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Assessment of Somato Metric Indicators of School Children Living in the Territory of The Republic of Karakalpakstan (Southern Aral Sea Region)

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Abstract: *An somatometric survey of 407 males and females aged 8 to 16 years was conducted. The main indicators of anthropological status included body length and weight, and chest circumference. Static processing of the received data was performed. The features of physical development typical for this region are revealed.*

Keywords: children and adolescents, physical development, the Aral sea region, environment

Introduction

Physical development is an important indicator of the health of a growing organism, representing the processes of growth and development of the organism. The study of the laws of the development of the child's organism helps to solve the problems of human ecology, since these studies give an opportunity to consider the problem of morphophysiological adaptation of a person to various environmental conditions. Therefore, the study of the laws of physical development of children and adolescents living in the Aral Sea region is relevant due to the unfavorable environmental situation of this region.

The purpose of this work is to examine the characteristics of somatometric status of schoolchildren living in the territory of the Republic of Karakalpakstan in relation to environmental conditions.

Material and methods

Somatometric examination was carried out in 407 males and females of different ages (8-16 years) during our study at the 17-th secondary school located in Nukus city of the Republic of Karakalpakstan. Of these: 204 (49,87%) are males and 203 (50,13%) are females.

The following parameters of body structure were determined by the generally accepted method [7]:

1. Body weight was measured on an electronic medical scale with a measuring accuracy from 50 g to 150 g, depending on the weight. 2. Height measurement with a measurement accuracy of up to 5 mm in height was assessed using SECA 217 (Germany). 3. Chest circumference was measured with anthropometry tape.

According to the results of the measurement of these characteristics, it is possible to control the physical development of a person as well as to determine the anthropometric model of body structure [15].

All calculations are built-in Excel functionality from the Microsoft Office 2010 application; MicroCAL Origin v.6.10 was carried out using statistical data processing software.

Results and their discussion

Physical development is a reflection of the environmental level of the environment as a result of the interaction of the genotype and the environment and is an important indicator of Health. Dynamic observation of the health of schoolchildren shows significant changes in recent years in terms of physical development of children and functional capabilities of the organism [12].

Most often, three main somatometric indicators are used to characterize physical development: body weight, height length and chest circumference [9, 10]. Height length is the most stable indicator characterizing the state of plastic processes in the body. According to the analysis of the results obtained, the length of height also increases with age increase in the groups of children studied. The results of the research conducted showed that in males this period (8-16-year-old), the annual growth rate of height in the range of 9-10 is +8,95 cm; in the range of 12-13 +8,02 cm; in the range of 13-14 +7,1 cm; in the range of 14-15 +9,02 cm. In females, it was found that in this period, the annual growth rate of the height in the interval 9-10 is +12,29 cm; in the interval 11-12 is +7,18 cm (Figure 1).

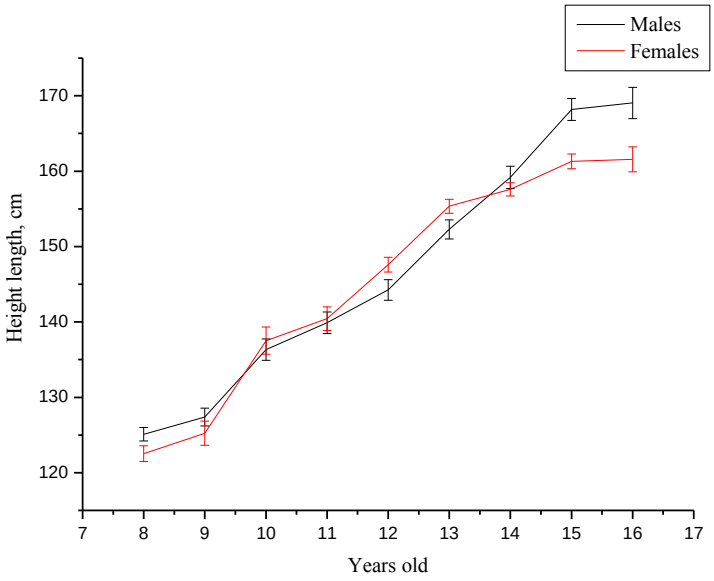

Figure 1. Dynamics of growth of height in males and females living in the territory of the republic of Karakalpakstan (Southern Aral Sea region)

Body weight depends on many factors, and the coefficient of variability is 7-8 times greater than the height length. Most actively, body weight changes rapidly between the ages of 7 to 12 years, that is, it can increase or decrease [11]. This period (8-16 years) was observed in males, with an annual increase in body weight in the interval 9-10 +5,95 kg; in the range of 13-14 +5,49 kg; in the range of 14-15 +10,21 kg. And in females, the annual increase in body weight was observed in the range of 8-9 +3,66 kg; in the range of 9-10 +4,86 kg; in the range of 11-12 +5,19 kg; in the range of 12-13 +5,69 kg and in the range of 13-14 + 4,3 kg (Figure 2).

