

Study of External Respiratory Indicators of Teenagers in the Conditions of the South Aral Sea Region

Ilyasova Gulnara Kenesbaevna

Nukus Branch of the Center for Scientific and Methodological Support, Training and Retraining of Specialists in Physical Education and Sports, Republic of Uzbekistan

Abstract: *The article is sanctified to the study of questions of functional reactions of the organism of teenagers 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 students, sport training, functional backlogs, environment

1. Introduction

The study of the adaptation mechanisms of adolescents to dynamically changing environmental factors is one of the priority tasks of physiological science. The health of the younger generation, in turn, is the fundamental basis for building the potential for adult health and serves as an important integrative indicator of well-being and a factor of national security of any state. In this regard, it becomes extremely urgent to increase the efficiency of the process of preparing a person to optimize all its aspects of functioning, which allows to significantly expand the range of adaptive changes in the body [8].

Environmental pollution is a multidimensional environmental issue. The drying up of the Aral Sea led to the emergence of the huge salt desert Aralkum, the area of which is steadily increasing, and currently amounts to about 60 thousand km². Under conditions of the Aral Sea drying out, this problem is exacerbated by the removal of salts (sulfates and chlorides) from the dried bottom. The salt transfer factor (70 million tons / year) became dominant in the deterioration of atmospheric air quality [2, 7]. Atmospheric pollution by sulfate aerosols poses a real danger to public health, leading to profound functional and cytomorphological changes in lung tissue [7]. Due to atmospheric pollution with salt aerosol, according to experts [1, 7], the state of public health has deteriorated markedly for a number of indicators. Particular attention in the structure of morbidity is attracted by the growth of such environmentally related diseases as respiratory, digestive and oncological diseases. It is well known that indicators of public health in relation to the state of the environment recommended by the WHO Regional Office for Europe as part of the Health for All strategy include allergic diseases [2]. The accession of Uzbekistan to the Convention on Long-Range Transboundary Air Pollution will allow the republic to more actively cooperate with foreign countries and organizations in solving environmental problems, develop and implement measures aimed at reducing emissions of pollutants, modernize existing technologies,

which will ultimately lead to improved environmental situation in the republic.

2. Material and methods

All examined children underwent an analysis of physical development (body weight and growth indicators). The functions of external respiration were studied by the method of pneumotachometry on the apparatus "Polyanalyzer - PA5-02". Assessment of the parameters of external respiration was carried out in a state of relative rest, in a sitting position. To assess the functional state of the cardiovascular system, the heart rate was analyzed using a PKC-01 rhythmocardiograph. Currently existing methods for identifying the characteristics of reactivity and determining the gradations of the severity of the state of the child's body are mainly based on subjective ideas about the various links of adaptive-compensatory mechanisms.

3. Results and discussion

The variety of sources, the complexity of the composition of emissions, photochemical and other processes occurring in the atmosphere make the assessment of pollutants into the atmosphere a rather difficult task. The main sources of pollutants in the air are vehicles, energy facilities and industrial enterprises. Natural sources, as well as transboundary and regional transport of matter, play a role in air pollution.

The dried coastal strip of the former seabed contributed to a change in the composition of atmospheric dust towards a significant (up to 70%) increase in the proportion of soluble salts. At present, 2/3 of the former water area of the sea are a salt desert, which is a source of salt removal to adjacent territories (Fig. 1).

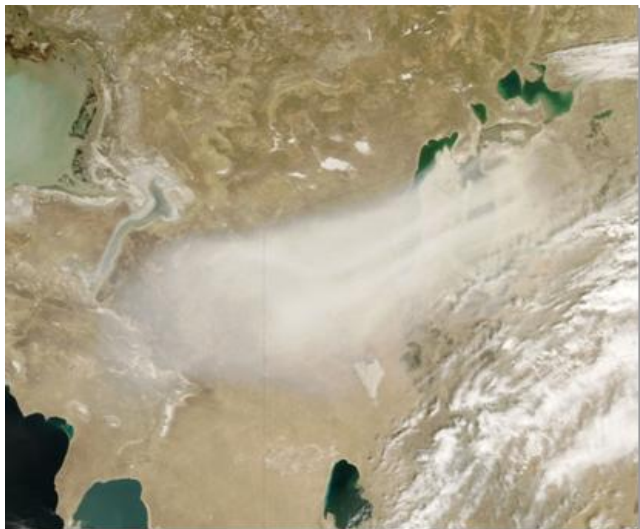


Figure 1: Wind salt removal 2011, synthesized (1-3 channels) image from the NOAA satellite

