

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Peculiarities of The Somatometric Indicators of the Central and Northern Kazakhstan School Children.

Priz V.N.<sup>1\*</sup>, Kalishev M.G.<sup>2</sup>, Matcuk E.V.<sup>2</sup>, Rogova S.I.<sup>2</sup>, Zhaketayeva N.T.<sup>2</sup>, Churekova V.I.<sup>2</sup>, and Sabiden G.S.<sup>2</sup>.

<sup>1</sup>Faculty of Preventive Medicine, Biology and Pharmacy, Karaganda State Medical University.

<sup>2</sup>Department of nutrition hygiene, general hygiene and ecology, Karaganda State Medical University .

### ABSTRACT

The comparative statistical analysis of the physical development parameters among schoolchildren residing at the Central and Northern Kazakhstan has been presented in this article. The obtained results allowed to find out authentic regional differences on some anthropometric indicators. It has been found that irrespective of nationality and residence area girls' body length at the age of 12 years is authentically higher than those of boys, and since 14 years boys' body length is authentically higher than the height of the girls.

**Keywords:** children of school age, physical development, somatometric indicators.

\*Corresponding author

## INTRODUCTION

The level of physical development is one of the most informative integrated criteria of child health, especially in periods of growth and development, as well as an indicator of children's health of the population responsive to the impact of socio-hygienic and ecological environmental factors [1,4,6,10,12,13]. Growth and physical development of specific children populations may vary considerably depending on the ethnic composition of the population, living conditions and way of life. [3,5,8, 16, 17]

The importance of dynamic observation over the levels and the harmony of physical development of the child population is also due to the fact that it allows to allocate groups of risk of health problems development in proper time, to carry out thorough investigations in proper time and to develop preventive measures[15]. Investigations of children's physical development among big children populations residing at a particular area allow to study regional peculiarities of children's health in order to determine the priority factors of public health formation and adoption of adequate management decisions to strengthen it and to increase life span [2,7,9,11].

**The objective of the study** is the study and comparative analysis of the somatometric indicators of schoolchildren residing at the Northern and Central Kazakhstan.

## MATERIALS AND RESEARCH METHODS

The research object were children and adolescents aged 6 to 17 years—students of 1-11 grades of secondary educational institutions of urban and rural areas in the Central and Northern Kazakhstan. Healthy children and adolescents in the amount of 11 580 people we involved in the study. Informed consent from children or their parents for involvement was obtained prior to the commencement of the research.

All subjects were divided into 12 age groups with their further separation by gender and nationality. Children were divided into "Kazakh" and "Russian" nationality conditional groups.

Students of the Kazakh nationality amounted to 52.5% of overall surveyed ones, Russian nationality - 47.5%, Kazakh nationality boys were 2940 persons, girls were 2869 people, boys of Russian nationality were 2887 people, and girls of Russian nationality were 2884 people. The proportion of boys among overall surveyed ones was 50.5%; the proportion of girls was 49.5%.

The study of children physical development indicators included measurement of body length, body weight and chest circumference with traditional methods in accordance with the requirements to arrangement and conduction of such studies.

Statistical analysis was performed using Microsoft Office Excel 2007. We used the methods of variation statistics with the definition of weighted arithmetic mean (M), standard deviation, error-weighted arithmetic mean (m), coefficient of variation (C).

