Section 2. Biology

THE INFLUENCE OF ENVIRONMENTAL FACTORS ON THE HEALTH OF STUDENTS AT ACADEMIC LYCEUMS IN THE REPUBLIC OF KARAKALPAKSTAN

Ramazanov Medetbay Baxitbaevich [1]

[1] Nukus branch of the Uzbek State University physical culture and sports acting

Abstract

The article discusses the influence of environmental factors on the health of students at academic lyceums in the Republic of Karakalpakstan. Regression equations were obtained that indicate the dependence of the level of general morbidity among adolescents on the degree of total air pollution.

Keywords: *Health preservation, environmental factors, physical education, approaches, monitoring, environment, adaptation*

Introduction

The problem of forming and maintaining the health of the younger generation in the context of socio-economic transformations and environmental aggravation of the environment in most regions of the world is very relevant (Kuchma, V.R., Suhareva, L.M., 2012; Baranov, A.A., Kuchma, V.R., Skoblina, N.A., Milushkina, O.YU., Bokareva, N.A., 2012).

At the present stage of development of society, environmental factors and lifestyle have a great influence on the formation of the health of the younger generation (Rahmanin, YU.A., Mihajlova, R.N., 2014). Adolescence is one of the critical stages in a person's life. Due to anatomical, physiological and morphofunctional characteristics at this age, the body becomes especially vulnerable and unprotected from the effects of various unfavorable environmental factors and suffers even from sub-threshold concentrations of harmful substances (Tepper, E.A., Taranushenko, T.E., Manchuk, V.T., Grishkevich, N.YU., Galonskij, V.G. 2012; Bokareva, N.A., Skoblina, N.A., Milushkina, O.YU., Besstrashnaya, N.A., Sapunova, N.O., 2015). The main risk factors for the lifestyle of students studying in academic lyceums of Karakalpakstan are non-compliance with hygienic standards of the regime and organization of the educational process, conditions and organization of nutrition and physical education (Kuchma, V.R., Milushkina, O.YU., Bokareva, N.A., Detkov, V.YU., Fedotov, T.M., 2013).

As is known, the health of children and adolescents is determined not only by the presence or absence of diseases, but also by harmonious and age-appropriate development, the normal level of basic functional indicators (Fedotova, T.A., Zhmakin, I.A., Maslov, A.N., Vasil'ev, P.V., 2011). Many studies have noted a decrease in the functional capabilities of the body and the effectiveness of adaptation of the body of children and adolescents to changing environmental conditions (Rahmanin, YU.A., Mihajlova, R.N., 2014; Kuchma, V.R., Milushkina, O.YU., Bokareva, N.A., Detkov, V.YU., Fedotov, T.M., 2013). The educational environment often does not contribute to the preservation of the health of students and creates conditions for the formation of pathology, especially in persons with reduced adaptive capabilities (Bokareva, N.A., Skoblina, N.A., Milushkina, O.YU., Besstrashnaya, N.A., Sapunova, N.O., 2015; Fedotova, T.A., Zhmakin, I.A., Maslov, A.N., Vasil'ev, P.V., 2011).

However, problems of health problems in the child population associated with the negative impact of environmental factors persist, especially in the regional center, which requires monitoring, development and adoption of measures to improve the situation.

Material and methods

The object of the study was students studying in academic lyceums in the city of Nukus and Chimbay district of the Republic of Karakalpakstan. The subject of the study was the components of the environment, conditions of education and training in educational organizations and the health of students. The assessment of the quality of the living environment and the health status of adolescents is based on our own research, medical and statistical indicators, socio-hygienic monitoring data for 2020–2023, statistical materials provided by the Ministry of Economy and Statistics of the Republic of Karakalpakstan, the results of laboratory studies of the Karakalpak Research Institute natural sciences. The study involved 250 adolescents aged 15–17 years. The examination was carried out on the basis of their voluntary informed consent. To identify the relationship between the quality of atmospheric air and the morbidity rate of the adolescent population, correlation analysis was used to determine the Pearson pair correlation coefficient the statistical relationship between environmental factors and the functional state of the cardiorespiratory system was identified using the method of correlation analysis (Spearman). The reliability of the results obtained was assessed using the Student test, the critical level of statistical significance p was taken equal to 0.05. Calculations were carried out in the universal statistical program Statgraf for windows using the "multiple regression" module and the stepwise regression method. The stepwise regression method consists in the fact that at each step the independent variable we are studying is included in or excluded from the model.