Observations from space and ground-based measurements indicate the distribution of salt marshes, weathering of salts and the formation of salt-sand storms [7]. According to scientists, the salt transfer factor (70 million tons / year) has become dominant in the deterioration of atmospheric air quality [2]. The level of air pollution in the South Aral Sea region is caused by emissions from stationary and mobile sources. According to actual data for the period from 2001 to 2018, it can be noted that the maximum emission was observed between 2008 and 2012, and in 2017, we also note that emissions from mobile sources somewhat prevail over emissions from stationary sources (Fig. 2).

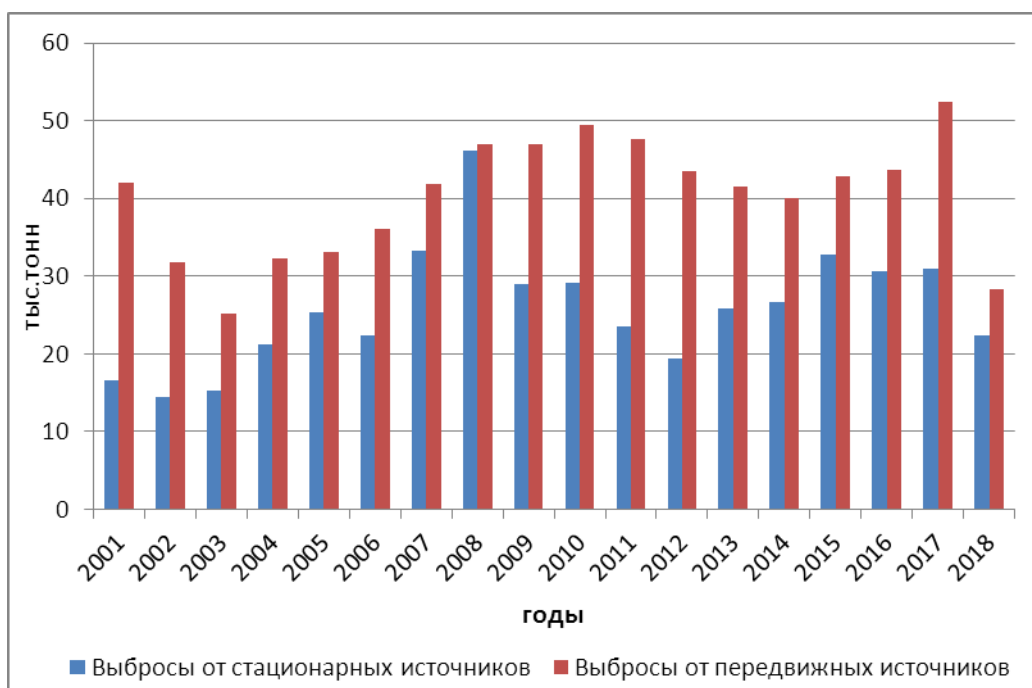


Figure 2: The dynamics of air pollution according to GRECSEN Ministry of Health of the Republic of Karakalpakstan

The analysis of works on the effect of atmospheric air pollution on the body shows that there is a certain 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 adverse exogenous and endogenous factors. An important indicator of the physical development of children and adolescents are indicators of growth and body weight. They are used to assess and interpret the health status of the child population. The least studied is the nature of the manifestation of morphological and functional features of

the development of children with different growth rates, living in various regions of the South Aral region.

We conducted studies of anthropometric indicators in adolescents living in various regions of Karakalpakstan, namely in Muynak, Karauzyak regions and the city of Nukus. Thus, an analysis of the data showed that the body growth indicators for adolescents in the Muynak and Karauzyak districts were almost at the same level -162-164 cm. As for the body growth of adolescents from the city of Nukus, these indicators slightly exceed their peers from other surveyed areas of the Republic of Karakalpakstan (fig. 3).

