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Functional Features Of External Respiration In Adolescents Living in The Environmental Conditions of Karakalpakstan

Ilyasova Gulnara Kenesbayevna
PhD in Biological Sciences, teacher,
Nukus branch of the Center for Scientific and Methodological
Support, training and retraining of
Specialists in Physical Culture and Sports of the
Republic of Uzbekistan

Abstract: In the article the questions of functional reactions of organism of teenagers are examined on breathing in the conditions of sport activity. It is set that the arbitrary increase of pulmonary ventilation in the conditions of rest comes true by students, going in for sports enough in wide limits, thus both due to making more frequent of breathing and due to the increase of respiratory volume.

Keywords: Adaptation, organism of teenagers, functional backlogs, environment, contamination of atmospheric air, respiratory volume.

The problem of human adaptation to the changing conditions of the human environment is currently one of the priority tasks of applied physiology. In this regard, the issues of increasing the efficiency of the process of adaptation to extreme human living conditions, characterized by the reserve physiological capabilities of the human body, are very relevant [7, pp. 28-33; 8. pp. 61-66].

The study of the mechanisms of adaptation of the adolescent body to dynamically changing environmental factors is one of the priority tasks of physiological science.

The health of the younger generation, in turn, forms the fundamental basis for the formation of adult health potential, is an important indicator of the well-being of the country and a factor of national security. In this regard, it is extremely important to increase the efficiency of the process of preparing a person to optimize all its aspects of functioning, which makes it possible to significantly expand the range of adaptive rearrangements [8. pp. 61-66]. The somatic, functional and psychophysiological maturity of children requires the attention of specialists of various profiles, serious interdisciplinary research, unified methodological and methodological approaches.

It is known that the environmental conditions of the Southern Aral Sea region have deteriorated significantly in recent years. According to a number of researchers, the health status of the population continues to deteriorate significantly according to a number of indicators [1, pp. 43-45; 2, p. 116]. The greatest changes have occurred in the indicators of the health status of children, who, due to the imperfection of the body's defenses, are the first among other population groups to react to the unfavorable environmental situation in the region [4, p. 11-14].

Air pollution is still the most important environmental cause of premature deaths in Europe. A large number of people are still exposed to harmful pollutants in the atmospheric air – such as particulate matter (PM), ozone (O3) and nitrogen dioxide (NO2). Atmospheric air pollution, solid particles as one of the main components of pollution, as well as exhaust gases from diesel engines have been classified as carcinogenic by the International Agency for Research on Cancer. In 2014 The World Health Organization (WHO) has published the latest estimates of the indicators of diseases associated with air pollution and household air pollution. As a result of the accumulation of certain toxic substances in food chains and in individuals, over time, even low concentrations in the environment can significantly increase the level of exposure to the population and the environment.

As you know, in the Republic of Uzbekistan, great and constant attention is paid to the protection of atmospheric air in order to preserve and strengthen the health of the population. Scientific and technological progress has led to the expansion of the use of natural resources and to changes in both quantitative and qualitative characteristics of atmospheric air pollution. The level of atmospheric air pollution in the Republic

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of Karakalpakstan is caused by emissions from stationary and mobile sources. According to the actual data for the period from 2001 to 2018 . it can be noted that the maximum emission was recorded in the period from 2008 to 2012 and in 2017. (fig. 1).