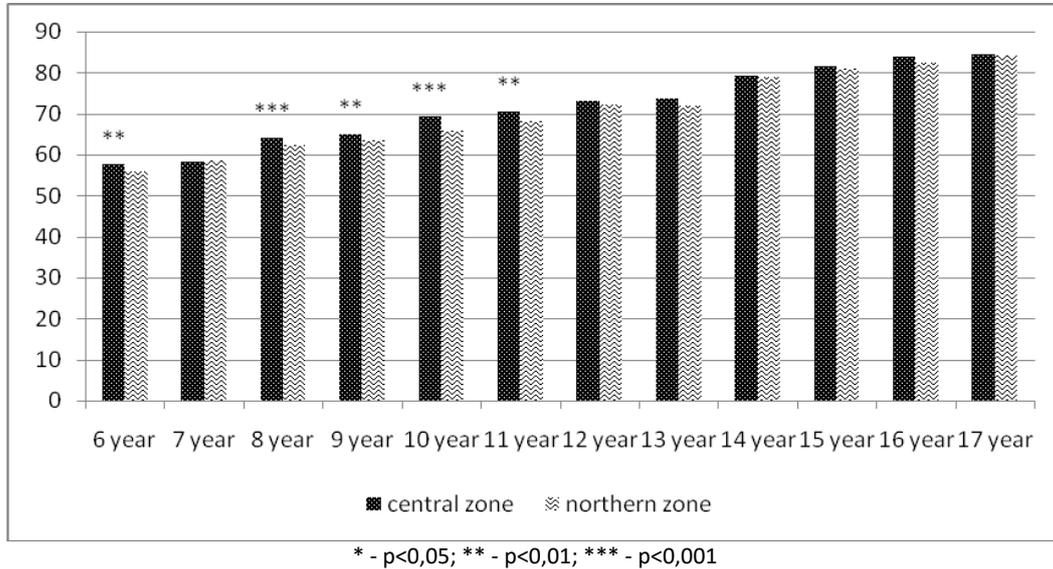
## RESULTS AND DISCUSSION

Comparing the body length of Kazakh boys from the Central and Northern Kazakhstan, it was stated that 6-year-old Kazakh boys from the Central Kazakhstan are authentically higher than their peers from the Northern Kazakhstan(119.87 cm and 115.4 cm, respectively;  $p < 0.001$ ).

7- (122.13 cm;  $p < 0.001$ ), 8- (128.08 cm;  $p < 0.001$ ) and 15- (166.88 cm;  $p < 0.001$ ) aged Northern Kazakhstan Kazakh boy's body length is authentically higher than the length of the same aged Kazakhs boy's body in the Central Kazakhstan(7 years -120.12cm,8 years-125.9cm;15 years-162.76cm).

It was found that the body weight of Northern Kazakhstan Kazakh nationality boys is authentically more than the body weight of Central Kazakhstan Russian boys at the age of 6 (22.41 kg and 21.48 kg, respectively;  $p < 0.05$ ) 7 (24.62 kg and 22.67 kg, respectively;  $p < 0.001$ ), 8 (26.85 kg and 25.68 kg, respectively;  $p < 0.01$ ), 9 (31.1 kg and 29.42 kg, respectively;  $p < 0.05$ ) and 12 years (40.81 kg and 39.07 kg, respectively;  $p < 0.05$ ).

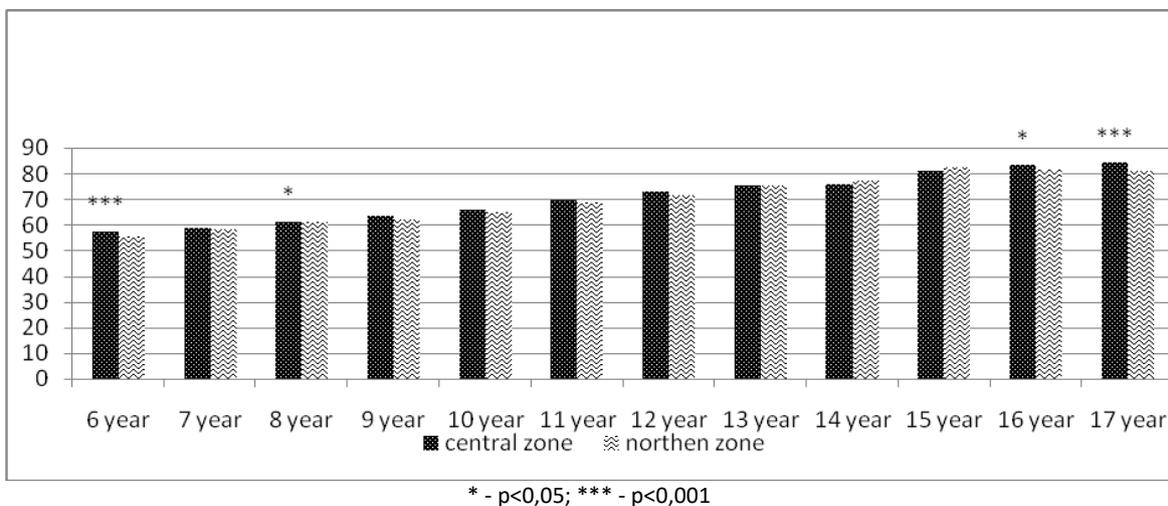
The chest circumference of the Central Kazakhstan boys is authentically wider than the chest circumference of the Northern Kazakhstan boys at the age of 6(57.58 cm and55.92cm, respectively;  $p < 0.01$ ) 8(64.2cm and62.19 cm, respectively;  $p < 0.001$ ), 9(65.06cm and63.56cm, respectively;  $p < 0.01$ ) 10(69.18 cm and65.9cm, respectively;  $p < 0.001$ ), 11(70.47 cm and68.16cm, respectively;  $p < 0.01$ ) and 16(83.76 cm and82.35cm, respectively;  $p < 0.05$ ) years old(Figure 1).