Results and its discussion

The construction of a model describing the relationship between the incidence and pollution of atmospheric air and tap water in the Republic of Karakalpakstan was calculated on the basis of the following factors: atmospheric air was studied – dust, SO_2, NO_2, NH_3, H_2S, Co; for tap water – turbidity, dry residue, sulfates, chlorides, nitrates.

Many of the most "significant" variables are highlighted. this allows you to identify and reduce the number of variables that reliably describe the relationship. inclusion of variables is determined using the Fisher criterion – F.

Correlation-regression analysis allows you to quantitatively measure the closeness and direction of the connection (correlation analysis), as well as establish an analytical expression for the dependence of the result on specific factors, while maintaining the constancy of the other factor characteristics acting on the resultant characteristic (regression analysis). We, in order to study the influence on the morbidity level of the population of Karakalpakstan (modeled sign Y) of a number of factors (factorial signs – X1, X2, X3, X4 and X5), multiple correlation-regression analysis was used as a mathematical model apparatus between the morbidity indicators of the population and concentrations of atmospheric air pollutants and the quality of tap water in all regions of the republic. Based on the calculation results, reliable and adequate probabilistic multiple regression models were

obtained linking the morbidity of the population with several variables X. Before building the models, preliminary transformations were performed, namely, the incidence rates were logarithmized (the natural logarithm was calculated) to stabilize the variance the overall quality of the resulting models was assessed using multiple correlation coefficients (R), determination (R2) and Fisher's criterion (F) multiple correlation coefficient r is the degree to which two or more independent variables (variables x) are related to the dependent variable Y. By definition, it is equal to the square root of the coefficient of determination (R2). coefficient of determination (R2) – shows the degree to which the process is described by the model. The R2 value is an indicator of the degree of fit of the model to the data (an R2 value close to 1.0 indicates that the model explains almost all of the variability in the relevant variables). Fisher criterion (F) – evaluates the validity and reliability of the model by the level of significance (p or significance F), which should be less than the calculated value F.

At the same time, due to the uniqueness of the large-scale wind removal of salts from the dried bottom (Fig. 1), there are no quantitative estimates of the connection between the increased concentration of sulfates and chlorides in the atmosphere and the increase in the number of respiratory tract diseases in the world literature. Model calculations showed the spatial and temporal coincidence of the salt concentration field with the zoning and dynamics of respiratory tract diseases.

Figure 1. *Wind removal of salts March 15, 2002, synthesized (1–3 channels) satellite image NOAA*

The high correlation coefficient (r=0.69) justifies the relevance of continuing this study regarding the dynamics of other pathologies in the southern Aral Sea region, as well as in order to obtain an analytical expression for the connection "salt removal → disease dynamics". In order to predict changes in the level of general morbidity depending on the intensity of air pollution, mathematical modeling was carried out using methods of correlation and regression analysis. A number of regression equations were obtained reflecting the dependence of the general morbidity of children of various age groups on the integral indicator of atmospheric air pollution.

$$Y = 262.7 + 60.34 * X_1$$
$$Y = 473.21 + 13.42 * X_2$$
$$Y = 276.33 + 100.74 * X_3$$

where Y is the level of general morbidity among children

X_1, X_2, X_3 – integral coefficient indicator for different zones (northern, central and southern).

The obtained regression equations indicate a direct dependence of the level of general morbidity of the child population on the degree of total air pollution: the more significant the degree of air pollution, the higher the level of morbidity.

Table 1. *Indicators of regression statistics and analysis of variance*

Name of terri-tory	Coefficient		Fisher criteria, F	
	Multiple cor-relation, R	Determination, R²	F calculated	Signifi-cance F
Nukus city	0.84	0.68	11.77	0.05
Chimbay district	0.76	0.63	6.25	0.09

In our calculations, the resulting models for all studied areas are characterized by high reliability and reliability (F calculated > > significance F) and high prediction accuracy (Table 1), i.e. the model describes the phenomenon well ($R2 > 0.7$). multiple correlation coefficients for all parameters ($R > 0.95$) indicate a close connection between factor characteristics and the results.

