

Secular changes in basic anthropometrical features of neonates and children in early childhood from Sofia

I. Yankova, Y. Zhecheva

Institute of Experimental Morphology, Pathology and Anthropology with Museum, Bulgarian Academy of Sciences

The aim is to analyze the changes in basic anthropometrical features of neonates and 3-6 years of age children from Sofia during XX century. Object of the study are 219 fullterm and healthy newborns investigated in 2001 and 640 preschool children investigated through 2004-2005. The secular changes in height, weight and head circumference are followed comparing our data with data from representative surveys conducted in 1907, 1960, 1970 and 1980/82. Data analyses of different generations' newborns and 3-6 year olds from Sofia in the XX century and early XXI century show periods of increase, abate or decrease of their growth. From early to mid twentieth century, stature, weight and head circumference in newborns changed slightly, and in preschool children stature and body weight increased significantly.

From 1960 to 1970 the anthropometric features of infants increased markedly. Next decade the acceleration changes subside, after that to the beginning of XXI century slow deceleration changes occurred.

Key words: secular changes, neonates, preschool children, stature, weight, head circumference

Introduction

Secular changes of somatometric and somatoscopic features in children are subject of many studies [1-4, 6-12]. These changes have fluctuating character and periods of acceleration, deceleration or even subsidence of the growth process are observed over the years [2]. Secular changes reflect the relationship between individual's genetic determination and environmental influences (socio-economic, environmental, geographic, etc.) in the realization of the human's physical shape [2, 6].

The first representative study of neonates, children, adolescents and adults in Bulgaria is conducted in 1907, followed by representative surveys in 1960, 1970 and 1980/82 [8, 11, 12, 13]. Surveys carried out in Sofia during 2001 of newborns and during 2004/05 of 3-6 years of age children provide the opportunity to assess the dynamics of secular changes over a period of nearly 100 years.

The aim of the study is to analyze the changes in basic anthropometrical features of neonates and 3-6 years of age children from Sofia during XX century.

Material and Methods

Object of the study are 219 fullterm and healthy newborns (110 boys and 109 girls) investigated through 2001, within 24 hours after birth, and 640 preschool children – 3-6 years of age (320 boys and 320 girls, evenly distributed into 4 age groups for both sexes separately) investigated through 2004-2005.

The secular changes in height, weight and head circumference are followed comparing our data with available data from representative surveys conducted in 1907, 1960, 1970 and 1980/82. The anthropometrical measurements were realized by Martin – Saller's classical methods [5].

Mathematical and statistical data processing are performed with SPSS 13.0. Statistically significant differences are established by Student's t-test in $P < 0.05$.

Results

Secular changes in stature (Fig. 1)

From 1907 to 1960, the stature of newborn boys and girls increased with 0.5 cm. In 70's of the XX century the newborns were about 2.0 cm longer than those born in 1960. In the next decade, however, the acceleration decrease, and during the period 1980-2001 deceleration changes are observed, as newborns are about 2.0-2.5 cm shorter.

A similar trend is observed in stature of 3-6-year-old boys and girls. In the first half of the twentieth century, their stature increased by 10.0-15.0 cm or 2.0-3.0 cm/decade. Since 1960 till 1970 the mean values of stature increased with 2.0 to 4.0 cm. In the next ten years it not changed and during the period 1980-2004, already reported negative secular changes.

Secular changes in weight (Fig. 2)

In the first half of the twentieth century body weight of neonates is not changed, and from 1960 to 1970 it increased with 0.500 kg. In preschool children the increase is

