

SHORT REPORT

Functional State of Military Personnel Engaged in Unarmed Combat

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Abstract

Thirty-two soldiers engaged in hand-to-hand combat participated in the survey (Master of Sports (MS) - 4 people, Candidate Master of Sports (KMS) - 12 people, and the first sports category (I) - 16 people). The surveys were conducted under the aegis of the Hetman Petras Sagaidachny National University of Ground Forces (Lviv). The study made it possible to predict and evaluate the functional state of the cardiovascular system of military captains, to carry out a qualitative selection in the sports section with hand-to-hand combat, as well as to rationally construct training regimens, competitions and monitor their functional status. It is established that the servicemen who are engaged in the hand-to-hand combat segment have a high level of physical development, excellent cardiac performance, are of the normotonic type and have average values of general physical capacity (PWC170) and aerobic possibilities, namely maximum oxygen consumption.

Keywords: functional state, aerobic capacity, anthropometric indicators, unarmed combat, cadets

Introduction

The high pace of training and competitive loads puts high demands on the functional status of servicemen who are engaged in hand-to-hand combat. In military practise, to achieve a high result, the optimum condition of the nervous and cardiovascular systems, the high level of development of speed-strength qualities, high-speed endurance, aerobic and anaerobic capabilities of servicemen is a prerequisite (Klymovych & Olkhovyi, 2016). The determination of the functional status of military personnel requires a comprehensive analysis of morphological parameters, the level of development of motor qualities, aerobic and anaerobic possibilities, and the state of the cardiovascular system (e.g., Costa et al., 2016). Since there is practically no data on the comprehensive analysis of the

functional state of servicemen who are engaged in hand-to-hand combat in the available scientific and medical literature, we conducted a study of the morphological and functional indicators that enable a comprehensive assessment of the functional state and determine the level of their preparedness (Rayevsky & Kanisevsky, 2010).

The duration and intensity of exercises, as well as their number, all of which determine the overall load are planned, taking into account the functional capabilities of the body and physical capacity. In this case, the principle of gradual increases in physical activity must be guided (Yavorsky, 2016). To date, only the complex harmonious development of qualities enables the high achievements of military men, and not merely one or two, leading physical, psychological or functional



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qualities (Klymovych, Olkhovyi & Romanchuk, 2016).

Thus, current data indicate the importance of indicators of the functional preparedness of servicemen who are engaged in unarmed combat in achieving their high results. At the same time, the authors of these publications consider only certain aspects of functional readiness, which reduces the theoretical and practical value of the research (Klymovych et al., (2019).

Most works devoted to the study of servicemen involved in unarmed combat relate to certain characteristics of their functional state in different conditions of training and adversarial activity (Rolyuk et al., 2016; Yoshimura, 1997). The literature does not disclose data on the comparison of the functional status of servicemen engaged in unarmed combat at rest and after metered physical loads of various types. Although numerous authors apply a large number of methods to evaluate the functional state of different systems of the body and their response to the load, the study of complex nature is practically absent. Since the control of any one functioning system can lead to erroneous conclusions about the failure of adaptation mechanisms in general, there is a need to work out a system of integrated assessment of the functional readiness of servicemen engaged in unarmed combat. In addition, there are only a limited number of publications on research in this area that supports the relevance of our work.

Kruszewski et al., (2017) studied the features of speed-force training in combat sports. However, data on the analysis of the cardiovascular system, as well as the aerobic and anaerobic capabilities of servicemen engaged in unarmed combat are absent in the literature. There are practically no publications on the assessment of physical development and functional state of the analysis of the cardiovascular system, and aerobic and anaerobic capabilities of servicemen of this category. In this regard, the main task was to select tests to assess the functional state of the analysis of the cardiovascular system, and aerobic and anaerobic capabilities of soldiers engaged in

unarmed combat, which could be conducted during mass surveys, and testing them in groups of servicemen who wish deal with hand-to-hand combat. The proposed set of tests should include tests for the assessment of physical development, as well as for the study of the functional state of the cardiovascular system.

Classes of unarmed combat, military all-round, martial arts, sports games, etc., expand the professional suitability of servicemen engaged in technical activities.

The purpose of this paper is to consider the level of physical development and the functional state of the soldiers who are engaged in hand-to-hand combat and to identify and analyse the functional and morphological characteristics that characterize the functional state of the analysis of the cardiovascular system, the aerobic and anaerobic capabilities of the soldiers.

Methods

Methods of research - theoretical and methodical analysis and generalization of scientific and methodical literature; medical and biological methods (anthropometry, physiometry, physical fitness tests); methods of mathematical statistics. The statistical analysis of the data was performed using standard procedures in Excel 7.0 and SPSS 11.5.