**Figure 1 - Average values of the chest circumference (cm) of school-age boys of Kazakh nationality from the Central and Northern Kazakhstan**

Body length of the Central Kazakhstan girls is authentically higher than the body length of the Northern Kazakhstan girls at the age of 9 (131.73 cm and 130.14 cm, respectively;  $p < 0.05$ ). At the age of 13 body length of the Northern Kazakhstan girls of Kazakh nationality (156.21 cm) is authentically higher ( $p < 0.05$ ) than the body length of the Central Kazakhstan girls (154.37 cm).

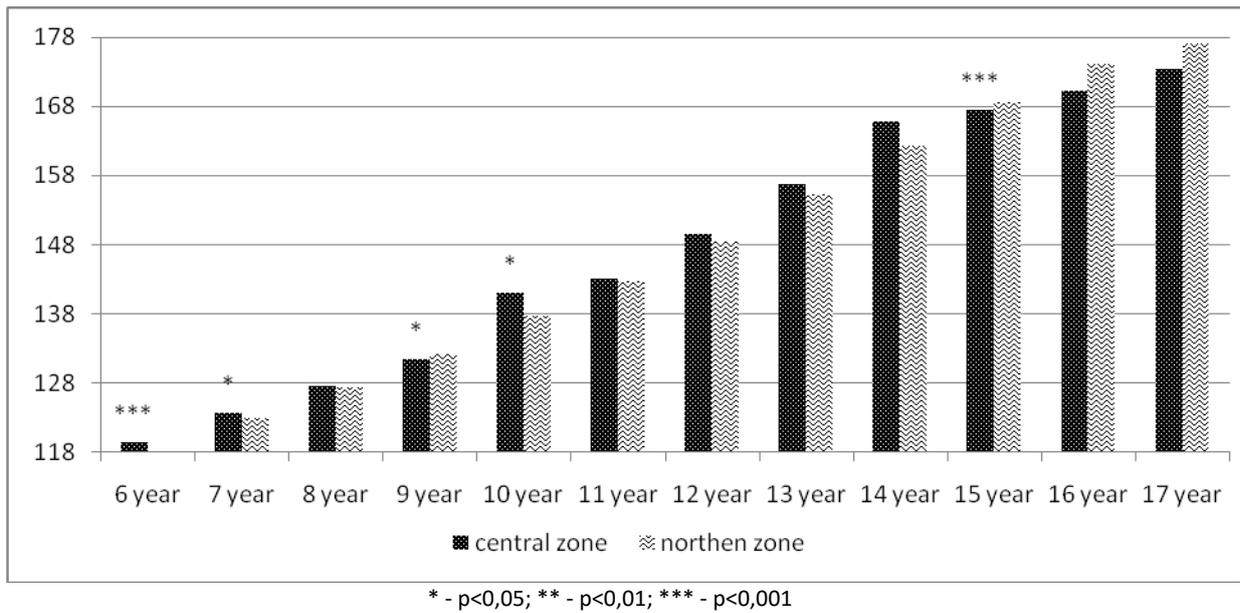
Body weight of the Northern Kazakhstan girls of Kazakh nationality is authentically more than the body weight of the Central Kazakhstan girls at the age of 6 (21.72 kg and 18.82 kg, respectively;  $p < 0.001$ ), 7 (23.78 kg and 22.86 kg, respectively;  $p < 0.05$ ) and 8 (26.04 kg and 24.23 kg, respectively;  $p < 0.001$ ) years. It should be noted that BW of 17-year-old girls of Kazakh nationality from the Central Kazakhstan (57.78 kg) is authentically more ( $p < 0.01$ ) of BW of their peers from the Northern Kazakhstan (55.82 kg).



**Figure 2: Average values of chest circumference (cm) of school-age girls of Kazakh nationality from the Central and Northern Kazakhstan**

Chest of 6- (57.41 cm;  $p < 0.01$ ), 9- (63.34 cm;  $p < 0.05$ ), 16- (83.24 cm;  $p < 0.05$ ) and 17- (84.26 cm;  $p < 0.001$ ) year-old girls of Kazakh nationality from the Central Kazakhstan is authentically wider than the CC of the Northern Kazakhstan girls of the same age (6 years old – 55.53 cm; 9 years old – 62 cm; 16 years old – 81.53 cm; 17 years old – 81.13 cm) (Figure 2).