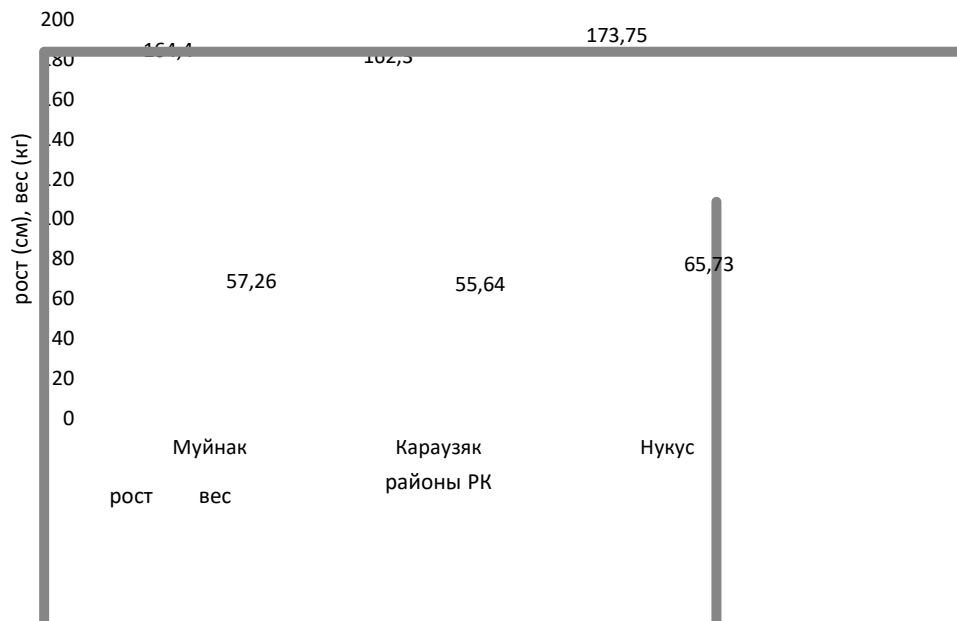


Figure 3: The dynamics of anthropometric indicators in adolescents living in various regions of Karakalpakstan

The analysis of body weight parameters showed that the lowest level was recorded in adolescents from the Karauzyak district - 55.64 ± 0.76 kg, and the highest weight was observed in adolescents from the city of Nukus - 65.7 ± 0.82 kg. By functional reserves of an organism is meant the adaptive and compensatory ability of an organ, system, and organism as a whole, developed during evolution, to increase many times the intensity of its activity in comparison with a state of relative rest. Systematic physical sports loads are a targeted effect on a growing organism, which contributes to the consolidation of changes in functional systems that characterize the adaptogenic effect, which determines the directed training of the body's resistance to various extreme influences and increases physical performance [1, 2]. Functional reserves are provided by certain anatomical and 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 heart activity, an increase in the total intensity of blood flow, pulmonary ventilation and increased activity of other organs and systems; high resistance of cells and body tissues to various external influences and internal changes in the conditions of their functioning [8]. At the same time, the efficiency of adaptation can be significantly increased due to the use of 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]. These effects enhance the impact of training loads on the body, contribute to the formation of more advanced adaptive mechanisms and increase efficiency. They allow you to more fully reveal the functional reserves of the athlete's body, provide an intensification of adaptation processes to the factors of the training impact, and increase the effectiveness of special sports training.

Arbitrary control of pulmonary ventilation is one of the most effective methods of regulating breathing and, therefore, a method of influencing respiratory function and the body as a

whole [1]. Based on this, at the initial stage of our research, we studied the reactions of the body of adolescents involved in sports when performing muscle loads (hypoventilation and hyperventilation) [8]. Then, the impact of systematic training on the functional fitness of adolescents involved in sports was assessed.

As a result of the studies, it was found that an arbitrary increase in pulmonary ventilation at rest is carried out by students involved in sports within a wide range, both due to increased breathing and due to an increase in tidal volume. The minute volume of oxygen consumption was somewhat reduced. At the same time, a significant increase in the efficiency of external respiration was noted, and gas body homeostasis was characterized by slight alveolar hypoxia and quite noticeable hypercapnia (Fig. 4).