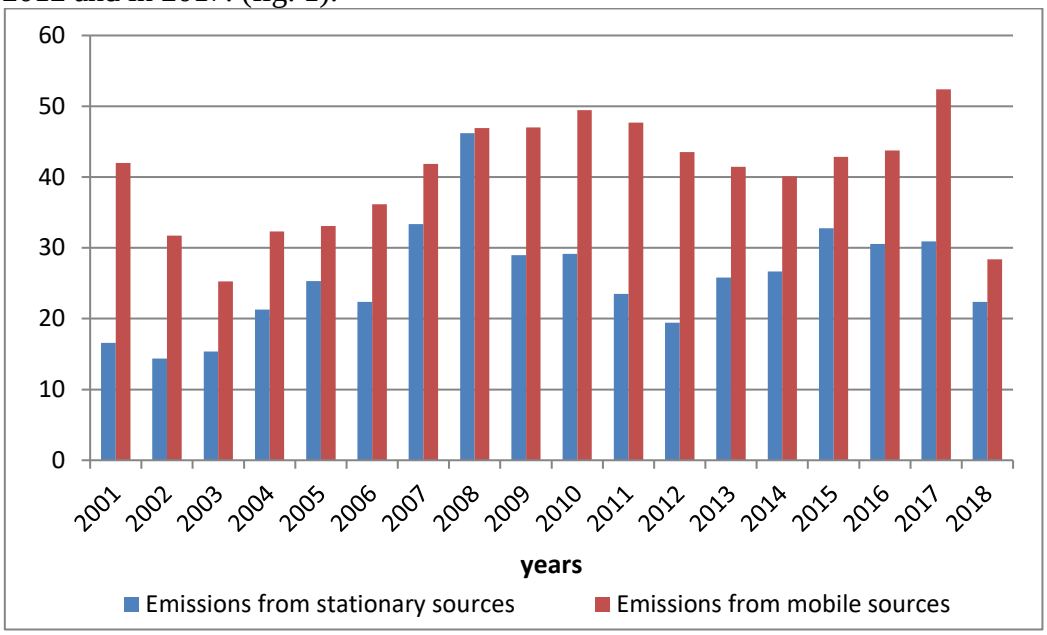

Fig.1. Dynamics of atmospheric air pollution according to the data

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It should also be noted that emissions from mobile sources somewhat prevail over emissions from stationary sources. The analysis of works on the effect of atmospheric air pollution on the body shows that there is some uniformity of physiological reactions to chemically different atmospheric pollution. Even in small concentrations, atmospheric pollutants, weakening the protective properties of the body, make it less protected from the influence of unfavorable exogenous and endogenous factors [3, p. 56]. At the preliminary stage, we conducted studies of anthropometric indicators in adolescents living in various districts of Karakalpakstan, namely in Muynak, Karauzyak districts and Nukus. Thus, the analysis of the data showed that the body growth indicators in adolescents of Muynak and Karauzyak districts were almost at the same level -162-164 cm. As for the body growth of teenagers from Nukus, these indicators are slightly higher than their peers from other surveyed regions of the Republic of Karakalpakstan (Fig.2).

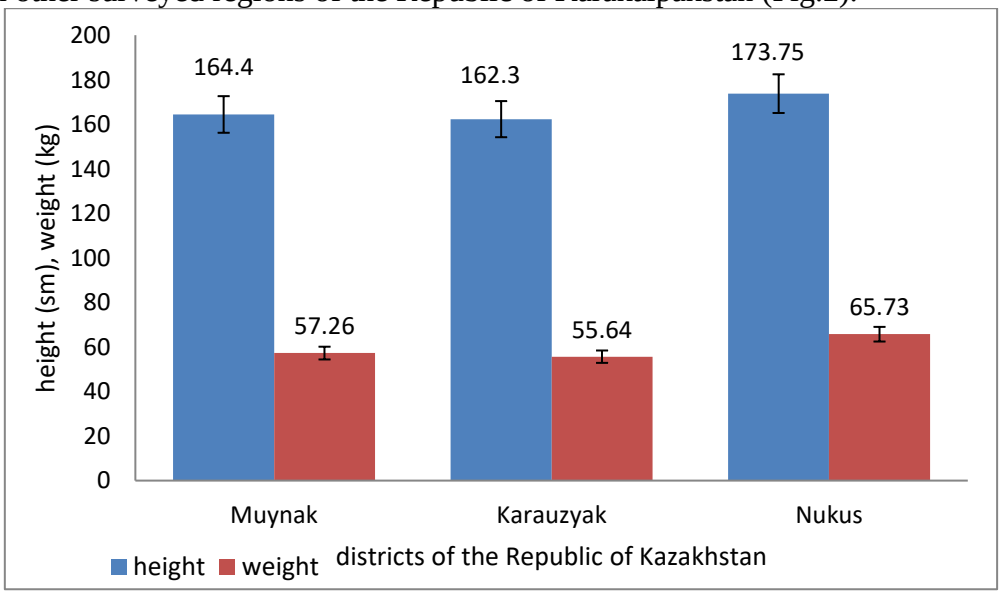

Fig.2. Dynamics of anthropometric indicators in adolescents living in various regions of Karakalpakstan

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The analysis of body weight parameters showed that the lowest level was registered in adolescents from the Karauzyak district - 55.64 ±0.76 kg, and the highest weight was recorded in adolescents from Nukus - 65.7±0.82 kg.

The functional reserves of the organism are understood as the adaptive and compensatory ability of the organ, system and the organism as a whole developed in the process of evolution to increase the intensity of its activity many times compared to the state of relative rest. Systematic physical sports loads are a purposeful effect on a growing organism, contributing to the consolidation of changes in functional systems that characterize the adaptogenic effect, causing targeted training of the body's resistance to various extreme influences and increasing physical performance [1, p. 47-65].

Functional reserves are provided by certain anatomical, physiological and functional features of the structure and activity of the body, namely, the presence of paired organs that provide replacement of impaired functions (analyzers, endocrine glands, kidneys, etc.); a significant increase in the activity of the heart, an increase in the overall intensity of blood flow, pulmonary ventilation and increased activity of other organs and systems; high resistance of cells and tissues of the body to various external influences and internal changes in their functioning conditions [8. pp. 61-66].

At the same time, the effectiveness of adaptation can be significantly increased by using additional functional loads on the body as a whole or on its individual functional systems, for example, breathing at rest and during muscular work [7, pp. 28-33]. These effects enhance the effect of training loads on the body, contribute to the formation of more advanced adaptive mechanisms and improve performance. They allow revealing more fully the functional reserves of the athlete's body, provide intensification of the processes of adaptation to the factors of training impact, and increase the effectiveness of special sports training.