Comparing body length of Russian boys from the Central and Northern Kazakhstan, it was stated that 6- (122.85 cm and 119.75 cm, respectively;  $p < 0.001$ ), 16- (174.2 cm and 171.75 cm, respectively;  $p < 0.01$ ) and 17-year-old (177.09 cm and 173.36 cm, respectively;  $p < 0.001$ ) boys of Russian nationality from the Northern Kazakhstan are authentically higher than their peers from the Central Kazakhstan. But boys at the age of 9 and 10 years from the Central Kazakhstan are authentically higher than the boys from the Northern Kazakhstan (9 years old – 134.74 cm and 132.24 cm, respectively;  $p < 0.01$ ; 10 years old – 139.39 cm and 132.24 cm, respectively;  $p < 0.01$ ) (Figure 3).



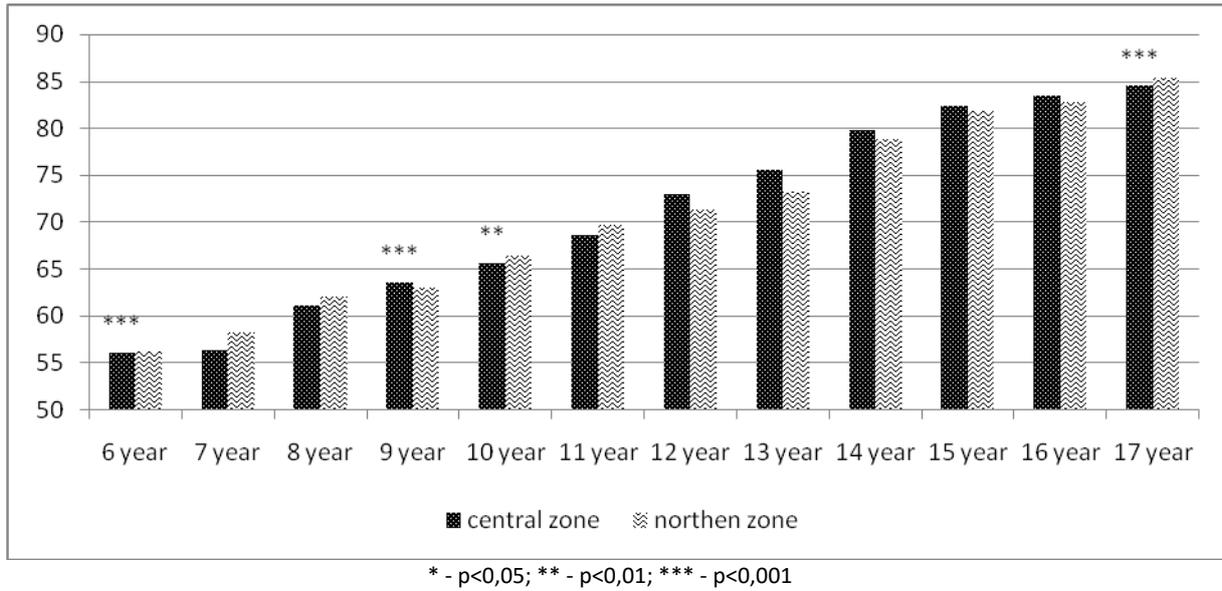
**Figure 3: Average values of body length (cm) of school-age boys of Russian nationality from the Central and Northern Kazakhstan**

BW of Russian boys from the Northern Kazakhstan at the age of 7 (24.69 kg;  $p < 0.01$ ), 16 (61.78 kg;  $p < 0.05$ ) and 17 (67.57 kg;  $p < 0.01$ ) years are authentically more than the BW of Russian boys from the Central Kazakhstan (7 years – 23.42 kg; 16 years – 59.43 kg; 17 years – 64.79 kg).

Comparing CC of Russian boys from the Central and Northern Kazakhstan, it was stated that in the 6- (58.79 cm;  $p < 0.001$ ), 9- (66.07 cm;  $p < 0.001$ ), 10- (67.88 cm;  $p < 0.01$ ) and 17-years (88.22 cm;  $p < 0.001$ ) periods chest of Central Kazakhstan boys is authentically wider than the boys from the Northern Kazakhstan (6 years – 56.21 cm; 9 years – 63.06 cm; 10 years – 66.42 cm; 17 years – 85.34 cm) (Figure 4).

