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# Some Features Of Cardiac Activity In Young Men Living In The Conditions Of Karakalpakstan

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**Annotation:** The study investigates the impact of environmental factors on the functional state of the human body, particularly focusing on young men living in Karakalpakstan. It analyzes the mechanisms of heart rate regulation and the adaptive reactions of the cardiorespiratory system. The research includes an evaluation of heart rate variability, systolic and diastolic blood pressure, and regulatory system activity. The findings highlight the influence of different environmental conditions and seasonal changes on the physiological functions of young men, providing essential insights into the adaptive mechanisms and health status of the population in this region.
**Keywords:** environmental factors, cardiorespiratory system, heart rate variability, blood pressure, adaptive mechanisms, seasonal acclimatization, Karakalpakstan, young men, physiological functions

The scientific challenges of assessing the impact of environmental factors on human health and justifying health improvement measures are today among the priority tasks of state environmental policy in almost all developed countries. Establishing causal links between environmental risk factors and population health allows for managing risk factors for preventive purposes. Assessing the health status of the population, studying its essence, and accumulating the necessary scientific information has become a current problem of high public and state significance. One of the most important tasks of modern physiology is the study of the mechanisms of adaptation of the body to various types of activities (Vanyushin et al., 2002, Dratsev, 2008). The cardiorespiratory system, which ensures the supply of oxygen to the body's cells, is one of the most important physiological systems, determining both the mental and physical performance of children in ontogenesis and adaptation to educational activities (Krysyuk, 2007, Ferguson et.al., 2007). The required levels of minute respiratory volume can only be achieved with the presence of an appropriate functional reserve and the maturity of the respiratory regulation mechanisms, ensuring the efficiency of the respiratory system.

The impact of the environment reflects on the functional state of the human body (Agadzhanyan et al., 2006). The circulatory system is particularly sensitive to the influence of the external environment, relatively early involved in adaptation reactions (Kipshidze, 1985, Dratsev, 2008) and can be considered a sensitive indicator of the adaptive reactions of the entire organism (Agadzhanyan et al., 2006). The study of regulatory mechanisms and functional interactions between regulatory circuits is one of the most relevant directions in fundamental and applied physiology and medicine. Analysis of heart rate regulation provides predictive information about the functional state (FS) and adaptive reactions of the entire organism (Baevsky et al., 1984; Mashin, 2007). We examined 126 practically healthy young men aged 20-22 years living in various regions of the Republic of Karakalpakstan. According to specialists, the territory of the Republic of Karakalpakstan is divided into three zones: southern, central, and northern (Konstantinova, Reymov, 1992). The northern zone includes the Muynak, Kungrad, Takhtakupyr, and Shumanay districts, the central zone includes the Kegeily, Chimbay, Khodjeli, Nukus districts and the city of Nukus. The southern zone includes the Amudarya, Beruniy, Turtkul, and Ellikkala districts. Ecophysiological monitoring was conducted from 2015 to 2018. The group of examined individuals included students studying at Karakalpak State University.

To assess the sequence of sinus heart contractions, we calculated the following indicators: the average duration of R-R intervals and the standard deviation of R-R intervals (SDNN) - a statistical indicator characterizing heart rate variability (HRV) in general. We also calculated heart rate (HR), stress index (SI), regulatory system activity index (RSAI), systolic (SBP) and diastolic blood pressure (DBP), and Robinson's double product (DP).

Student age, from an ontogenetic aspect, represents a period when biological maturation of a person is

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completed and all morphofunctional indicators reach their definitive sizes. During this time, the coordination of interactions between different links of physiological systems and the relationships of organs and systems is characteristic (Ermolaev, 1985). The regulation of physiological interactions in the body is based on the use of the minimally necessary number of connections and coordination of interacting systems (Ivanitsky, 1985) and through the improvement of central mechanisms of somatic and autonomic control (Nozdrachev, 1991). Therefore, the level of health development during this period can serve as a control for the effectiveness of the entire system of hygienic measures carried out at the previous stages of ontogenesis with an established lifestyle and can regulate further health improvement activities.

"Mean arterial pressure does not have pulse oscillations and can only vary within a few cardiac cycles, being the most stable indicator of blood energy, whose values are determined almost exclusively by minute blood supply volume and total peripheral resistance to blood flow. Depending on the place of residence (see Fig. 1), in older and middle-aged groups of young men (21-22 years), maximum values of systolic arterial pressure (SAP) are observed in individuals living in the southern and central regions of Karakalpakstan, as well as in young men from the northern regions aged 20 and 22 years. The minimum SAP values were found in young men of the middle age group (21 years) - 121-122 mmHg.

