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Research Article

THE RELATIONSHIP BETWEEN CARDIOINTERVALOGRAPHY INDICATORS AND PSYCHOLOGICAL COMPONENTS OF THE ADAPTIVE POTENTIAL OF CADETS IN THE FIRST YEAR OF STUDY

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ABSTRACT

Military service is a very specific type of activity, during which the human body can be exposed to a whole range of unfavorable factors of various etiologies. The most difficult period in military service is the initial adaptation period, when the physiological and psychological restructuring of the soldier's body occurs, his adaptation to life and everyday life, to the requirements of the military environment. Adaptation of military personnel to military activities affects the success of this activity, as well as the preservation of the health of military personnel. The study of the features of the process of adaptation to military service seems important for organizing high-quality training of personnel and achieving the ability of military personnel to withstand significant physical and neuropsychic stress. All this also applies to students of military educational institutions. In this case, motivation will be understood as a time-limited psychophysiological process that controls the behavior of an individual, setting its direction, organization, activity and stability; the ability of a person to actively satisfy his needs, while further acting in the interests of the state and society. One of the important areas of this work, which has great practical significance, is the study, assessment and

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forecasting of the adaptive capabilities of the cadets' body. Most often, psychological diagnostic methods are used to determine the level of adaptation, but recently instrumental research methods, in particular, heart rate variability analysis, have become increasingly widespread.

KEYWORDS

Adaptation period, military service, cadets, psychological diagnostics, heart rate variability.

INTRODUCTION

The aim of the study was to examine the relationship between the indicators of cardiointervalography and the psychological components of the adaptive potential of the individual (API) when assessing the functional state of the body of 1st year cadets.

The object of the study were cadets during their training at the Armed Forces Academy during 2022-2024. The research involved 59 cadets of the 1st and 2nd courses. The average age was 19.5±3 years. Group 1 included cadets serving on conscription and students of the Military Academic Lyceum (TM HAL). The number of subjects was 34 people. Group 2 included cadets who entered the Academy after graduating from secondary school. The number of subjects was 25 people.

METHODS

To study the adaptation processes, a multi-level personality survey was conducted - according to the Adaptability questionnaire (MLO-A), developed by Maklakov A.G.

The methodology is based on the concept of adaptation as a continuous process of active adjustment of a person to constantly changing conditions of the social environment and professional activity. The effectiveness of adaptation largely depends on how realistically a person perceives himself and his social connections, accurately measures his needs with the available opportunities and is aware of the motives of his behavior. A distorted or insufficiently developed idea of oneself leads to a violation of adaptation, which can be accompanied by increased conflict, disruption of relationships, decreased performance and deterioration of health. Cases of severe adaptation disorders can lead to gross violations of military discipline, law and order, suicidal behavior, disruption of professional activity and the development of diseases. The questionnaire contains

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165 questions and has certain scales. The results are processed according to four "keys" corresponding to the scales: "reliability", "neuropsychic stability", "communicative potential", "moral normativity", "adaptive abilities". The subject can answer each question of the test with "yes" or "no". Therefore, when processing the results, the number of answers that match the "key" is taken into account. Each match with the "key" is estimated at one "raw point".

The study of the functional state of the regulatory mechanisms of the cardiovascular system was carried out using the variation cardiointervalometry (VCI) method. The removal, recording and analysis of electrocardiogram signals were carried out using the UPFT "Psychophysiologist" (OOO Medikom MTD, Taganrog), with electrodes built into the device body. The subject held the device in his hands, tightly pressing his palms to the electrodes. Based on the heart rate calculation, heart rate variability was assessed at five functional levels: the functional state of the body is normal; the functional state is close to optimal; the functional state is acceptable; the functional state is extremely acceptable; the functional state is negative stress; the functional state is critical.

Mathematical and statistical processing of the experimental material was carried out using the Microsoft Excel spreadsheet editor and the Statistica 6.0 software package.

RESULTS

The results of psychological testing showed that in the examined sample, 1 group of high and normal adaptation (33.9%) and 2 groups (8.5%). With satisfactory adaptation 1 group (22%) and 2 groups (30.5%). With low adaptation 1 group (1.7%) and 2 groups (3.4%). 1 group of good adaptive abilities. People of this group easily adapt to new conditions of activity, quickly "enter" a new team, navigate the situation quite easily and adequately, quickly develop a strategy for their behavior and socialization. As a rule, they are not conflict-prone, have high emotional stability. The functional state of people of this group during the adaptation period remains within the normal range, performance is maintained. In group 2, most people of this group have signs of various accentuations, which are partially compensated in familiar conditions and can manifest themselves when changing activities. Therefore, the success of adaptation largely depends on external environmental conditions. These people, as a rule, have low emotional stability. The socialization process is complicated, antisocial breakdowns, manifestation of aggression and conflict are possible. The functional state in the initial stages of adaptation may be disrupted. People in this group require constant monitoring.