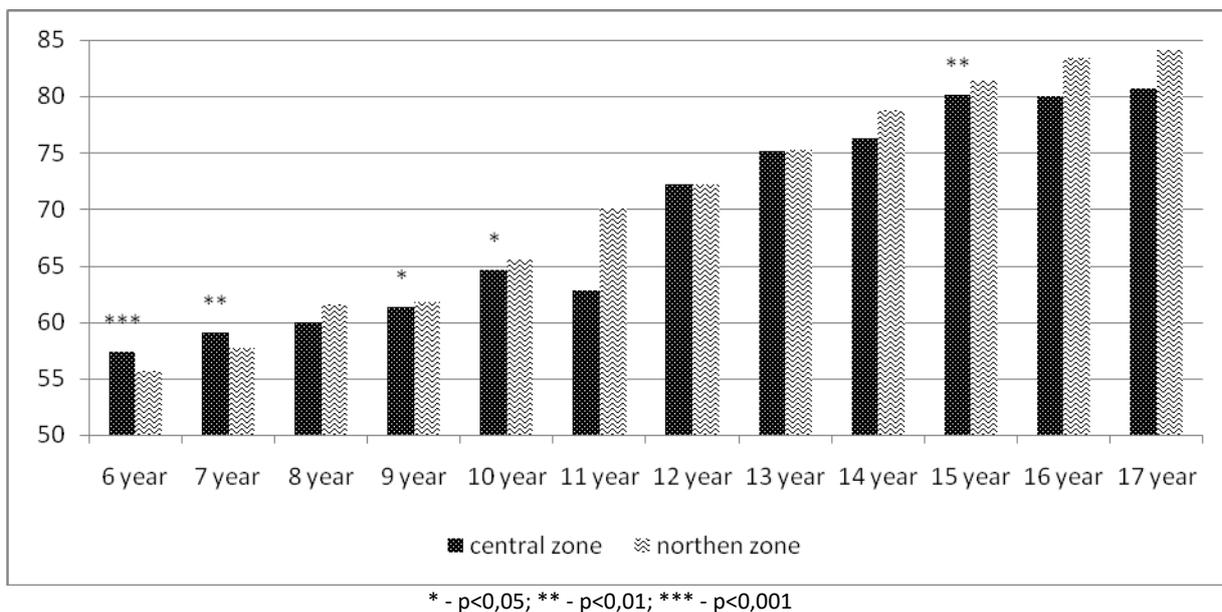
Comparing body length of Russian schoolgirls from the Central and Northern Kazakhstan, authentic differences were also found. Girls from the Central Kazakhstan at the age of 6 are authentically higher than the girls of the Northern Kazakhstan (118.75 cm and 117.1 cm, respectively;  $p < 0.05$ ).

BW of 6-year-old girls of Russian nationality from the Central Kazakhstan is authentically more ( $p < 0.001$ ) than BW of their peers from the Northern Kazakhstan (21.85 kg and 20.06 kg, respectively). At the age of 7 (24.05 kg;  $p < 0.05$ ) and 9 (29.58 kg; and  $p < 0.05$ ) years BW of Russian girls from the Northern Kazakhstan is more than BW of girls from the Central Kazakhstan (7 years – 22.74 kg; 9 years – 28.02 kg).



**Figure 4: Average values of chest circumference (cm) of school-age boys of Russian nationality from the Central and Northern Kazakhstan**

CC values of Russian girls from the Central Kazakhstan at the age of 6 (59.65 cm; p<0.001), 7 (59.06 cm; p<0.01), 9 (63.31 cm; p<0.05), 10 (67.28 cm; p<0.05) and 15 years (83.35 cm; p<0.01) are authentically more than the CC values of Northern Kazakhstan girls of the same age (6 years – 55.73 cm; 7 years – 57.69 cm; 9 years – 61.81 cm; 10 years – 65.53 cm; 15 years – 81.44 cm) (Figure 5).



**Figure 5: Average values of chest circumference (cm) of the school-age girls of Russian nationality**

**CONCLUSIONS**

1. Analysis of schoolchildren anthropometric research results showed that children of junior and secondary school age from the Central Kazakhstan have values of body length and chest circumference authentically increasing values of these indicators at the children residing at the Northern Kazakhstan regardless the nationality. At the same time, body weight of junior and secondary school aged children from the Northern Kazakhstan prevails over the body weight of children residing in the Central Kazakhstan.

