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Growth and development in school-age children from Rostov region, Russia: Comparison between urban and rural settings

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ABSTRACT

The purposes of the current study were: (1) to describe growth and physical development and establish norms for schoolchildren from Rostov region in Russia; (2) to compare major characteristics of development between urban and rural children by sex and age.

Nearly 200,000 children (198,712) aged between 7 and 17 years from 232 urban and rural schools of Rostov region (Southern Federal District of Russia) participated in the study. School age is a period of intensive growth and physiological and psychological development. Irregularities of personal development are caused by a multitude of factors, such as sex differences, heredity, socio-economic status of a family, standard of living, particular environmental conditions, and lifestyle.

It has been established that children from the Southern Federal District of Russia had body mass index values higher than age-appropriate norms for all Russians (Total Russian, Rudnev et al., 2014) and World Health Organization charts. Children from urban settings were taller and heavier than children from rural settings.

Sex is one of the most influential factors which play key role in determining specific characteristics of growth and personal development. According to our results, boys and girls both had similar age-related changes in weight and height, but their respective dynamics differed. Girls' height and weight values accelerated at the age 10 to 12 years and plateaued after the age fourteen, whereas in boys height and weight steadily increased with age, showing slight acceleration at the age 12 to 13 years, and reached a plateau by the age of seventeen.

Abstract (in Russian)

Целями настоящего исследования были: (1) с использованием репрезентативной группы обследуемых описать общие закономерности онтогенеза человека в диапазоне возрастов 7-17 лет, характерные для Ростовской области России; (2), выявить и описать частные особенности исследуемых возрастов развития школьников, связанных с полом и местом проживания, описать различия роста и развития детей из городских и сельских населенных пунктов.

В исследованиях приняло участие 198712 учащихся (96584 мальчиков и 102128 девочек) учащихся 232 образовательных организаций городов и сел Ростовской области (Южный федеральный округ России). Период жизни человека, захватывающий «школьные годы» (7-17 лет), характеризуется интенсивными процессами роста и физического развития. Исследуемые процессы характеризуются выраженной неравномерностью и половыми особенностями. Основные закономерности развития иллюстрируются на независимых выборках девочек и мальчиков, иллюстрируя при этом ряд

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гендерных особенностей. На внешний вид человека, его морфофункциональные особенности оказывают влияние факторы различной природы: наследственной, социально-экономической, экологической; сформированный в динамике возрастов образ жизни. На данном этапе исследований совокупность факторов объединены в категории: регион (Ростовская обл. РФ), город и село.

Особенности возрастных изменений длины и массы тела, ряда функциональных параметров мальчиков и девочек имеют сходный характер. При этом, для роста и массы тела девочек характерно отчетливое «ускорение», начинающееся с 10-12 лет и «замедление», начинающееся с 14 лет. Динамика изменений параметров мальчиков представляется более монотонной, тем не менее, имеет место ростовой скачок. Который начинается на 1,5-2 года позже девочек – в 12-13 лет и не имеет четко выраженного спада на всем периоде наблюдений – до 17 лет.

В работе показаны признаки опережающего, относительно известных международных и отечественных норм, развития детей, проживающих в одном из южных регионов РФ – Ростовской области, и, в частности, при более интенсивном физическом развитии школьников сельской местности. Однако, и мальчики и девочки всех исследуемых возрастных групп, проживающие в городах, характеризуются большей длиной и массой тела относительно своих сверстников – жителей села.

Introduction

At the present time in Russia large-scale assessments of growth, development and health conditions of children are conducted only sporadically, as often noticed (Baranov et al., 2008; Bezrukih et al., 2003; Godina, 2009; Il'chenko, 2014; Kuznecova, 2005; Mel'nik et al., 2012; Rudnev et al., 2014). Thus, there are no complete anthropometric data regarding physical development of school-age Russian children. According to experts (de Onis et al., 2007; Tanner et al., 1966) it is advantageous to review the national and regional growth standards every 5-15 years.

School age is the main period of growth and development, when child's organism is more sensitive to both favorable and unfavorable influences. Despite debates whether stages, of the morphofunctional and psychological child development exist or not (Bailey et al., 2001; Lourenço, 2016), we accepted the hypothesis of age crises by Vygotskiy (2005). According to this hypothesis child's school age includes a crisis of the seventh year and a crisis of the adolescence. In these periods organism undergoes both quantitative and qualitative changes.

It is widely held opinion, that the school and educational environment could have an effect not only on growth and development but also on child health. It is difficult to find a simple solution to this complicated problem. According to Landrigan (2016) schools in USA, among other factors, were not considered as a negative factor influencing children's health. In accord with data of Russian researchers (Baranov et al., 2008; Bezrukih et al., 2003; Il'chenko, 2014) extensive informational and physical loads of schoolwork resulted in poor adaptation and might have had negative influences on schoolchildren's health.

Innovation in education system introducing intensive teaching with large information content negatively affects schoolchildren's health (Il'chenko, 2014). Modern teaching programs are based on prestige and often ignore physical, psychical and intellectual consequences these programs may have for children. Studies in Russia have shown that incidence of health problems among children increased by 4-5 times during school years and 55 percent of schoolchildren had chronic diseases after leaving school (Chirkova, 2000).

We hypothesize that in urban and rural settings conditions for physical and psychological developments are different. Children from rural settings have better nutrition and more possibilities for motor activity, experience no stress even in the worst socio-economic standards of living and have less intensive and less innovative educational program at school than schoolchildren from urban settings. However, the influence of socio-economic factors on growth and development of urban and rural schoolchildren are still poorly understood.

The purposes of the current study were: (1) to describe growth and physical development and establish growth norms for schoolchildren aged 7 to 17 years from Rostov region in Russia, and (2) to compare major characteristics of development between urban and rural schoolchildren according to age and sex.

Materials and methods

The regional project named "Our Good Health School" is a school health screening system which is aimed at keeping school-age children healthy. In the Rostov region, the health screening within this project has been performed since the year 2012. All measurements for the screening were approved by the Rostov regional Department of Education and Department of Public Health. Rostov region is a large agrarian region (100 800 km^2) of the Southern Federal District of Russia. The study was conducted in 232 urban and rural elementary schools during the 2012 to 2015 school seasons. In total, 198,712 healthy children (96,584 boys and 102,128 girls),