physical training classes, shifting their focus from traditional "coaching" to the development of all major muscle groups that provide the highest motor activity of troops of chosen specialty during the performance of their professional tasks. In this case, it is important to ensure the compliance of the most basic principles of physical training – regularity and systematic studies. Non-observance of this principle prevents the long-term adaptation to any type of exercise.

This is confirmed by the fact that graduates, whose physical ability was estimated on "excellent" or "good" level, lost it in a few months after the graduation: level of their physical ability during the service in the army dropped to the "satisfactory" and even "unsatisfactory" one. Any method of development of functional capability of the human body provides an appropriate alternating duty and rest. Even the most perfect method can't effectively ensure the physical ability of military personnel for professional activity without it, especially in the combat conditions. This allows us to assume that it is necessary to be accustomed to wear personal protective equipment, to perform the exercises mentioned above (under the terms of execution). This in turn characterizes the professional efficiency and the development of all important physical qualities of military personnel, which are used carrying out the professional tasks.

### Conclusions

The analysis of correction level of general physical qualities and military motor skills in the structure of modern requirements for the different types of combat operations and missions provided an opportunity to unify the direction of main guidelines of practical training of all the categories of military personnel. These are as follows: the development of endurance and strength, rolling tolerance, overcoming of obstacles using the complex of complicated coordinated motions in short time, carrying out the long-term marches in full equipment or with the load, doing physical exercises against the background of noise and smoke simulation, carrying out the trainings with special physical activity for the certain military branches.

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