

LONGITUDINAL COHORT STUDY OF GROWTH, DEVELOPMENT, PUBERTY AND REPRODUCTIVE HEALTH IN RUSSIAN BOYS

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Introduction. There are few longitudinal male cohort studies with serial assessments of growth and puberty. **Design/Methods.** We assembled a multi-disciplinary team of U.S. and Russian researchers to design and conduct a longitudinal boys' cohort study of male growth, development, puberty and reproductive health in Chapaevsk, Russia. At annual study visits scheduled at each subject's birth month, the same study physician (O.S.) assesses pubertal staging and one nurse (L.S.) measures anthropometric variables. Pubertal assessments are based on a 1–5 scale for genitalia and pubic hair staging by visual inspection, testicular volume is measured using orchidometers, and penile length is measured with a ruler. Blood and urine samples for hormonal, chemical, genetic and epigenetic analysis were collected at baseline and biennially. **Results.** In 2003–2005, 516 prepubertal boys were recruited at ages 8–9 years (86% of all eligible Chapaevsk boys) to be followed annually for at least 10 years. The participation rate has remained high with over 75% followed for 6 years and 64% at 9 years of follow-up with 4319 visits as of February 2014. A core set of 23 anthropometric indices measured at annual visits (e.g., height, weight, segment lengths and diameters, circumferences, skinfolds) are available, as well as an additional 30 measures conducted biennially. Longitudinal curves for selected anthropometric and pubertal measures will be constructed. 113 semen samples were collected at 18–19 years old and evaluated for semen quality, including sperm concentration and motility. **Conclusions.** To our knowledge, this longitudinal male cohort is the first to have serial assessments of growth and puberty performed by the same physician and nurse followed for over ten years, from prepuberty to young adulthood. This cohort provides an excellent foundation for describing growth and pubertal development trajectories and evaluating associations with environmental exposures.

Key words: *growth, development, puberty, longitudinal curves, Russians, males, anthropometry*

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PHYSICAL STATUS OF CHILDREN BORN IN 1996 (LONGITUDINAL AUXOLOGICAL STUDY OF CHILDREN FROM VILNIUS CITY, 1996–2013)

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Based on the 1985–1992 cross-sectional auxological Lithuanian growth study, the new growth monitoring system and percentile growth charts were implemented at clinical practice in Lithuania since 1995 (Tutkuvienė, 1995). The aim of the present study was to evaluate physical status of children born in 1996 in Vilnius city from birth up to the end of puberty and to investigate their growth tendencies. **Material and methods:** data were derived in 2014 from personal health records of children (373 boys and 342 girls, total number 715) born in 1996 in Vilnius city. Main growth indices (height and weight recorded annually from birth up to the age of 17

years, and calculated body mass index) of children were investigated. Main growth indices were compared with the results of the longitudinal study of children born in 1990 from Vilnius city (Suchomlinov, 2011) and the results of the cross-sectional growth studies of Lithuanian children (Tutkuvienė, 1995, 2000–2005). Results: at the age of 17 years children born in 1996 were 1.5–2 cm higher than in 1985–1992 ($p < 0.05$) – boys' and girls' height was 180.1 ± 7.5 cm and 168.1 ± 6.1 cm, respectively. Children of both sexes from the current study, compared to their peers born in 1990, were higher at birth (boys 53.3 ± 2.3 cm and 52.8 ± 2.3 cm, girls 52.8 ± 2.4 cm and 52.3 ± 2.4 cm respectively, $p < 0.05$). There were no differences in final height, weight or BMI between 1990 in 1996 birth cohorts; however, children born in 1996 had significantly higher BMI compared with the results of the cross-sectional growth study of Lithuanian children conducted in 2000–2005 (boys 21.8 ± 3.4 kg/m² and 21.1 ± 2.6 kg/m², girls 21.5 ± 3.6 kg/m² and 20.2 ± 2.3 kg/m² respectively, $p < 0.05$). Conclusion: stabilization in height and gaining in BMI was observed in children born 1996 in Vilnius city.

Key words: *longitudinal auxological study, personal health records, height, weight, body mass index*

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GROWTH FROM BIRTH TO TWO YEARS: ECOLOGICAL ASPECTS

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To estimate the specificity of growth dynamics of Slavonic children from birth to 2 years in different ecological conditions, data on physical development of children of the former USSR from late 1960's – early 1970's were compiled. Among them, samples from the following regions: megalopolis of Moscow; sea port of Murmansk, settled over the polar circle in the permafrost zone; city of Norilsk, settled over the polar circle, one of the most polluted cities in the world; city of Magadan, settled in the permafrost zone, severe climate with short summer; industrial center of Cheliabinsk, air pollution over the norm and high radiation background; industrial center of Kuibishev, the highest level of the air pollution in Russia; industrial agglomeration of Donetsk, a zone of ecological disaster with the extreme exhaustion of natural resources. Growth patterns of four main indices of physical development (body length and mass, chest and head circumferences) were compared at different age groups: at birth, 1, 3, 6, 12, 18 and 24 months of age. The highest indicators of physical development and the rate of their changes through 0–2 years interval belong to the children from rapidly developing urban centers with intensive migration processes – Moscow, Murmansk, Kuibishev. Evidently, high level of urbanization is positively correlated with the high level of medical service. Children growing in the severe conditions of the North, in Norilsk and Magadan, have lower indices of physical development and lower rates of their dynamics. The combination of natural and anthropogenic stress in the ecology of Norilsk intensifies this tendency. Children of Cheliabinsk, living in the conditions of the high anthropogenic pollution, are characterized with the deficit of body mass and chest circumference through the second year of life, which is an evidence of as-thenization of body shape, more evident in girls. The same tendency characterizes the growth of children from urban Donetsk. The lowest indices of children from Donetsk region are probably connected not only with the high level of technogenic stress, but also with the lower quality of life in this province, which includes nutrition status and medical service. The retardation of the girls from Donetsk and the region compared to the boys who assume to be more ecosensitive, may testify to the distress of the ecological situation in the region and to the extreme exhaustion of adaptive resources of the child's organism. The research is partly maintained by RFBR grant # 12-06-0036a.

Key words: *growth dynamics, physical development, infancy, early childhood, ecological stress*

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