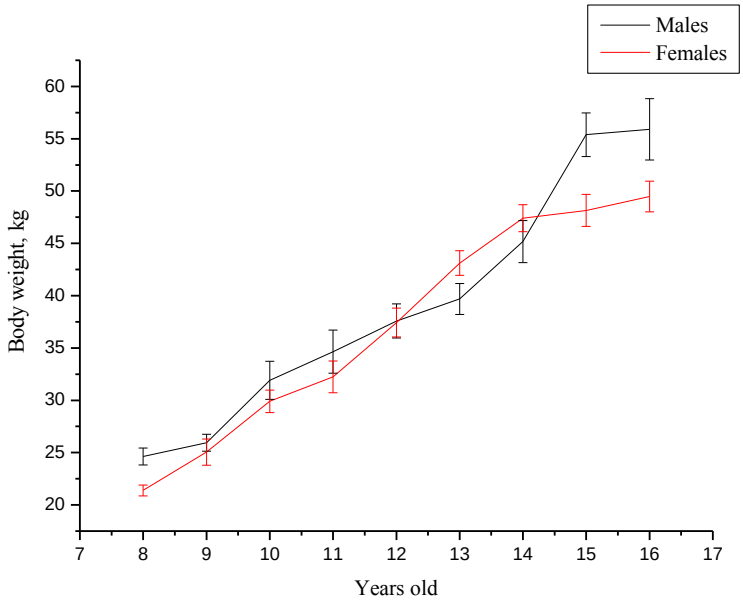

Figure 2. Dynamics of body weight gain in in males and females living in the territory of the republic of Karakalpakstan (Southern Aral Sea region)

Studies have shown that deficiency of muscle and fat components in body weight negatively affects functional fitness indicators [5].

The circumference of the chest is an important indicator of the length of the thigh. With age, the circumference of the chest of an adult person becomes larger. This is due to the growth of skeletal bones, muscles and fat deposits under the skin.

The annual growth rate of the circumference of the chest with an interval of 10-11 in males was +3,9 cm; with an interval of 14-15 was found to be +5,51 cm. In females, however, it became known that the annual growth rate of the circumference of the chest reached +3,91 cm in the range of 8-9 and +4,96 cm in the range of 12-13.

Height length in 8-year-old males and females, respectively 125,10±0.9 cm and 122,52±1.06 cm, while in 16-year-old males and females respectively 169,04±2,08 cm and 161,57±1,65 cm. That is, during this period (8-16 years) there was an increase in height to 43,94 cm in males and 39,05 cm in females.

Body weight was 31,27 kg (from 24,63±0,81 kg to 55,90±2,93 kg) in males from the age of 8 to 16 years and a total increase of 28,09 kg (from 21,38±0,52 kg to 49,47±1,47 kg) in females.

Chest circumference (calm turganda) in males is 20,81 cm (from 60,52±0,796 cm to 81,33±1,773 cm), and in females 21 cm (from 57,28±0,498 cm to 78,28±1,097 cm) there is a total increase.

The above results indicate that physical development is dependent on sexual development and indicate a late onset of sexual development in males and females in the conditions of Karakalpakstan. According to the literature, at the time of the study, the rate of development of secondary sexual symptoms in adolescents aged 10 to 17 years living in the city of Nukus was determined by the general delay in their sexual development due to a violation of their growth and development [4].

The study of the reproductive function of adolescents should be carried out taking into account the parameters of physical development, since the processes of sexual and physical development are closely related to each other. Gender differences are not observed in males and females under 10 years of age according to biological law. And after 10 years of age, gender differences are observed in them. Of course, sexual development in females begins earlier than in males (the results we get are also suitable for this). According to the results obtained, the amount of basic somatometric indicators carried out by measurements in representatives of both sexes is increasing. From the youth physiology it is known that young adolescents grow and develop rapidly. This is due to the release of a large amount of sex hormones into the blood during puberty [2].

Studies in recent years have shown that anthropometric indicators depend on the degree of pollution of the environment [1]. Aridization of the Aral Sea region ecosystem led to an increase in the continental climate and the emergence of dust-salt storms [6]. Due to the evaporation of sea water from the Aral Sea and the strong wind, every year 0,1-0,5 million tons of salt rises to the atmosphere. According to modern observations, dust-salt storms cost from 13-23 million tons per year, and other assessments from 40 to 150 million tons. Pollution of the atmosphere increased by 6-7 times [8]. Excessive salinity of the soil caused the natural migration of pesticides and their withdrawal from the same territory, their accumulation and distribution in the Aral Sea Region [8]. As a result, a high level of contamination of food and water with these compounds was observed. Taking into account the fact that in the environment and in the body, pesticides with chlorogenic and phosphoric compounds are stored for a long time, they pass into the blood through food, are absorbed in various organs and tissues. These can lead directly to a high probability of morbidity in the Aral Sea population and lead to an increase in height, a violation of sexual development [14].

As a result of increased pollution of the environment (for example, smoke in the atmosphere, an increase in the concentration of toxic waste in the chemical industry), the rate of growth processes, the development of the musculoskeletal and reproductive systems decreases. This process, according to some observations, is more pronounced in males [3]. Morphofunctional indicators, especially in newborns, are considered very sensitive to various negative changes in the external environment. At a young age, it was also found out that the dynamics of the main anthropometric indicators of the organism depends on climate-environmental conditions. Literature shows that aerotexnogen pollution reduces the growth and development of the body in children and adolescents, worsens the functional state of the cardiorespiratory system and increases the likelihood of its formation with asthenic body structure (samototype) [13].

Conclusion

The development of anthropometric standards typical for the region in the Aral Sea region is one of the current tasks. In this study, it was attempted to analyze the characteristics of somatometric status of schoolchildren in relation to environmental conditions and determine the characteristics of physical development characteristic for the area studied.

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