

**THE SIGNIFICANCE OF CARDIOINTERVALOGRAPHY IN DETERMINING  
THE ABILITY OF MILITARY PERSONNEL TO ADAPT AT THE BEGINNING OF  
MILITARY SERVICE**

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**Abstract:** Heart rate variability analysis is a new methodology for studying the processes of regulation of physiological functions, and the circulatory system is considered as an indicator of the adaptive reactions of the whole body. The clinical importance of studying heart rate variability is emphasized. The circulatory system is considered as a sensitive indicator of the adaptive reactions of the whole organism, and the variability of the heart rate reflects well the level of tension of the regulatory systems due to the activation of the autonomic nervous system in response to any stressful effect. The dynamics of autonomic regulation of heart activity was studied during the initial training period of military servicemen. First-year cadets are shown to have an average predominance of the tone of the sympathetic division of the autonomic nervous system.

**Key words:** heart rate variability, cardiointervalography, adaptation.

The development of political, ideological, religious, economic and other conflicts and crises in the current period. The analysis of the development trends of various types of large-scale emergency situations showed that emergency situations remain one of the important obstacles to sustainable and long-term economic growth, taking into account their impact on human potential and safe living conditions.

The increase in local wars and armed conflicts, the increase in the wave of terrorism, the increase in the number of man-made accidents and natural disasters make the need for a significant mobilization of human and economic resources, the need to prevent and eliminate the consequences of emergency situations urgent. demanded a solution. It is clear that the health and lives of thousands of people depend on the speed and effectiveness of providing assistance to persons exposed to or at risk of such exposure. In this regard, issues of ensuring high readiness of personnel to perform their duties in extremely difficult, including combat, conditions become crucial. At the same time, ensuring the health of the employees of the structures involved in the elimination of the consequences of the emergency situation becomes a priority task.

As a rule, the professional activity of persons dealing with the elimination of the consequences of an emergency situation is carried out in extremely difficult situations. It is associated with the uncertainty of events, lack of time, and is accompanied by a high level of responsibility for other people's lives, a conscious feeling of threat to one's own life and health. Unfavorable environmental and climatic factors also contribute significantly to the creation of special tensions. The effect of professional stress can be manifested in the over-intensification and reduction of regulatory mechanisms of functional systems that ensure adaptation to changing life factors.

Extreme factors of service in most cases have a negative impact on the health of persons performing special tasks. The most obvious manifestations of this effect occur in the form of vascular vegetative distasia. Often, it develops from gradual functional shifts (physical and psycho-emotional fatigue, insomnia, irritability, anxiety). These and other changes lead to the formation of a stressful state and the disruption of the body's adaptive activity. The reaction of the body to the incompatibility of the functional state with internal and external stimuli and factors of the professional environment is considered as "occupational stress" characteristic of workers of extreme professions and, first of all, military personnel.

Under the influence of constant stressful factors, the activity of the sympathetic division of the autonomic nervous system increases significantly. Changes in the tone of the centers of the autonomic nervous system have a significant impact on the body's functional reserves with impaired adaptation processes at various levels, instability to physical stress. This reconstruction forms the psychophysiological characteristics of military personnel.

Accordingly, pathology of the cardiovascular system is often detected among military personnel. It has been shown that the influence of acute stressors forms the development of hypertension.

In modern conditions, arterial hypertension rarely occurs in isolation. It is often accompanied by a number of symptoms that make up the metabolic syndrome (abdominal obesity, dyslipoproteinemia, impaired glucose tolerance, insulin resistance with compensatory hyperinsulinemia, thyroid pathology).

A chronic stressful situation, a difficult psychological background, combined with the difficult socio-economic conditions inherent in the performance of the professional duties of the employees of special units contribute to the emergence of gastrointestinal tract pathology.

It is noted that owners of dangerous professions suffer from biliary dyskinesia with the formation of gall bladder disease and chronic cholecystitis.

The endocrine system plays one of the leading roles in regulating the compensation mechanism in response to extreme factors affecting the body. Each hormone, in one way or another, participates in the response to external influences. The adequacy and nature of adaptive shifts depends on its change, which ensures restoration and preservation of the stability of the internal environment of the body as a whole.