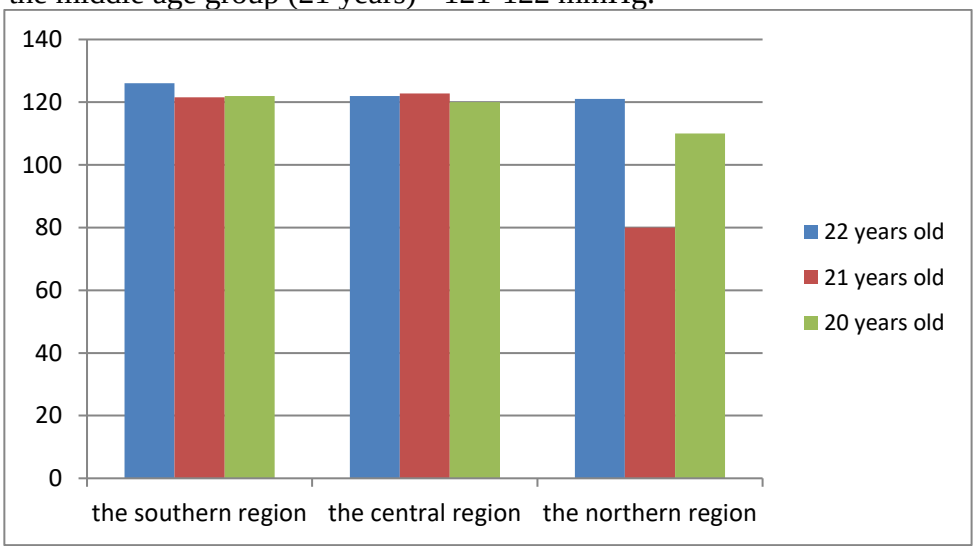


**Fig. 1.** Dynamics of SAP (mmHg) in young men living in Karakalpakstan, depending on age

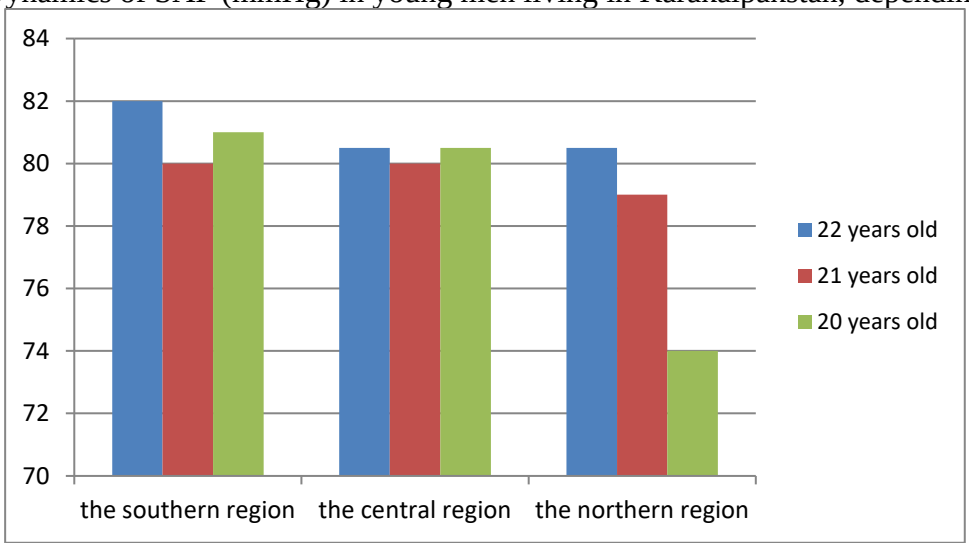


**Fig. 2.** Dynamics of DBP (mmHg) in young men living in Karakalpakstan, depending on age

"When comparing the obtained diastolic blood pressure (DBP) results in young men from different regions of the republic (Fig. 2), it was found that the older age group (22 years) had the highest values across all three zones of the republic, ranging from 80-82 mmHg. This is likely due to the high tension of adaptive

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reactions in the examined individuals during the academic processes. The lowest values were observed in the younger age group from the northern regions of Karakalpakstan.

To maintain this level of functioning of the main body systems, the values of the integral indicator of regulatory system activity (RSAI = 3-4 points) in young men aged 20-22 years indicate a state of moderate tension of regulatory systems. It was also found that in the first age group of young men, the level of functioning of the main systems is within the norm. When determining the type of autonomic regulation in older young men (second group), the predominance of vagotonics (66%) was noted, while in the younger group (first group) the number of normotonics (62%) prevailed.

According to experts, the seasons of the year are a significant factor in the formation of the functional state of a person (Veretelnik, 2000; Evdokimov, 2004). Throughout the year, a person undergoes cycles of natural seasonal acclimatization. The functional state of the circulatory and respiratory systems depends on the phase of the annual cycles of natural seasonal acclimatization and environmental temperature conditions. To date, there is no complete information on the annual dynamics of functional rearrangements in the body and its impact on human ontogenesis in conditions of aridization and desertification of the Southern Aral Sea region, although this has great scientific and practical significance. It has been established that in students living in the Republic of Karakalpakstan, the regulation of heart rate in older young men (second group) during the annual observation cycle is dominated by the influence of the central circuit over the autonomic circuit. The most pronounced centralization of heart rate control was recorded in June-July and December. In the second group of young men, differences in the functional state of the cardiovascular system and autonomic regulation were revealed in the cold season, whereas no such differences were noted during the summer period.

"It is also noted that the examined young male students exhibit optimal heart rate regulation and regulatory system tension. It was found that the involvement of the central regulatory circuit is minimal, and the sympathovagal balance is slightly shifted towards the parasympathetic branch of the ANS. At the same time, it was established that in September-October, stabilization of compensatory-adaptive mechanisms occurs.

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# SOME FEATURES OF CARDIAC ACTIVITY IN YOUNG MEN LIVING IN THE CONDITIONS OF KARAKALPAKSTAN

**Resume**

In the article the questions of study of the age-related features of functioning of the cardiovascular system are examined for youth's resident in Republic of Karakalpakstan Karakalpakstan. It is set that for youths' resident in the ecological terms of Karakalpakstan the level of functioning of the basic systems is within the limits of normative indexes. It is shown that the inspected youths-students have the optimal adjusting of cardiac rhythm and tension of the regulator systems.