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ANALYTICAL AND COMPARATIVE REVIEW OF THE LITERATURE ON THE RESEARCH TOPIC «THE STUDY OF ADAPTIVE POTENTIAL AND PHYSICAL DEVELOPMENT IN THE BODY OF ORGANIZED YOUTH»

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Abstract:

This article contains the history of the study of the formation of an objective method, the study of the adaptive capabilities of the body, which revealed the regular cyclicity of fluctuations in the work of the cardiovascular system, as well as the work of R. M. Baevsky, who in his numerous works was one of the first to describe the statistical analysis of HRV, introduced the basic concepts, summary vegetative indices, explained the regulation of the heart rhythm and the origin of individual HRV indicators. Anthropometric indicators of physical development, the main indicators of the circulatory system: heart rate, systolic blood pressure, diastolic blood pressure. The coefficient of health is used as a criterion for the adaptive capacity of the organism

Keywords: Adaptive potential, physical development of the body, heart rate variability, blood pressure fluctuations, prognostic significance, health, disease.

INTRODUCTIONS. In the history of the formation of HRV as an objective method for studying the adaptive capabilities of an organism, several stages have been passed. The discovery of Meyer's waves in 1876 - fluctuations in blood pressure, with a frequency of 0.1 Hz, which were associated primarily with the work of the vasomotor center - the first discovery that revealed the natural cyclicity of fluctuations in the work of the cardiovascular system. At the same time, the first approbation of the mathematical calculation of HRV on a computer did not meet with a response in medical circles. This method would continue to be of interest only in experimental science, but it would be meaningless for practical application if it were not for its prognostic significance revealed by numerous studies. So, already in 1965, at the very origins of HRV analysis as a diagnostic method, its clinical significance was revealed by Hon and Lee: fetal distress, as they noted, was preceded by changes in the dynamic series of cardio intervals and, thus, it was possible to prevent this pathological condition [1963]. The main works of this time in the USSR are associated with R. M. Baevsky, who in his numerous works was one of the first to describe the statistical analysis of HRV, introduced the basic concepts, total vegetative indices, explained the regulation of the heart rhythm and the origin of individual HRV indicators [Baevsky R. M. , Parin V.V., 1968]. Under the leadership of these scientists, already in 1966 - much earlier than in the West - the first symposium on the mathematical analysis of the heart rhythm was held. Their monograph, published in 1984, summed up the results of the work of researchers working in the field of HRV analysis in the 70–80s. – Zhemaitite D.I., Bezrukikh M.M., Niedekker I.G., Gabinsky Ya.L., Voskresensky A.D., Vorobieva V.I., Wentzel M.D., Kletskina S.Z. and others. [1]

OBJECT AND METHODS OF RESEARCH. Analysis of heart rate variability (HRV) is one of the most popular methods both in our country and abroad. This method began to be actively developed in the USSR in the early 60s. One of the important incentives for its development was the success of space medicine. In 1961, during the flights of Yuri Gagarin and German Titov, using ECG records transmitted to Earth via telemetry channels, an analysis was made of the duration of a successive series of RR intervals to assess changes in the activity of the sympathetic and parasympathetic divisions of the autonomic nervous system**.** These studies were continued in the flights of the crews of the Vostok and Voskhod spacecraft, and then they began to be constantly carried out on the Soyuz transport spacecraft and in the medical control system for the crews of the Salyut and Mir orbital stations (R.M. Baevsky, 1972, R. M. Baevsky, O. I. Kirillov, S. Z. Kletskin, 1984, A. L. Goldberger, M. W. Bungo, R. M. Baevsky et al 1994, A. I. Grigoriev, R. M. Baevsky, 2002). The first publication on the results of the analysis of HRV in space appeared in 1961 (O.G. Gazenko, R.M. Baevsky). These materials

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were published in English in 1965 (V.V. Parin, R.M. Baevsky, O.G. Gazenko). [2]

In 1966, the first symposium on heart rate variability (on the mathematical analysis of heart rate) was held in Moscow (Parin V.V., Baevsky R.M., 1968). At this symposium, 35 reports were made, about 60 people participated in it. In 1977, the second All-Union Symposium on Heart Rate Variability was held in the city of Pavlovsky Posad near Moscow, at which 147 reports were presented. [3]

The transition from health to illness is associated with a decrease in the adaptive capacity of the body, with a decrease in the ability to adequately respond not only to social and labor, but also to ordinary everyday stress. At the same time, a number of transitional states appear on the border between health and disease, which are called prenosological (Baevsky R.M., Kaznacheev V.P., 1978, Baevsky R.M., 1979). The results of mass preventive examinations showed that from 50 to 80% of the population are at different stages of prenosological conditions (Kaznacheev V.P., Baevsky R.M., Berseneva A.P., 1981). Thus, most people do not need medical diagnostics (disease diagnostics), but prenosological diagnostics, i.e. in determining the degree of reduction in the adaptive capabilities of the body, the degree of deviation from the norm. Based on the results of many years of research, we have proposed the following classification of the functional states of the body (Baevsky R.M., 1979, Baevsky R.M., Berseneva A.P., 1997):