The introduction of various compensatory and adaptive mechanisms changes the metabolism and functional state of organs and tissues accordingly. A single or short-term stressful effect, as a rule, does not lead to a stable reconstruction of homeostasis regulation mechanisms, while long and repeated stress can be the basis for the development of stress-induced pathology.

Thus, a violation of regulatory adaptive abilities leads to a violation of intersystem interactions in the body, a decrease in its resistance to stress, including failure to perform assigned tasks.

Research on the search for methods that allow to adequately assess the activity of the VNS in maintaining homeostasis and adapting to changing environmental conditions. Cardiointervalography is one of the instrumental methods of assessing the dynamics and intensity of adaptive processes related to the autonomic regulation of heart activity.

**Purpose of work.** to study the diagnostic possibilities of the cardiointervalography (CGI) method in disorders of autonomic regulation of heart activity.

**Research methods.** The study of the functional state of the cardiovascular system regulatory mechanisms was carried out using the method of variational cardiointervalometry (VKM). Extraction, recording and analysis of electrocardiosignals was carried out using the UPFT "psychophysiolgist" (Medikom MTD Taganrog LLC) device.

**Research object:** during 2023-2024. A total of 64 cadets of the first stage participated in the study. The average age was  $19.5 \pm 3$ . The main group included cadets who entered a military educational institution from a secondary school ( $n=31$ ), the control group included cadets who completed military service and graduated from the military academic lyceum (TM HAL) ( $n=33$ ). To see the effect of neurovegetative regulation of heart rate of cadets, KIG was conducted. A clinoorthostatic test (KOS) was performed as an equivalent of physical load during the performance of KIG. The following indicators are taken into account: Mode ( $M_0$ ) - the most common value of the cardio interval, which represents the level of system activity; mode amplitude ( $A_{m0}$ ) -  $x$  – the range of cardiointerval oscillation values, reflects the number of cardiocycles ( $\Delta$ ) and mode number in percentage form, indicates the state level of the sympathetic division of the autonomic nervous system; range of variation (level of activity of the parasympathetic part of the VNS); tension index (ZI) - tension level of regulatory mechanisms. The degree of centralization of heart rhythm control was determined by the reaction of the  $A_{m0} / \Delta x$  index. During the KOP period (increase or decrease of the index in the range of 100%). Proportion between nerve and humoral heart rhythm

stimulation channels was determined by the reaction of the Amo / Mo index (increase or decrease of the index within 100%).

**The results of the study:** comparing the average values of KIG indicators, the cadets of the main group had higher indicators, the superiority of the central contour of heart rate control (decrease in Mo and  $\Delta x$ , increase in Amo and ZI). However, when analyzing the dynamics of KIG indicators during the implementation of individual KOS, it did not show significant differences with the control group (62.4%).

At the same time, a more than 2-fold increase in the Amo/ $\Delta x$  index was noted in the main group of cadets in response to KOS. Higher than the control group (42.2% vs. 19.0%,  $p < 0.01$ ). A more than 2-fold decrease in the index was observed in the main group compared to the control group. The obtained results showed that the changes are an imbalance of sympathetic and parasympathetic effects on the heart rhythm, this is an increase in the influence of one of the sections of the VNS over the norm during physical load, mainly the sympathetic component.

A 2-fold increase in the Amo/MO index was significantly observed in the main group (34.1% vs. 15.7%,  $p < 0.05$ ), showing the superiority of the central circuit over the autonomic circuit of heart rate control.

The obtained results of changes in Amo / $\Delta x$  and Amo/Mo indices during KOP affected the mechanisms of adaptation of the circulatory system. The characteristic features of adaptation of the autonomic nervous system in the first year of military service are a slight shift of the autonomic balance towards the predominance of the sympathetic nervous system. All indicators of heart rate variability indicate a decrease in the ability of the sinus node to concentrate the heart rate, a higher mobilization of the circulatory system, and an increase in the centrality of heart rate control. Such manifestations of the shift of the vegetative balance towards sympathicotonia may be related to the intensity of the educational process and psychoemotional stress.

**Conclusion:** Analyzing the dynamics of Amo/  $\Delta x$ , Amo/Mo indexes together with cardiointervalography and clinorhastatic test can be effectively used in early detection of neurovegetative regulation disorders and adaptation problems of military personnel. This means predicting the formation of cardiovascular pathology and taking preventive measures at the pre-disease stage.

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