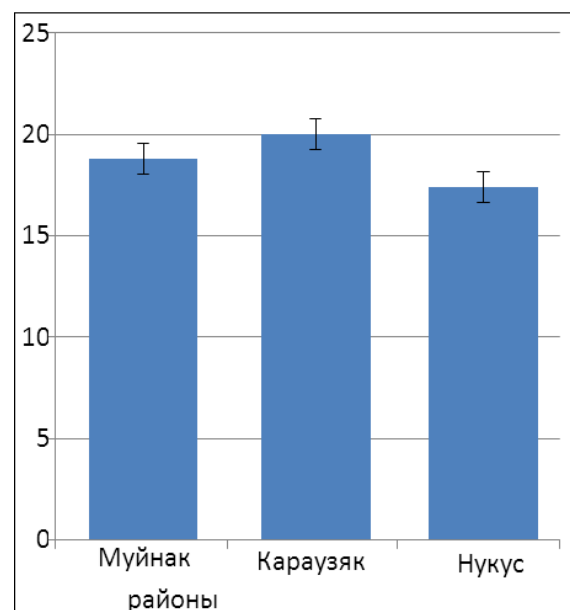


Figure 4: A comparative analysis of external respiration in adolescents living in various regions of Karakalpakstan (2016-2019)

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 due to the reduction of respiratory cycles [7, 8]. It can be assumed that voluntary hyperventilation, accompanied by a significant increase in the activity of the respiratory muscles and the inevitable shift of gas homeostasis towards hypocapnia, on the one hand leads to an increase in the regulatory influences, primarily of an arbitrary nature, on the external respiration system, and on the other hand, the desire of the natural mechanisms of regulation to optimizing the functioning of the external respiration apparatus in adolescents living in the conditions of the Southern Aral Sea region [8]. Arbitrary hyperventilation, as well as voluntary hypoventilation, which is carried out in the process of performing physical activity leading to a decrease in the optimality of the functioning of body systems [7]. It seems to us that this is a reflection of competitive regulatory influences, on the one hand, neurohumoral respiratory regulation mechanisms, and, on the other, voluntary pulmonary ventilation control mechanisms.

Thus, we note that arbitrary influences on the respiratory function of external respiration are likely to some extent disrupt the coordinated activity of various body systems and lead to a violation of their optimal functioning. It was also found that the systematic use of voluntary hypoventilation in the training process of sports training for adolescents can significantly increase the level of aerobic performance and maximum physical performance.

References

- [1] Abdirrov Ch.A., Agadzhanyan N.A., Severin A.E. Ecology and human health.- Nukus.- Karakalpakstan, 1993.- p. 43-45.
- [2] Arushanov M. L, Tleumuratova B. S. Dynamics of environmental processes in the South Aral Sea region. - Hamburg: Palmarium. - 2012. -- 183 p.
- [3] Vorontsov IM Patterns of the physical development of children and methods for its assessment // Uchebno-metodich. Benefit.- L., 1986.- 56 p.
- [4] Zaineev M.M., Sitdikov F.G., Ziyatdinova N.I., Zefirov T.L. The reaction of the cardiorespiratory system of first-graders to various types of load during the school year // Kazan Medical Journal.- 2008.- T.89.- No. 6.- p. 8330-834.
- [5] Rafikov A.A. Natural conditions of the drained southern coast of the Aral Sea. - Tashkent: Fan, 1982. - 142 s.
- [6] Solopov A.I., Gorbaneva E.P., Vlasov A.A., Voskresensky S.A. Functional reactions of the human body to the regulation of respiration in various ways // Aerospace and Environmental Medicine, 2010. - T. 44. - No. 5. - P. 28-33.
- [7] Tleumuratova B.S., Mambetullaeva S.M. Modeling the impact of transformations of the Aral Sea ecosystems on the environment // VII International Scientific Conference "Priority Directions in the Field of Science and Technology in the XXI Century" May 30-31, 2014 Tashkent: "CHINOR ENK", 2014. - C.75