Results

During the anthropometric measurements, it was found that the body mass of the subjects was on average 69.34 ± 2.78 kg, body height 175.56 ± 2.39 cm, and chest circumference of 99.60 ± 3.90 cm (Table 1). On the basis of the indicators, we have identified indices that allow us to assess the physical development of servicemen engaged in unarmed combat. The obtained data testify that the Kettla index of the subjects is 394.5 ± 39.07 g/cm, and the body mass index ranges from $19-25$ kg/m². Both indicators confirm the average regulatory value for healthy individuals.

Table 1. Morphological and physiometric indices servicemen engaged in unarmed combat (n=32)

Indexes	M±SD
Body height (cm)	175.56±2.39
Body weight (kg)	69.34±2.78
chest circumference (cm)	99.60±3.90
Strength (by kistovym dynamometer-kg)	49.70±4.10
Heart rate (min)	64.31±5.10
Systolic blood pressure	122.40±7.70
Blood pressure is diastolic	80.70±4.90

However, the development of the muscles of different groups in the surveyed soldiers was unequal, since the magnitude of manual dynamometry (49.7 ± 4.1 kg) and the value of the strength index ($69.08 \pm 8.72\%$) indicate a lack of flexor muscles fingers of the hand. The strong body composition of the surveyed military men and the good development of the chest indicate the high values of the Erisman index (11.04 ± 1.32) and the low values of the Pinyu index, which was lower than 26 in all surveyed.

According to several indicators of the body structure, in particular, the development of the chest and the weight-growth ratio, the troops involved in the examination significantly exceed the average normative values for healthy individuals of

this age, indicating a high level of physical development.

The assessment of physical condition also involves the measurement of various physiometric indicators, in particular, the basic parameters of the cardiovascular system. The obtained data testify to the fact that the average indexes of systolic blood pressure at rest were 122.40 ± 7.70 mmHg, and diastolic 80.70 ± 4.90 mmHg, (i.e., within the normal range), CO $43-61$ ml, and average values of the minute volume of blood 3.84 ± 0.61 l.

The influence of the sympathetic and parasympathetic nervous system on the regulation of blood circulation in a state of rest is characterized by the vegetative index of Kerdo (VC). This indicator of servicemen engaged in hand-to-hand

combat has a predominantly negative value in the range (minus) -11 to -66 units, indicating the dominance of parasympathetic regulation.

The functional state of the cardiovascular system was also characterized by the use of Ruffie's test, the average value of which is 1.64 ± 0.36 , which indicates excellent cardiac performance. The absolute value of PWC170 is 1296.19 ± 75.63 kgm/min, the relative value of PWC170 is 15.49 ± 0.44 kgm/min per kilogram of body weight corresponding to single events (Wilmore & Kostlyla, 2001). The average value of maximum oxygen consumption in the surveyed military personnel was 3.7 ± 0.46 l min⁻¹, relative 47.09 ± 0.96 l min⁻¹ kg⁻¹, indicating average aerobic capacity. In the course of the study, it became clear that there is a dominant development of speed-strength qualities, which is associated with the specific aspects of this sport.

The analysis of the cardiovascular system indicators is widely used by domestic and foreign authors when evaluating the functional readiness of servicemen engaged in unarmed combat (e.g., Prontenko et al., 2018). The analysis of the research of the scientists showed that in the current conditions the professional activity has certain characteristics and high demands on the physical and psychological readiness of the military personnel of the Armed Forces of Ukraine (Romanchuk, 2015).

Discussion

Previous studies have shown that the level of preparedness of servicemen engaged in unarmed combat is insufficient to perform professional and combat tasks (Klymovych, Oderov, Korchagin, Olkhovyi & Romanchuk, 2019). Our main task

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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was to select tests to assess the functional state of the analysis of the cardiovascular system, aerobic and anaerobic capabilities of soldiers engaged in unarmed combat that could be conducted in mass surveys and test them in groups of servicemen who wish to engage in unarmed combat.

The research complemented the results of other researchers regarding the positive effects of the use of physical exercises on overall physical fitness and the health of military servicemen engaged in unarmed combat (Romanchuk, 2015).

The novel element of our results is that the proposed set of tests includes tests for the assessment of physical development, as well as for the study of the functional state of the cardiovascular system.

A programme of applied physical training has been developed, the essence of which is to provide physical readiness and accelerate the process of adaptation of graduate officers to professional (combat) activity. The applied content of the author's programme enables forming the necessary qualitative performance of professional activities of officers. In addition, it has been established that this programme enables maintaining or even improving the overall physical qualities of military personnel during physical training.

In the process of analysis of scientific sources, normative documents and practical experience of military experts, it has been proved that, in the practice of military and combat sports, in order to achieve a high result, the optimal condition of the cardiovascular and nervous systems, the high level of development of speed-strength qualities, high-speed endurance, aerobic and anaerobic opportunities for athletes. At the same time, it is insufficient to study the level of functional preparedness of servicemen engaged in unarmed combat.

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