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TRENDS IN CHANGES OF MORPHOMETRIC INDICATORS IN ADOLESCENTS AGED 13–16 YEARS UNDER THE INFLUENCE OF URBANIZATION

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Abstract. Adolescence is a critical period of ontogenesis characterized by intensive morphofunctional transformations of the organism. Morphometric indicators, including body height, body weight, circumferences of various body segments, skinfold thickness, physical development indices, and body composition parameters, serve as important criteria for assessing the health status of adolescents. In recent decades, significant changes in the parameters of physical development among children and adolescents have been observed due to urbanization processes, reduced physical activity, increased screen time, and the influence of environmental factors. In this regard, there is a growing need for the periodic revision of regional physical development standards and for comprehensive morphometric examinations at least once every five to ten years.

Keywords: adolescents, morphometry, anthropometry, physical development, urbanization, obesity, physical activity, health monitoring.

Introduction. Physical development of children is one of the most important integral indicators of population health, reflecting the processes of growth and development of the organism, the degree of adaptation to environmental influences, and the overall health status [1, 5, 11, 12, 19, 24]. Anthropometric indicators serve as the principal criteria for evaluating the morphological characteristics of the child's organism. According to experts of the World Health Organization, systematic assessment of children's physical development constitutes an essential component of population health evaluation [4, 6, 12, 14, 20, 23, 26]. The Fergana Valley is one of the largest demographic regions of Uzbekistan and is characterized by specific climatic, ecological, and socioeconomic conditions. High population density, environmental factors, dietary habits, and lifestyle characteristics may exert a certain influence on the growth and developmental processes of children [2, 7, 21, 24, 26]. However, information regarding contemporary anthropometric indicators of school-aged children residing in this region remains insufficient, indicating the necessity for comprehensive investigations and the updating of regional standards of physical development [3, 8, 16, 19, 24, 25].

Purpose of the study - To conduct a retrospective analysis of literature data concerning trends in changes of morphometric indicators among adolescents aged 13–16 years under the influence of urbanization.

Discussion. One of the most significant factors affecting the morphometric characteristics of modern children is urbanization. Urbanization is a complex socio-demographic process characterized by the growth of the urban population, the development of urban infrastructure, and changes in people's lifestyles. Under contemporary conditions, urbanization is considered one of the leading factors influencing the physical development of children and adolescents [1, 4, 5, 7, 17, 19]. Changes in physical activity, dietary patterns, work and rest schedules, as well as increasing psycho-emotional stress contribute to the transformation of morphometric characteristics in the younger generation [2, 6, 9, 10, 11].

The age period from 13 to 16 years is characterized by intensive sexual maturation, accelerated skeletal growth, increased muscle mass, and restructuring of the endocrine system. It is during this

period that changes in somatometric indicators associated with modern living conditions become most evident [2, 6, 8, 9, 10, 26].

According to the World Health Organization, regular monitoring of body height, body weight, and body mass index enables timely identification of deviations in physical development and implementation of preventive measures [3, 5, 8, 16, 19]. In modern anthropometry, the following indicators are used to assess the physical development of adolescents: body height, body weight, body mass index, chest circumference, waist circumference, hip circumference, waist-to-height ratio, and somatotype characteristics.

The development of urban infrastructure, the digitalization of the educational process, and reduced everyday physical activity lead to substantial changes in the structure of adolescents' physical development. Studies demonstrate that adolescents living in large cities are characterized by lower levels of physical activity compared with their peers residing in rural areas [2, 6, 9, 10, 11, 12].

A reduction in daily physical activity is accompanied by an increased prevalence of overweight and obesity, which is reflected in body mass index values, waist circumference measurements, and the percentage of body fat [1, 4, 7, 15, 22, 25].

Systematic reviews demonstrate a persistent trend toward decreasing physical activity among adolescents in many countries worldwide. One of the characteristic features of modern adolescence is the significant increase in time spent in front of computer screens, tablets, and smartphones. Increased screen time is accompanied by prolonged sedentary behavior, which is associated with a higher risk of obesity and disturbances in physical development [3, 4, 13, 15, 18]. Furthermore, contemporary studies indicate a relationship between prolonged use of digital devices, sleep disturbances, and alterations in energy metabolism among adolescents [6, 8, 9, 12, 26].

Environmental living conditions also influence the morphometric characteristics of adolescents. Atmospheric air pollution, deterioration in drinking water quality, exposure to industrial emissions, and other anthropogenic factors may affect growth rates and the overall health status of children [14, 16, 18, 22, 24]. Many researchers consider physical development to be an integral bioindicator of the ecological well-being of a territory [15, 19, 20, 25].

Particular attention has been focused on studies involving adolescents living in large industrial centers, where the combined impact of unfavorable environmental factors may alter body height, body weight, and somatotype characteristics [3, 4, 17].

In recent decades, many countries have reported so-called secular trends in physical development, referring to long-term changes in anthropometric indicators under the influence of social and environmental factors [18, 19, 24, 26]. Changes in the lifestyle of modern adolescents have resulted in physical development standards established fifteen to twenty years ago gradually losing their relevance.

In this regard, most researchers consider it necessary to conduct comprehensive anthropometric examinations of adolescents, develop regional centile reference tables, update physical development standards every five to ten years, take into account the influence of urbanization, nutrition, and physical activity levels, and introduce modern methods for assessing body composition [1, 8, 11, 12, 16].

Regular monitoring makes it possible to identify unfavorable trends in a timely manner and to develop effective preventive programs.

Conclusion. At present, one of the important objectives of medicine is to shift the focus from the study of diseases to the promotion and preservation of health, which requires obtaining detailed

information about the baseline health status of the population. The most objective indicator of the health of a growing organism is the level of physical development.

Morphometric indicators of adolescents aged 13–16 years are sensitive indicators of health status and living conditions of the younger generation. Contemporary processes of urbanization, changes in dietary patterns, reduced physical activity, increased screen time, and the influence of environmental factors lead to significant changes in the physical development of adolescents.

Therefore, comprehensive anthropometric studies should be conducted on a regular basis, at least once every five to ten years. The data obtained are necessary for updating regional physical development standards, improving preventive measures, and preserving the health of adolescents under modern conditions.

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