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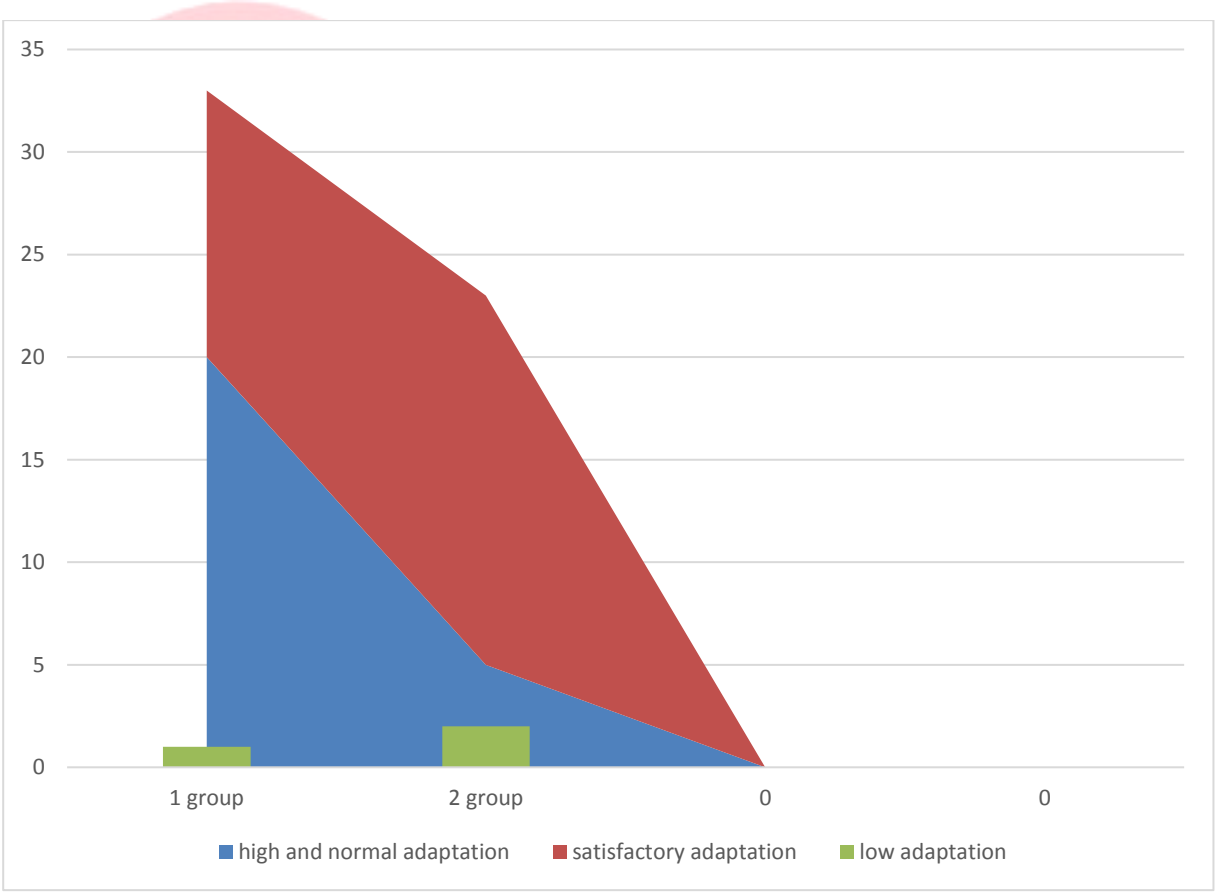
Table 1. Adaptation indicators by groups (Methodology of MLO A.G. Maklakov)

Level of adaptive abilities	1 group (n=34)		Group 2 (n=25)	
	Quantity	%	Quantity	%
High and normal adaptation groups	20	33,9 %	5	8,5 %
Satisfactory adaptation group	13	22 %	18	30,5 %
Low adaptation group	1	1,7 %	2	3,4 %

Fig. 1. Adaptation indicators based on the results of the psychological survey according to Maklakov A.G.



The study of the functional state of the regulatory systems of the cadets' body based on heart rate variability data revealed the following: normal - observed in 32.3% of cadets in group 1 and 16% in group

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2; close to optimal - in 50% of group 1 and 40% in group 2, acceptable - 11.7% of cadets in groups 1 and 28% in groups 2, the functional state is maximum acceptable in 5.8% of group 1 and 16% of group 2.

Thus, according to the obtained results, in the majority of cadets in the first (50%) and slightly fewer in the second (40%) groups, the functional state of the regulatory mechanisms was close to optimal and was characterized by normocardia (with a heart rate below average values), i.e. an optimal heart rhythm, which indicates a balanced influence of the autonomous and central regulatory circuits. In this group, a slight predominance of the trophotropic function was also observed (responsible for such imbalances as hyperhidrosis, dilation of peripheral vessels, hypotension, increased intestinal peristalsis, bradycardia, hypersalivation), which indicated a possible, slight predominance of parasympathetic influences.

