

## **Section GROWTH and DEVELOPMENT**

### **EVALUATION OF FOOT ANTHROPOMETRY AND SECULAR CHANGES IN TURKISH CHILDREN AND ADOLESCENTS**

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Evaluation of foot development is important for growth and development as well ergonomics studies. The purpose of the present paper is to investigate age and sex dependent foot anthropometry and secular changes in Turkish children and adolescents. A cross-sectional survey was conducted on 1427 (709 boys and 718 girls) healthy school children aged between 6–17 years from Ankara. Height, foot length and foot breadth were measured according to the standard anthropometric protocols and foot index was calculated. To reveal secular changes on foot growth, the data were compared with Bostancı's study of 1950, which included 1679 healthy school children from Ankara. The results show rapid increment in foot length at 11-13-year-olds for the boys and 9-10-year-olds for the girls. Similar growth pattern in foot breadth was also recorded which followed by a steady increase. Although during early childhood the boys have larger foot dimensions, just before the puberty girls catch up and sexual dimorphism disappear. After the age of 13 years significant difference between the two sexes have been recorded ( $p < 0.01$ ). Positive secular increase was prominent for the foot length and breadth measurements for both sexes but this increment was greater for boys, which can be linked with the different degree of response to the improved environmental conditions. Positive secular changes documented in the present study appear to be a logical outcome of gradual social changes. As a developing country, Turkish population still tends to be diverse, and by taking into account potential social improvement, we might predict a further positive secular trend in growth.

**Key words:** *Foot anthropometry, secular changes, children and adolescents, Turkey*

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### **TERRITORIAL VARIATIONS OF THE MATURATION RATES OF HAND AND WRIST BONES IN CHILDREN AND ADOLESCENTS**

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This research aims at studying the influence of ecological factors on the maturation rates of hand and wrist bones in children and adolescents. It is based on the radiographs of the left hands, collected in the course of the expeditions of the Institute and Museum of Anthropology through 1964-2013 periods in 19 ethno-territorial child groups, aged 8-17 years, with the total number of 6456 individuals. The Tanner-Whitehouse method (TW-2) was used to determine skeletal maturation. As to the European part of the former USSR the highest rates of skeletal maturation belong to the rural school children of Arkhangelsk region and Karelians of Olonetski region with the exceeding of skeletal age compared to chronological almost through the whole age interval. In the groups of Russians of the Yaroslavl region and Byelorussians the skeletal age falls behind chronological, which is stronger manifested in Byelorussian girls from longevity population (over 0.5 years). Maturation rates of hand skeleton of Chuvashs and Bashkirs are close to each other and 0.25 years lower than British standards. Significant changes of maturation rates of the hand and

wrist bones through 25 years occurred in Abkhazia. The results of skeletal age of Abkhazian children in 2004 showed significant acceleration of maturation rates in the long-lived population of the Abkhazians. The changes are more evident in the population of the Ochamchiry region as compared to Gudauta region. The differences between longevity population of Chlow with the delayed rates of physical development and the control group from Duripsh, revealed in the 1970 – 1980 study, almost disappeared. Child groups of Central Asia, Khalkha-Mongolians and Tuvinians had the slowest maturation rate of hand skeleton, 0.8 years less than British standards. Altaians and Stolypin's migrants descendants are characterized by the accelerated rate of physical development and high maturation rates of hand skeleton (0.4 years above the standard). In the Middle Asian region the highest maturation rates belong to the Turkmen urban school children from Chardzhev, the lowest maturation rate in this region is seen in the rural Tajik children from Varukh. Growth and maturation rates depend on various environmental factor: climatic, geographic and social. Differences of skeletal maturation in the observed groups may be interpreted in the context of maintaining (Khalkha-Mongols, Tuvinians, and Tajiks) or transformation (Turkmen, Chuvashs, Bashkirs, Altaians, Russians) of the traditional way of life. Social stress, connected with the military actions, caused the acceleration of maturation rates in the longevity group of the Abkhazians. Longevity populations were traditionally characterized by the low rates of growth and development (Abkhazians till 1991, Belorussians).

**Key words:** *skeletal age, TW-2, maturation rates, human ecology*

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### **CRANIOFACIAL GROWTH TRENDS IN THE FIRST YEAR OF LIFE BASED ON CT DATA**

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The first year of life is a crucial period of craniofacial growth during which most of the main individual and racial features of the facial skeleton are formed. But these important growth changes are still relatively poorly described due to bad preservation of skulls of children of this age in archeological skeletal samples, absence of this age cohort in X-ray longitudinal studies as well as rarity of appropriate CT data. Importantly, quantitative description of growth trends expressed as “normal values” of craniofacial measurements in 3D is lacking. In the present study more than one hundred CT scans of boys and girls of the first year of life were digitized to produce numerical values and growth curves for 30 linear measurements of the mid-face. The children are skeletally normal patients of several hospitals in Moscow, Kaluga and Lipetsk, most of the subjects are ethnically Russians. Slice thickness of the scans ranges from 0.3 to 1.5 mm. 40 landmarks were being placed on 3D surface reconstructions by the first author and their coordinates were further converted into linear distances between the landmarks. In order to construct growth curves the sample was divided into four age groups (newborns, 1-2 months, 3-6 months and 7-11 months) separately for each sex as to account for sexual dimorphism as well. Reliability of our data has been additionally confirmed by very good congruence of our results and those obtained previously on forensic material. The results numerically describe main ontogenetic trends of this period of ontogeny such as slow growth of the upper face in height and length compared to width, very rapid vertical orbital expansion, relatively subtle changes in nasal and mid-facial protrusion. But the study also provides more detailed picture of growth processes and interplay between different mid-facial structures.

**Key words:** *craniofacial growth, computed tomography, children*

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