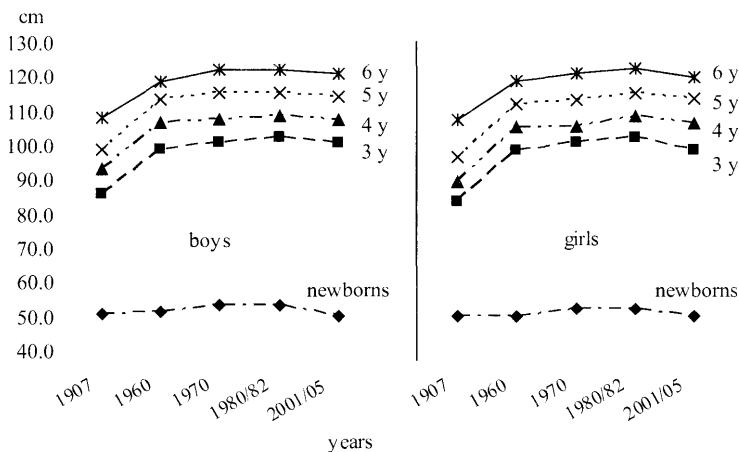


Fig. 1. Secular changes in stature of neonates and preschool children

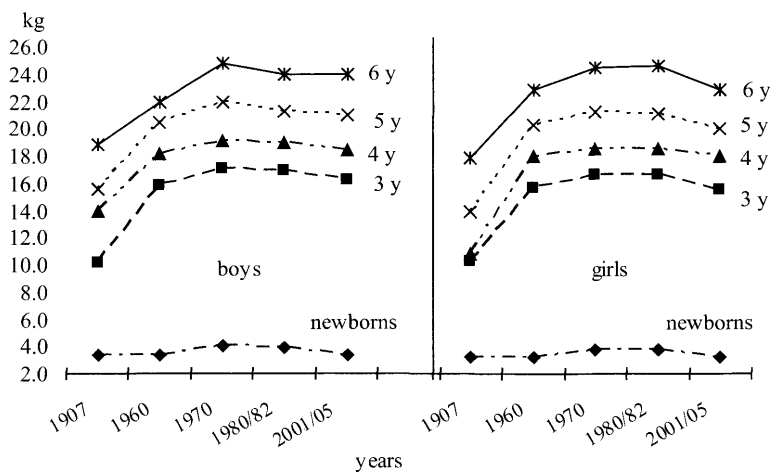


Fig. 2. Secular changes in body weight of neonates and preschool children

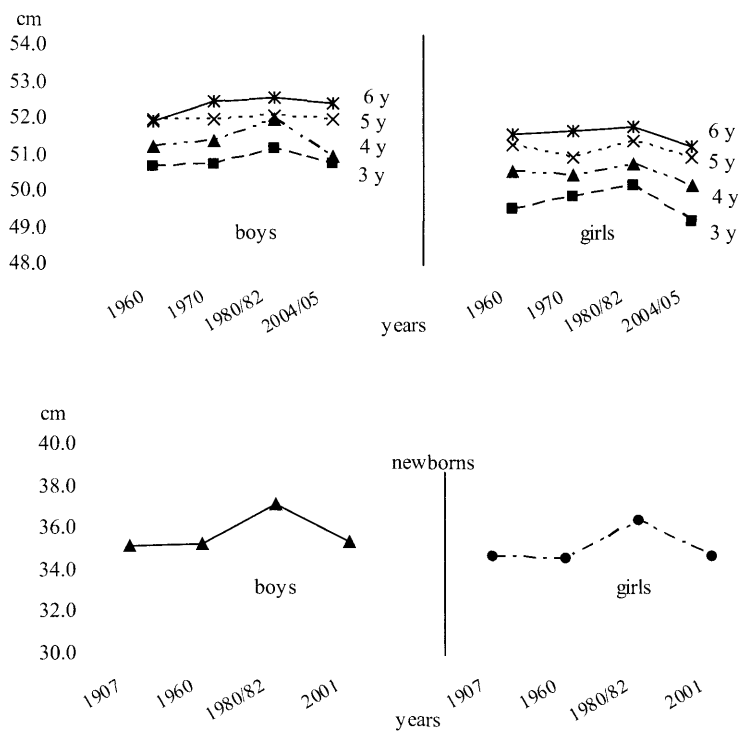


Fig. 3. Secular changes in head circumference of neonates and preschool children

about 1.000 kg/decade, as only in 6-year-old boys it reached to 3.000 kg during the period 1960-1970. After that the acceleration processes subside and begin deceleration changes which continued until 2005.

Secular changes in head circumference (Fig. 3)

Until 60's of the twentieth century the secular changes in head circumference of newborns are not established, and for 3-6-year-old children no data. During the next twenty-year period the head circumference of newborns increased with about 2.0 cm, and in preschool children slow secular changes are established. After that, to the beginning of the XXI century markedly deceleration occurred in almost all ages with the exception of 5 and 6 year old boys.