In another group of cadets, which included both representatives of groups 1 and 2, the features of the adaptation of the autonomic nervous system in the first year of training consisted of a shift in 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, high mobilization of the circulatory organs, and an increase in the degree of centralization of heart rate control.

Table 2. Indicators of the functional state of regulatory mechanisms according to HRV indicators.

HRV by functional levels	1 group (n=34)		Group 2 (n=25)	
	Quantity	%	Quantity	%
The functional state of the body is normal;	11	32,3%	4	16%
the functional state is close to optimal;	17	50%	10	40%
the functional state is acceptable;	4	11,7%	7	28%
the functional state is maximally acceptable;	2	5,8%	4	16%

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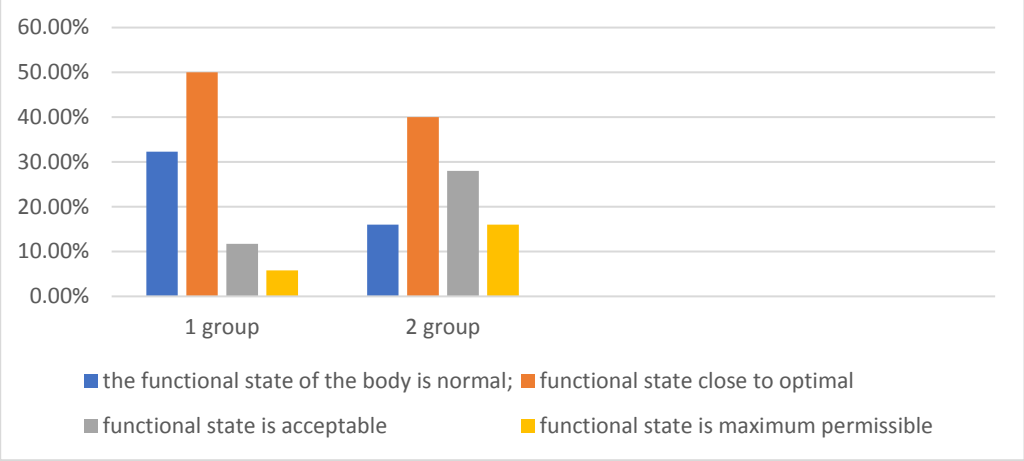
Fig. 2. Indicators of the state of regulatory mechanisms according to the HRV indicators



Such manifestations of the shift of the vegetative balance towards sympathicotonia can be associated with the intensification of the educational process, psychoemotional stress. This can be explained by the following: high-intensity loads of the special preparatory period of training increase the exhaustion of the functional capabilities of the cardiovascular and central nervous systems, which negatively affects the state of regulatory mechanisms and, ultimately, the physical condition of cadets.

Comparison of groups with a low and medium / high level of PAP revealed significant differences between them in a number of indicators of the CVS. Indicators reflecting the activity of the parasympathetic link of the regulation of the CVS were higher in more adaptive individuals with a higher level of PAP. These were mainly cadets of group 1.

Cadets with a low level of PAP were generally characterized by the predominance of the influence of sympathetic mechanisms on the state of the CVS. In individuals with a low level of psychological adaptability, a fairly pronounced tendency towards less variability in intervals between heart contractions is manifested. This feature reflects a certain stabilizing effect of centralization of heart rhythm control, which is mainly due to the increased degree of activation of the sympathetic division of the ANS and a decrease in the activity of the autonomous circuit of cardiac regulation.

Considering that the above indicators prevailed among the cadets of the 2nd group, it can be stated that the cadets of this group are more likely to experience not only overstrain of the physiological, but also psychological regulatory systems. We believe that it is

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necessary to take into account the upper limits of the scales, the excess of which in the "average" cadet may indicate the risk of failure of adaptation with an inadequate change in the level of functioning of the main biological systems of the body and psyche.

Thus, the study of the adaptation processes of 1st-year cadets of military educational institutions using psychological tests and heart rate variability indicators allows us to identify a group with an insufficient level of adaptation and the possibility of its failure. This will allow for timely correction of disorders, enhance the body's ability to adapt to new conditions, increase the stock of functional reserves and the ability to mobilize them in a timely manner, preventing depletion of regulatory mechanisms.

CONCLUSIONS

1. Cadets of group 2 with low LAP scores are usually characterized by the predominance of the influence of the central control circuit in regulating the heart rate and the effects of sympathetic mechanisms on the state of the cardiovascular system. In group 1 cadets with average/high LAP scores, the influence of parasympathetic and sympathetic mechanisms on this system is more balanced.

2. The indicators of the VCM in a state of physiological rest can be considered as prognostic characteristics in relation to not only biological but also psychological adaptability of an individual.

3. Motivated adolescents (who have entered military service and graduates of Military Academic Lyceums) adapt to military service more easily.

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