

IRON DEFICIENCY AND PHYSICAL DEVELOPMENT OF ADOLESCENTS

Yesenbekova E.J

Karakalpak Medical Institute, Nukus, Uzbekistan

Annotation. The paper discusses the results of assessing the analysis of anthropometric indicators of physical development and the prevalence of anemia in adolescents aged 14–17 years in the Republic of Karakalpakstan. A total of 432 adolescents were examined. We studied the results of medical examination of children aged 14 to 17 years. Physical development assessment was carried out using standard methods. A complete blood count was performed on an automatic hematology analyzer. The reference values of hemoglobin levels proposed by experts from the World Health Organization were used as criteria for anemia. Hemoglobin level and red blood cell count are associated with body weight, height and body mass index of respondents. According to the data obtained, 68.5% of children of puberty had anemia of varying severity, while the proportion of boys suffering from anemia was 26% (of which 84.4% were mild), the proportion of girls was 42.5% (of which mild degree - 67%). The risk of anemia was more than 1.7 times higher in adolescent girls. **Key words:** adolescents, physical development, general blood test, anemia. **Relevance.** Iron deficiency is one of the pressing problems of the puberty period and is caused by discrepancy between the needs for a microelement and its intake into the body of a teenager. The puberty period has its own characteristics due to a physiological growth spurt, complex endocrine, vegetative and immune restructuring of the body[5].

Key words: body mass index, ferritin, obese, serum iron

This is a time of sharply increasing needs for iron due to the rapid process of growth, increased blood volume, and increased muscle mass [2]. Iron is an essential trace element and, in addition to erythropoiesis, is involved in the synthesis of DNA and neurotransmitters, and the innate immune response. Therefore, iron deficiency anemia (IDA), as an extreme form of iron deficiency (ID), is associated with reduced tolerance to physical exercise and reduced resistance [1]. In addition, IDA is associated with lower weight and height in children with varying degrees of statistical significance [3].

Iron deficiency (ID) may be the most common form of nutritional deficiency worldwide and it is a significant public health problem in both developed and undeveloped countries.¹ In a nationally representative cross-sectional health study in the USA, the prevalence of ID was 9–11% for adolescent girls and women of childbearing age, corresponding to approximately 8 million women with ID.² One previous national study in Taiwan showed that the prevalence of ID was 2–6% in adolescent males and 9–10% in adolescent females.³ ID may cause adverse effects, including reduced work capacity,⁴ delayed mental and physical development in children,⁵ lower cognitive or behavioral function,^{6, 7} and impaired sensorimotor function.⁸ Since ID is an important public health issue, examining its determinants is important to public health research. Several predisposing factors have been mentioned in the literature, such as female sex, parasite infestation,⁹ and *Helicobacter pylori* infection.¹⁰ Some previous studies have suggested being overweight as a risk factor for ID.[1,3,4]

Purpose of the study. To determine the prevalence of anemia among adolescents and their impact on the physical development of children.

Research methods. The studies were carried out at city clinics in Nukus. A total of 432 adolescents were examined. We studied the results of medical examination of children aged 14 to 17

years. A complete blood count was performed on an automatic hematology analyzer. The reference values of hemoglobin levels proposed by experts from the World Health Organization were used as criteria for anemia.

The statistical analysis was performed using SPSS 21.0 (IBM SPSS Statistics). A p value <0.05 was considered statically significant. The Chi-square test was used to test the association between two categorical variables. The t test was used to examine group differences for continuous variables. Due to the nature of right-skewed distribution, the levels of PF and SI were log-transformed to approach normal distribution before plotting and statistical testing including t test, ANOVA and Pearson correlation analysis. The ANOVA test was used to examine difference of means for hemoglobin, ferritin, and SI across the four age- and weight-groups. The downward or upward trend of the occurrence of low PF, low SI, and anemia across four weight groups was tested by Cochran–Armitage trend test. The linear association between BMI–logPF and BMI–logSI was presented by Pearson correlation coefficient. A multivariate logistic regression model was conducted separately to associate age, sex and weight groups with the odds of depleted iron store. The odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. Stratified analyses by sex were also performed in addition to the overall analysis.

Physical development assessment was carried out using standard methods. The results were analyzed taking into account gender, living conditions, weight, height and body mass index. 99 Research results. Preventive medical examinations are called upon to play a leading role in monitoring the health of children and adolescents, the main task of which is to obtain objective information at the individual, group and population level.

Indicators of physical development of adolescents were analyzed. Anthropometric measurements were taken in children and adolescents (weight, height, body mass index - BMI, chest circumference). At the same time, the proportion of adolescents meeting WHO standards was: 77% girls and 89% boys. Hemoglobin level and red blood cell count are associated with body weight, height and body mass index of respondents. According to the data obtained, 68.5% of children of puberty had anemia of varying severity, while the proportion of boys suffering from anemia was 26% (of which 84.4% were mild), the proportion of girls was 42.5% (of which mild degree - 67%. The risk of anemia was more than 1.7 times higher in adolescent girls. Stratification of hemoglobin levels by main indicators of physical development showed that high growth is positively correlated with hemoglobin levels. However, this trend was established only in the population of boys Increase in body weight and weight-height coefficient values also had a positive correlation with hemoglobin values.

Conclusion. An association was established between hemoglobin level and the gender of the children examined, living conditions and level of physical development.

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