Arbitrary control of pulmonary ventilation is one of the most effective methods of regulating respiration and, consequently, a method of influencing respiratory function and the body as a whole [6, pp. 28-33]. Based on this, at the initial stage of our research, the reactions of the body of adolescents engaged in sports when performing muscle loads (hypoventilation and hyperventilation) were studied [8. pp. 61-66]. Then the impact of systematic training on the functional fitness of adolescents involved in sports was assessed.

As a result of the conducted research, it turned out that an arbitrary increase in pulmonary ventilation at rest is carried out by students who play sports quite widely, both due to increased breathing and due to an increase in respiratory volume. The minute volume of oxygen consumption at the same time decreased slightly (Fig.3)

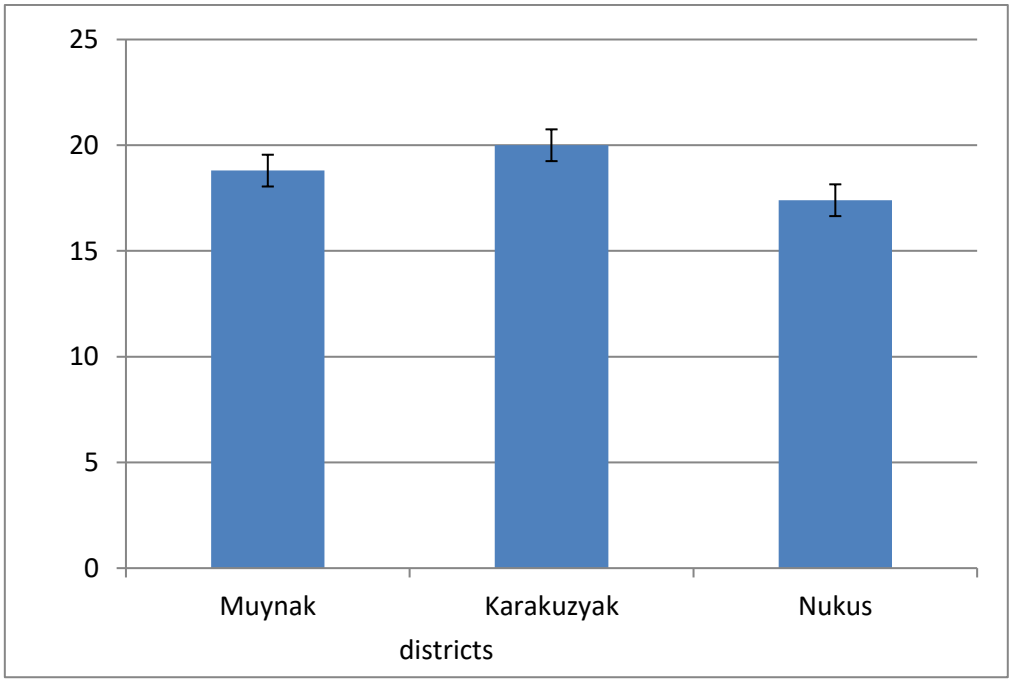

Fig 3 Comparative analysis of external respiration indicators in adolescents living in different regions of Karakalpakstan

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It should be noted that at the same time there was a significant increase in the efficiency of external respiration, and the gas homeostasis of the body was characterized by insignificant alveolar hypoxia and quite noticeable hypercapnia. An arbitrary decrease in pulmonary ventilation at rest was carried out by athletes to a somewhat lesser extent than its increase and was achieved solely by reducing respiratory cycles [5, pp. 833-834].

The analysis of regulatory influences showed that the natural pattern of breathing is characterized by their minimal stress. At the same time, arbitrary hyperventilation was accompanied by an increase in tension in the work of regulatory mechanisms and an increase in the physiological cost of the body's response to arbitrary respiratory maneuvers.

It can be assumed that arbitrary hyperventilation, accompanied by a significant increase in the activity of the respiratory muscles and the inevitable shift of gas homeostasis towards hypocapnia, causes, on the one hand, an increase in regulatory influences, primarily of an arbitrary nature, on the external respiratory system, and, on the other hand, the desire of natural regulatory mechanisms to optimize the functioning of the external respiratory apparatus in adolescents living in Karakalpakstan [8. pp. 61-66].

Arbitrary hyperventilation, as well as arbitrary hypoventilation, which is carried out during exercise, leading to a decrease in the optimal functioning of body systems [5, pp. 833-834]. Apparently, this is a reflection of competitive regulatory influences, on the one hand – neurohumoral mechanisms of respiratory regulation, and on the other – mechanisms of arbitrary control of pulmonary ventilation.

Thus, it can be noted that arbitrary influences on the respiratory function of external respiration probably to a certain extent disrupt the balance of the activity of various body systems and lead to a violation of their optimal functioning. Evaluation of the reactions of the body of adolescents under muscle loads in sports activities showed the presence of conditions of relative hypoxia and hypercapnia. This, probably, was the basis for the formation of mechanisms of stable adaptation to shifts in the internal environment of the body with a significant increase in the efficiency of pulmonary ventilation. The systematic use of arbitrary hypoventilation in the training process of sports training of adolescents can significantly increase the level of aerobic performance and maximum physical performance.

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