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CORRELATES OF AUTONOMOUS NERVOUS AND IMMUNE SYSTEMS AT INTELLECTUAL EXERTION OF MEDICAL STUDENTS IN CONDITIONS OF COMBINED ACTION OF ENVIRONMENTAL STRESSORS

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ABSTRACT

In the process of research, an assessment of the indicators of the medical students adaptive capacity with different levels of physical fitness was made in conditions of the combined action of intellectual exertion and meteorological environmental factors. The functional state determination, the degree of tension of the regulatory systems and functional reserves were evaluated by calculating the Harkavy nonspecific reactivity index and the Bayevsky adaptation potential with the use of correlation analysis. Correlation analysis of these indexes revealed a significantly strong direct correlation, which was 0.72. Thereby, the Harkavy index (HI) at the second stage of the experiment in sharp fluctuations in meteorological environmental factors conditions reflected the level of adaptation mechanisms stress validly.

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Introduction. The subsequent formation of students' physical and mental health passes in conditions of information overload against the backdrop of significant fluctuations in the meteorological nature factors of the environment [1]. Genetically determined physiological mechanisms of visceral functions regulation of the human body in changing meteorological conditions are an adequate adaptive improvement response. It should be noted that the strongest fluctuations in the meteorological factors come with the period of intense intellectual exertion on the body of students on the background of hypodynamia and hypokinesia. As a result of the adaptation reserves stress, which is caused by psycho-emotional fatigue, the pathological meteosenitivity as a consequence of the depletion of the possibilities of various functional systems of the body, primarily cardiovascular and immune, is occurred [4, 6]. According to the scientific data, attention is not paid to studying the weather and climatic conditions influence on healthy people of active working age. [3]. The medical

students activity during the first 3 years of study includes learning the theoretical material with a minimum physical activity level, which is an additional stressor during the unfavourable changes in the environment period [5, 7]. Thus, the prospect of this research is the timely detection of the adaptation mechanisms tension by changing the parameters of functional blood circulation and blood systems regulation in the intense intellectual exertion conditions of medical students with different levels of meteotropic response.

The evaluation of medical students' adaptation potential indicators with different levels of physical fitness under intellectual exertion in the joint action of environmental meteorological factors conditions has become the aim of the research.

Materials and methods of research. Eighty-seven 2nd year students of the KhNMU of the age of 18-20 years (34 men and 53 women). All the students were examined on the basis of clinical blood analysis, determined the adaptation index by Harkavy L.H., and also investigated the adaptive potential by Baevsky R.M. In determining the functional state, the evaluation of regulatory systems and functional reserves of the body, the stress level in the process of intellectual activity of students took place [9]. On the basis of the correlation of anthropometric indicators, the physical development level was estimated [8]. Atmospheric pressure data was received from the official site of the Ukrainian Hydrometeorological Center <https://meteo.gov.ua> With the "Meteo-Q" questionnaire help, the quantitative and qualitative functional state of the students organism before and after the sharp fluctuations in weather and climatic conditions were determined and meteotropic reaction level was concluded. Mental capacity and mental rate were evaluated with the Krepelin method [2]. For calculations implementation, parametrical statistical methods were used. They included the average quantity and variations from this average quantity. The parametric t-criterion of the Student was used for comparison of average quantities.

Results and discussion. In the first stage of the experiment, during the period of the corresponding normal meteorological conditions, three separate groups of men and women with different physical training levels were formed. Students of all groups were determined the non-specific reactivity index by Harkavy L.H. (HI) and adaptation potential by Baevsky R.M. Correlation analysis of these indicators revealed a significantly strong direct correlation between the nonspecific reactivity index and the adaptive potential, which was 0.72. Thereby, the Harkavy index (HI) in the second stage of the experiment showed the exertion of adaptation mechanisms with sharp changes in the parameters of the joint action of natural environmental factors (atmospheric pressure, electromagnetic radiation of the sun, temperature, humidity, etc.). In groups of men: 1st group (25.8%) – athletes with moderate training schedule – $HI = 0.38 \pm 0.02$; of them: 38.2% with a high level of meteosensitivity by the questionnaire "Meteo-Q" and 37.5% with an intellectual working capacity low-level. Students of this group showed $HI = 0.28 \pm 0.03$ in the second stage of the experiment, which indicates the non-specific reactivity mechanisms activation and determines the "stress" of the adaptation reaction. A similar situation occurred in the 3rd group, which was composed by non-athletes with a low-level of physical training which was 19.4% of students. HI in this group was 0.39 ± 0.02 ; of them: 46.3% with a high level of meteosensitivity and 50.0% with an intellectual working capacity low-level. Students of group 3 on the second stage of the experiment showed $HI = 0.26 \pm 0.03$, indicating a "stress" reaction of adaptation. The second group (54.8%) consisted of non-athletes with an average physical training level who almost regularly practice physical activity and $HI = 0.41 \pm 0.03$; of them: 18.2% with a high level of meteosensitivity by the questionnaire "Meteo-Q" and 23.5% with an intellectual working capacity low-level. Students of this group at the other stage of the experiment showed $HI = 0,37 \pm 0,03$, which indicates the nonspecific reactivity mechanisms stress within the limits of adequate physiological adaptation to unfavourable changes in natural conditions.

Conclusions. A significant percentage of students with a high meteosensitivity level and adaptive reserves exhaustion under nonspecific reactivity mechanisms stress, are in groups with obvious physical fatigue and hypodynamia signs. They were observed with presence of a "stress" adaptation reaction type signs.

Dosed physical activity, contrarily, contributes to increasing the student's body adaptive capacity to both intellectual exertions and sharp fluctuations in meteorological environmental factors.

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