Thus, the multifactorial nature of the processes of formation of students' health makes it difficult to assess its condition and identify cause-and-effect relationships between the influence of environmental factors and health status. all this requires choosing the most informative indicators of the environment and health of the younger generation. The environmental factors, educational environment and lifestyle of students in general education institutions identified during the study, which contribute to a decrease in their functional reserves, leading to increased morbidity, need correction in order to preserve health.

References

Kuchma, V. R., Suhareva, L. M. Sanitarno-epidemiologicheskoe blagopoluchie detej i podrostkov v sovremennyh usloviyah: problemy i puti resheniya. Zdorov'e naseleniya i sreda obitaniya. 2012.– № 8.– P. 4–6.

Baranov, A. A., Kuchma, V. R., Skoblina, N. A., Milushkina, O. YU., Bokareva, N. A. Osnovnye zakonomernosti morfofunkcional'nogo razvitiya detej i podrostkov v sovremennyh usloviyah // Vestnik RAMN. 2012.– № 12.– P. 4–6.

Tepper, E. A., Taranushenko, T. E., Manchuk, V. T., Grishkevich, N. YU., Galonskij, V. G. Osobennosti morfofunkcional'nogo statusa detej na raznyh etapah shkol'nogo obrazovaniya // Sibirskij medicinskij zhurnal – (Tomsk). 2012.– № 27(4).– P. 83–7.

Rahmanin, YU. A., Mihajlova, R. N. Okruzhayushchaya sreda i zdorov'e: prioritety profilakticheskoj mediciny // Gigiena i sanitariya. 2014.– № 93(5).– P. 5–10.

Bokareva, N. A., Skoblina, N. A., Milushkina, O. YU., Besstrashnaya, N. A., Sapunova, N. O. Gigienicheskaya harakteristika mediko-social'nyh faktorov i obraza zhizni sovremennyh moskovskih shkol'nikov // Zdorov'e naseleniya i sreda obitaniya. 2015.– № 5.– P. 6–33.

Kuchma, V. R., Milushkina, O. YU., Bokareva, N. A., Detkov, V. YU., Fedotov, T. M. Gigienicheskaya ocenka vliyaniya sredovyh faktorov na funkcional'nye pokazateli shkol'nikov // Gigiena i sanitariya. 2013.– № 5.– P. 91–4.

Fedotova, T. A., Zhmakin, I. A., Maslov, A. N., Vasil'ev, P. V. Sravnitel'nyj analiz slyuny u detej v zavisimosti ot sanitarno-gigienicheskih harakteristik rajonov prozhivaniya // Voprosy prakticheskoj pediatrii. 2011.– № 6 (4).– P. 103–4.

Setko, A. G., Trishina, S. P., Terekhova, E. A., Mokeeva, M. M. Rezul'taty donozologicheskoj diagnostiki sostoyaniya zdorov'ya uchashchihsya sovremennogo obrazovatel'nogo uchrezhdeniya // Zdorov'e naseleniya i sreda obitaniya. 2015.– № 6.– P. 9–26.

Ramazanov, M. B. "To the Question of Research of the Functional State of the Cardiorespiratory System of Lyceum Students in the Conditions of Karakalpakstan". International Journal of Current Microbiology and Applied Sciences (IJCMAS) Int.J.Curr.Microbiol.App. Sci. 2022.– 11(3).– P. 377–379.

Ramazanov, M. "Problemy issledovaniya funkcional'nogo sostoyaniya regulyatornyh sistem organizma uchashchihsya liceev Karakalpakstana" «Koncepcii ustojchivogo razvitiya nauki v sovremennyh usloviyah» Sbornik statej po itogam Mezhdunarodnoj nauchno-prakticheskoj konferencii CHelyabinsk 9 dekabrya 2021. – P. 11–13.

Contact: medetramazanov@inbox.ru