Discussion

Since early XX century to 70's stature, weight and head circumference of children increased. In the next decade the acceleration changes abate and to beginning of the XXI century negativ secular changes are ocured.

Investigating height, weight, head circumference and chest circumference of Bulgarian children from birth to 3 years, Dundova et al. [9] found significantly slower acceleration changes between 1970 and 1980 compared to the previous decade. They considered that in our country and in set of countries are observed subsidence of acceleration processes. The study of secular trend in weight and stature of newborns from Smolyan region also shows tendency to negative changes in the period 1975-1995. But in the last decade (1995 - 2008), a tendency toward positive secular changes in both measures is noticed, better expressed in newborn boys [10].

Secular trends in body dimensions of newborns and preschool children in various populations are contradictory [1, 2, 3, 4, 6, 7]. Many authors studied secular changes in different age groups of children and adolescents. They established similar trends, increases of stature and weight to the 70's or 80's of the XX century, after which the increase stops or appeared deceleration changes [2, 3, 4, 6, 7]. In Croatia, however, between 1983 and 2003 a positive secular trend in the birth weight of liveborn children is established [1].

Conclusions

The children in the early twenty-first century are shorter than their coevals in 1980. At the beginning of the XXI century the children have almost equal body weight with the generation peers in 1960.

Newborns and preschool children in the early XXI century have smaller head circumference compared with the generation twenty years ago.

References

1. Bralić, I., U. Rodin, J. Vrdoljak, D. Plavec, V. Čapkun. Secular birth weight changes in liveborn infants before, during, and after 1991-1995 homeland war in Croatia. – Croatian Medical Journal, Vol. 47, Issue 3, 2006, 452-458.
2. Falkner F, J. M. Tanner. Human Growth – 2nd Edition. Plenum Press, New York and London, 1987, 1-537.
3. Godina, E. Z. Some latest trends in the somatic development of Moscow schoolchildren. – In: Karel Hajniš (ed.): Growth and Ontogenetic Development in Man IV. – Charles University, Prague, 1994, 123-128.

4. Godina, E. Secular trends in some Russian populations. – *Anthrop. Anz.*, 68, 4, 2011, 367-377.
5. Martin, R., K. Saller. *Lehrbuch der Anthropologie in systematischer Darstellung.* – Bd. I. Stuttgart, Gustav Fisher Verlag, 1957, 322-324.
6. Bodzsár, E., C. Susanne. (eds): *Secular growth changes in Europe.* – Eötvös Univ. Press, Budapest, 1998, 5-381.
7. Vignerova J., P. Blaha, J. Kobzova et al. 2000. Growth and development of school children. – *Centr. Eur. J. Publ. Health*, 8 (3): 21-23.
8. Ватев С. Антропология на българите. София, 1939, 12-49.
9. Дундова, Р. Лонгитудинално проучване растежа на деца от 0 до 3 годишна възраст. – Дис. к.м.н., София., 1978.
10. Младенова, С., Ц. Ничева. Физическо развитие на новородените деца от Смолянски регион (1975-2008 г). – Сборник доклади от Юбилейна национална научна конференция с международно участие „Човекът и вселената“. 6-9.10.2011, Смолян, 432-437.
11. Слънчев, П., Б. Янев, Ф. Генев, П. Щерев, П. Боев, Д. Сепетлиев, Б. Захариев. Физическо развитие, физическа дееспособност и нервно-психическа реактивност на населението на България (1980-1982). – Национална спортна академия, София, 1992, 1-336.
12. Янев Б., П. Щерев, П. Боев, Р. Семерджиева, Д. Сепетлиев. Физическо развитие и дееспособност на населението в България от раждане до двадесет и шест години. – БАН, София, 1965, 31-44.
13. Янев Б., П. Щерев, П. Боев, Ф. Генев, Д. Сепетлиев, И. Попов, Б. Захариев. Физическо развитие, физическа дееспособност и нервно-психическа реактивност на населението. – Медицина и физкултура, София, 1982, 7-348.