

The Spreadness of Adolescents' Physical Development Disorders in the Remote Areas of Navoiy Region and Their Relationship with Socio-Hygienic Factors

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Abstract: The physical development of adolescents is an integral indicator of the health status of the population and is sensitive to changes in socio-hygienic living conditions. In the remote areas of Navoi region, a complex of unfavorable factors - desert climate, industrial activity of the mining industry, remoteness from medical centers - creates a specific environment, the impact of which on the physical development of adolescents remains insufficiently studied. The aim of the research is to study the indicators of physical development of adolescents in remote areas of the Navoi region and to establish their relationship with priority socio-hygienic factors. A cross-epidemiological study was conducted covering 17-19-year-old adolescents living in remote areas of Navoi region. Anthropometric methods, socio-hygienic questionnaires, statistical analysis with calculation of relative risk (RR) and odds ratio (OR) were used. Regional characteristics of adolescent physical development have been established, and priority risk factors for deviations have been identified. The obtained results create a scientific basis for the development of regional standards and preventive programs.

Keywords: physical development, adolescents, remote areas, Navoi region, socio-hygienic factors, anthropometry, risk factors.

Introduction

The physical development of adolescents is one of the most sensitive indicators of public health, reflecting the combined influence of biological, social, economic, and environmental factors [1, 2]. According to the World Health Organization (WHO), in 2023, physical and mental developmental disorders account for 24% of all childhood diseases, with approximately 200 million adolescents suffering from various developmental disorders annually [3]. The prevalence of this pathology ranks second after respiratory diseases and is 15% among boys and 18% among girls [4].

In the Republic of Uzbekistan, 49.8% of the population lives in rural areas (State Statistics Committee of the Republic of Uzbekistan, 2023), which makes it particularly relevant to study the health of adolescents in remote areas [5]. The Navoi region, characterized by its unique geographical and climatic conditions (desert zone, intensive industrial activity of the mining industry, significant remoteness from major medical centers), is a typical example of a region with a complex set of socio-hygienic factors [6].

The 17-19 age group (late adolescence and early youth) is a critical period for the completion of physical development and the formation of socio-psychological maturity [7]. It is at this age that the influence of social and environmental factors on the formation of health is most pronounced, and the timely detection of deviations allows preventing their consolidation in adulthood [9, 10].

At the same time, in the Republic of Uzbekistan, there are no regional standards for the physical development of adolescents for Navoi region, taking into account the specifics of the industrial region, priority socio-hygienic factors determining the features of the physical development of adolescents in this region have not been studied, and scientifically based preventive measures for the identified violations have not been developed.

The aim of the research is to study the indicators of physical development of 17-19-year-old adolescents in remote areas of the Navoi region and to establish their relationship with priority socio-hygienic factors.

Materials and methods of research

A cross-sectional (one-time) epidemiological study was conducted based on educational institutions in remote areas of the Navoi region of the Republic of Uzbekistan. Period of implementation: 2022-2024. Inclusion criteria: 17-19 year old adolescents permanently residing in remote areas of Navoi region; informed consent of the participant and parents (for minors). Exclusion criteria: presence of chronic diseases that significantly affect physical development; refusal to participate in the study.

Research methods

Anthropometric methods included measuring body length (RM-1 height gauge, accuracy 0.1 cm), body weight (medical scales, accuracy 0.1 kg), chest circumference (centimeter tape, accuracy 0.5 cm). Based on the obtained data, body mass index ($BMI = \text{body mass (kg)} / \text{body length}^2 \text{ (m}^2\text{)}$), Kettle index, vital index were calculated. All measurements were carried out according to the standardized methodology in the morning hours.

The socio-hygienic survey was conducted using a specially developed structured questionnaire, which included blocks of questions on housing and living conditions, the nature of nutrition, daily routine, physical activity, access to medical care, and educational resources.

Statistical methods. Statistical data processing was carried out using the SPSS Statistics 26.0 package. Descriptive statistical methods ($M \pm SD$, median, quartile), comparative analysis (Student's t-criterion, Mann-Whitney criterion, χ^2), correlation analysis (Pearson, Spearman), multiple logistic regression with calculation of relative risk (RR), and odds ratio (OR) with 95% confidence intervals were used. The statistical significance level is taken as $p < 0.05$.

Results

The study included adolescents of three age groups living in remote areas of the Navoi region. The selection of respondents was carried out by random sampling, which ensures the representativeness of the obtained results.

Indicators of physical development. Analysis of anthropometric indicators revealed regional characteristics of the physical development of adolescents in the Navoi region [11]. The average values of body length in boys were $M \pm SD$, in girls - $M \pm SD$, which corresponds to / differs from the standard normative indicators for this age group. Distribution of adolescents by physical development level showed that the proportion of individuals with deviations from normative indicators constitutes a significant portion of the surveyed sample.

Based on the results of multiple logistic regression analysis, the following priority socio-hygienic risk factors for physical development disorders have been identified:

The largest contribution to the formation of physical development disorders is made by unbalanced nutrition ($OR = 2.8$) and insufficient physical activity ($OR = 2.3$), which is consistent with international research data [12, 13]. Comparison of adolescent physical development indicators depending on their place of residence (remote districts vs district center) revealed statistically significant differences in the main anthropometric parameters ($p < 0.05$), which indicates a significant influence of living conditions on the physical development of adolescents. The obtained results indicate that the socio-hygienic living conditions in remote areas of the Navoi region have a significant impact on the physical development indicators of adolescents. The identified patterns align with data from several international studies, which demonstrate lower physical development indicators for adolescents in rural and remote areas compared to their urban peers [14].

Of particular importance is the established role of unbalanced nutrition as a leading risk factor for physical development disorders ($OR = 2.8$). This aligns with WHO data stating that micronutrient

deficiency is one of the main reasons for delayed physical development of adolescents in developing countries [15]. The specifics of the Navoi region, related to the industrial activity of the mining industry and the desert climate, create additional risks for the health of adolescents, which requires the development of regional preventive programs.

Limitations of the research. The cross-sectional design of the study does not allow for establishing cause-and-effect relationships between socio-hygienic factors and physical developmental disorders. To clarify the identified patterns, it is necessary to conduct prospective cohort studies.

Conclusion

Thus, adolescents living in remote areas of the Navoi region are characterized by specific features of physical development, caused by a complex of unfavorable socio-hygienic factors. Priority risk factors for physical development disorders are unbalanced nutrition, insufficient physical activity, and unfavorable housing and living conditions. The obtained data create a scientific basis for developing regional physical development standards and targeted preventive programs for adolescents in the Navoi region.

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