1. The state of the physiological norm. It is characterized by satisfactory adaptation to environmental conditions. There are sufficient functional capabilities of the body. Homeostasis is maintained at a minimum voltage of regulatory systems.
2. Donosological conditions. Under these conditions, to maintain the balance of the organism with the environment, it is necessary to mobilize functional resources, which requires the tension of regulatory systems. A different degree of tension of adaptive mechanisms develops. The functional (adaptive) capabilities of the body at rest are not reduced, the ability to adapt to stress is reduced. Homeostasis is maintained only due to a certain tension of regulatory systems.
3. Premorbid conditions. The state of unsatisfactory adaptation to environmental conditions. The functionality of the body is reduced. Homeostasis is preserved only due to a significant tension of regulatory systems or due to the inclusion of additional compensatory mechanisms.
4. Disruption (half) of adaptation mechanisms. A sharp decrease in the functionality of the body. Homeostasis is broken. Development of specific pathological changes at the organ-system level. The indicated classification of functional states has been quite seriously tested in the practice of mass preventive examinations of the population and can be considered quite acceptable for solving the problems of prenosological diagnostics. Prenosological diagnostics is understood as the recognition of the functional states of the body that occur in the process of transition from the norm to pathology. At the same time, the state of tension of regulatory systems, which ensures the mobilization of the necessary functional reserves, is considered to be actually prenosological. The state of unsatisfactory adaptation, when the functional reserves are reduced, should be classified as a premorbid state. Only the failure of adaptation, from the point of view of clinicians, can be attributed to the state of the disease, while all other states can be considered as different levels of health.

Maintaining sufficient adaptive (adaptive) capabilities of the body, i.e. ensuring health is directly dependent on the functional reserves of the body, on its ability to mobilize these reserves to maintain and maintain homeostasis in changing environmental conditions. The lower the body's functional reserves, the higher the tension of regulatory systems should be in order to ensure the necessary level of functioning of the main vital systems of the body. The simplest and most accessible method for assessing the tension of regulatory systems or the total activity of the sympathoadrenal system is currently HRV analysis. It allows you to quickly judge changes in the vegetative balance and, accordingly, the processes of spending and restoring functional reserves. For a specific assessment of the functional states of the body according to HRV, a mathematical model was developed in the form of discriminant function equations, which include HRV indicators (Baevsky R.M., Chernikova A.G., 2002). [4]

In a research work on the topic "Studying the adaptive potential and physical development in the body of organized youth" it was studied: anthropometric indicators of physical development, the main indicators of the circulatory system: heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP) . The adaptive potential (AP) was calculated according to Baevsky. Calculation of the adaptive potential (AP) according to the modified formula of R. M. Baevsky [5]. The coefficient of health is used as a criterion for the adaptive capacity of the organism. The following values are entered into the formula: heart rate, systolic blood pressure, diast blood pressure, age, body weight, height of the subject.

RESULTS OF DISCUSSION AND EXPERIMENT.

The study used data obtained as a result of a survey of 72 young men aged 16–28, first-year students of the Fergana Medical Institute of Public Health, who were divided into 2 groups. The main group was formed of

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22 students - citizens of Uzbekistan, 28 students - citizens of Kyrgyzstan, 22 students - citizens of Pakistan. According to the formula of R. M. Baevsky to determine the adaptive potential of the subject's body:
AP = (0,011 × HR) + (0,014 × BPsyst) + (0,0008 × BPdiast) + (0,014 × A) + (0,009 × BW) + (0,004 × G) – (0,009 × H) – 0,273,
HR – heart rate (beats/min); BP syst - systolic blood pressure (mm Hg); BP diast - diastolic blood pressure (mm Hg); A - the age of the subject (years); BW – body weight (kg); G - gender (coefficient for females - 2, male - 1); H - height (cm). [6].

An accelerated method for assessing the level of physical condition was proposed by E. A. Pirogova in 1985. The physical state reflects the level of physical performance, functional reserves of life-supporting organs and systems and, first of all, cardiovascular, the degree of physical development and physical fitness. A clear relationship was noted between the severity of the risk of developing coronary heart disease and the physical condition of the individual (Pirogova E.A. et al., 1985). [8].

DETERMINATION OF THE LEVEL OF PHYSICAL CONDITION ACCORDING TO E.A. PIROGOVA.

Since the physical state is determined by morphological and functional indicators that reflect the state of the body's main life support systems, it is quite justified to refer to it in the practice of assessing a person's physical health. According to this method, the forecast of the level of physical condition (PFS) can be obtained as a result of preliminary measurement of simple morphological and functional parameters (heart rate, blood pressure, body weight) and used when calculating the index of the level of physical condition according to the formula

PFS = (700-3 x HR - 2,5 x BPavg. - 2,7 x A + 0,20 x BW)/(350 - 2,6 x A + 0,21xH)

HR - heart rate, beats. V. min. at rest;
BP cf. - mean blood pressure at rest, mm Hg. Art. It is found according to the formula:
BP avg = BPd + (BPs - BPd) / 3;
BPd - diastolic blood pressure, mm Hg. Art.;
BPs - systolic blood pressure, mm Hg. Art.;
A - age in years;
BW - body weight, kg;
Height - height, cm;
The resulting digital value is evaluated according to the table with a gradation of 5 levels: 0.255-0.375 - "low", 0.255-0.375 - "below average", 0.376-0.525 - "average", 0.526-0.675 - "above average", 0.826 and more - "high". [8]

CONCLUSION. In various areas of applied physiology, when studying the processes of adaptation of an organism to changed environmental conditions, the possibility of assessing the dominant level of control of physiological functions becomes crucial for predicting the probable result. If the adaptation process proceeds with the dominance of the mechanisms of mobilization or activation of regulatory systems, then the functional reserves of the body may be insufficient to obtain the desired effect**.** Monitoring the effectiveness of a wide variety of health-improving measures can be carried out on the basis of an assessment of the dominant level of control of physiological functions using HRV analysis methods. At the same time, it is important that the result of all influences on the patient is the activation of self-regulation mechanisms. Thus, the method can be widely used in the treatment of not only cardiovascular, but also a variety of diseases, since changes in heart rate in this case are considered as an indicator of the state of the physiological functions control system in the whole organism.

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