2. Values of body length and weight of Russian nationality of 16-17 years old residing in the Central Kazakhstan are authentically lower than the values of the same indicators of their peers from the Northern Kazakhstan. And anthropometric data of Kazakh girls of 16-17 years old from the Central Kazakhstan exceed the data of their peers residing at the Northern Kazakhstan.
3. Russian girls of 6 years old residing at the Central Kazakhstan outperform their peers from the Northern Kazakhstan on all the studied somatometric parameters.
4. Irrespective of the nationality and residence area, body length of the girls at the age of 12 years is authentically higher than those of the boys, and since 14 years old and in the consequent years, boys' body length authentically increases girls' height.

#### REFERENCES

- [1] Bogomolova E. S. Hygienic justification of growth and development monitoring of schoolchildren in the system "health – life environment" – synopsis of thesis. MD – Nizhny Novgorod – 2010 – 48 p.
- [2] Dolgikh V.V. Kulesh D.V. About the state of health of children and adolescences residing at Irkutsk region// Issues of current pediatrics. – 2006. – V. 5, no. 1: Topical issues of pediatrics: Information package of X Russian Congress of pediatricians. – P. 180-181.
- [3] Kuchma V.P. Problems of monitoring of the state of health of children population in respect of the environmental factors // Hygiene and sanitary. – 1993. – no. 11. – P. 4-7.
- [4] Kuchma V.P., Skoblina N.A., Platonova A.G. Physical development of Moscow and Kiev schoolchildren // Hyg. and san. – 2011. – no. 1. – P. 75-78.
- [5] Kuchma V.P., Sukhareva L.M., Yampolskaya Yu.A. Tendencies of growth and development of elderly adolescence at the turn of millennium // Hygiene and sanitary. – 2009. – no. 2. – P. 18-20.
- [6] Kuchma V.P. Physical development, state of health and way of life of children from Near Arctic. M.: NCZD RAMN, 1999. – 200 p.
- [7] Mazur L.I., Scherbitskaya O.V. Regional peculiarities of physical development and state of health of schoolchildren from the city of Samara and Samara region // Fundamentalnyye issledovaniya. – 2006. – no. 12. – P. 25-28.
- [8] Morphofunctional peculiarities of rural adolescences in the Altai Territory // Vozgoment O.V., Koryukina I.P., Aminova A.I. and others. – Izvestiya Biyskogo otdeleniya Russkogo geograficheskogo obschestva. 2006. – Rel. 26. – P. 69-71.
- [9] Reshetnik L.A., Zaznobova T.V., Pogorelova I.G. Physical development of senior high school and lyceum students of urbanized Siberian city / Edited by prof. G.G. Onischenko // Materials of XI All-Russian congress of hygienists and sanitary doctors. V. 3. – M., 2012. – P. 473-474.
- [10] Russakova N.V., Trifonova E.A. Physical development at children and adolescences as the indicator of children state of health // Information package of XVI Russian congress of pediatricians "Topical problems of pediatrics" (15-18 February 2010, Moscow). – M., 2010. – P. 684.
- [11] Skoblina N.A., Kuchma V.P., Milushkina O.Yu., Bokareva N.A. Current tendencies of physical development of children and adolescences // Public health and life environment. 2013. – no. 8. – P. 9-12.
- [12] Filina G.G. Socio-hygienic problems of the state of health of children and adolescences // Hygiene and sanitary. 2001. – no. 5. P. 7-11.
- [13] Chagayeva N.V., Popova I.V., Tokarev A.N., Kashin A.V., Belyakov V.A. Comparative characteristics of physiometric indicators of schoolchildren development // Hyg. and san. – 2011. – no. 2. – P. 72-75.
- [14] Feigelman S. Middle childhood. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF, eds. Nelson Textbook of Pediatrics.-19th ed. Philadelphia, Pa: Saunders Elsevier; 2011:chap 11.
- [15] Krystł., Kowal M., Woronkiewicz A., Sobiecki J. atal. Secular changes in height, body weight, body mass index and pubertal development in male children and adolescents in Krakow, Poland // J. Biosoc. Sci. 2012. Vol. 44. N 4. P. 495–507.
- [16] Ptacek R., Kuzelova H., Celedova L., Cevela R. Impact of various types of care on somatic development of children // European Psychiatry. – 2012. - V. 27. – S. 1. – P.1.
- [17] Tanner J.M. Growth as a mirror of the condition of society: Secular trends and class distinctions // Human Growth. A Multidisciplinary review / Ed. A. Demirjan. — London and Philadelphia: Taylor&Francis, 1986. — P. 3-34.