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CHARACTERISTIC PARAMETERS OF HEAD MEASUREMENTS IN HUNGARIAN CHILDREN AGED 3-18 YEARS

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Abstract

The authors calculated the percentile curves of six head measurements and three head indices for Hungarian boys and girls from the data reported earlier (FARKAS and NYILAS, 1988).

Key words: percentile curves, head measurements, Hungarian boys and girls.

Introduction

Biological anthropology is a typically interdisciplinary science. It is necessary to stress the use of the adjective biological here for there are nowadays many types of anthropology. Besides the earlier philosophical, social and cultural forms of anthropology, for instance, we can currently also speak of instrumental anthropology and visual anthropology. Biological anthropology studies the biological feature of man.

Man is a biological and social creature. Accordingly, the anthropologist or human biologist who studies the biological features of man must collaborate with experts in many other branches of science in order to solve the problems that arise in the course of the research.

One branch of science that is particularly important from this respect is odontology. Throughout the history of Hungarian anthropology, during a period of more than a hundred years, there have been numerous cases when an anthropologist and an odontologist have worked together to solve some scientific problem. Such joint activity has been performed in part during investigations on findings originating from examinations on the living population.

The collaboration has always been close and fruitful between the Department of Anthropology at József Attila University and the Dental and Oral Surgical Clinic at Albert Szent-Györgyi Medical University in Szeged. This collaboration was initiated by Professors DEZSŐ HATTYASI and LAJOS BARTUCZ, was further developed by Professors KÁROLY TÓTH and PÁL LIPTÁK, and is continuing present. The effectiveness of this

joint work is illustrated by theses that have been written in connection with the award of a number of high level scientific degrees.

Background

The question may justifiable be posed of why cooperation yielding such useful result should develop between odontologists and anthropologists.

The physician nearly always deals with individual patients and only rarely has a possibility to examine many thousands of individuals from one particular aspect. If the odontologist wishes to study the variations in dental enamel, for example, it is scarcely possible to extract the healthy teeth of several hundred humans, examine them and replace them. In contrast, this does not constitute a problem as concerns material originating from excavations.

Anthropologists may observe a great number of things, but as they are biologists they do not possess adequate medical knowledge and hence may have difficulty in interpreting a given phenomenon. Good collaboration between odontologists and anthropologists, however may overcome such difficulties.

Thus, when the two institutions are denoted in the name of the conference "Tooth regulation and Anthropology", this is not by chance. It may be stated with confidence that the collaboration is based on a friendly and scientific connection dating back several decades, and we hope that it will continue to be productive in the future.

The work of the anthropologist is particularly useful, for instance, if he or she can construct tables based on many thousands of measured data relating to the development of children, and if these tables can be utilised in medical practice.

In this respect, a good connection has developed primarily with paediatricians. In the course of their everyday work, paediatricians already apply development tables serving for control of body growth, based on parameters relating to height, weight and chest measurements. This in itself is important, for in the not too distant past of Hungarian paediatricians and school doctors recommended and prescribed American developmental norms dating from the 1940s; since the American data relate to a quite different ethnic group, it is obvious that they could not have been appropriate from a Hungarian aspect.

However, there are few Hungarian data of a similar nature as concerns head measurements, and particularly face measurements (BALI, 1932; DEZSŐ, 1967; EIBEN, 1967; EIBEN and PANTÓ, 1984; RAJKAI, 1967); further, the articles that have been published mainly report the results of measurements of head parameters. This led us to prepare norm tables relating to some head measurements in children, similar to those utilised for the assessment of body development.

Material and method

This article emerged as a side product of an extensive compilation of data. During the period 1980-84, more than 32,000 girls were examined in a study involving puberty. Since the classes participating in that study were generally coeducational, the boys also took part in the investigation. Overall, in the different parts of the country, head measurements were made on a total 23,338 boys and girls aged 3-18 years. The parameters calculated from the data (mean, standard error and range) were reported earlier (FARKAS and NYILAS, 1988). On the basis of these data, development curves have now been prepared (Figs 1-18).

Results

The above mentioned development curves provide results that can be used in everyday practice.

We should like to draw attention to some conclusions that can be drawn from the parameters and the curves.

First, as concerns the nomenclature, the expression data collection originates from the incorrect, but frequently applied expression cross-section study. It is more correct to name this data collecting method data collection on one occasion. The essence is that measurements are made on children of various ages and of either sex at a given time. This allows the compilation of a large number of data within a short period. The method has the disadvantage that it does not permit an indication of the developmental trend exhibited by generations born in different years and hence growing up under different economic, ecological and social conditions, which may markedly influence the results. Thus it may arise, for instance, that, in the event of one measurement, the mean for a group of higher age will be less than that for the following age group, which is clearly impossible in repeated measurements on the same children. Accordingly, the development curves constructed from parameters originating from data collected on one occasion must be corrected if they are to reflect the growth trend. However, it is not certain that this correction will results in the true values for a given age group.

Another problem arises in the assessment of the tempo of growth in relation to head measurements. The ratio of head length for neonates is 1:4, whereas for adult it is 1:8. Hence, the head measurements change to a lesser extent than do the body measurements during extrauterine life. A connected point here is that the facial dimensions change more extensively before the emergence of the milk teeth and the permanent teeth. As concerns the facial measurements, it is difficult to delineate such clear cut and well-definable growth stages as in the cases of weight or height, for instance. A graphical plot of the annual increase therefore results in a rather sawtooth curve.

As a third problem, it may be mentioned that the absolute changes in head measurements are much smaller than those in the body dimensions. Accordingly, the difference between the means for two successive age groups is sometimes very slight. This makes practical application of the development values somewhat difficult.

The fourth question is one of viewpoint. In cases of probability calculation and of Gaussian curves, a question of principle arises on the basis of the correlation of the mean and the standard error. For an infinite number of data, it is known that 95% of the cases fall within the interval mean $\pm 1{,}96 \times$ standard error. In biological practice, this is referred to as the normal range. In this way, it is assumed that, for a large sample, 2,5% will automatically be classified as very small (underdeveloped), and 2,5% as very large (overdeveloped). In medical practice, percentiles are preferred in use. Accordingly, 3% of the population is regarded underdeveloped, and 3% as overdeveloped. This means that, at each end of the scale, there are 0,5% of the cases which are still considered to be normal according to the percentiles. This problem primarily arises in connection with growth curves, but it can be eliminated if the normal range is calculated from the formula mean $\pm 1{,}96 \times$ standard error on the basis of the mean and the standard error. In practice it is merely a technical question to decide whether, in a given case, the growth curve or the tabulated values should be taken as basis. Since the construction of the growth curve requires the previously mentioned correction, it is clear that, for an assessment of the actual situation, it is more correct to apply the tabulated data.

We give both forms and leave it to the judgement of the user to decide which to employ.

Our intention in mentioning the above questions was merely to point to some problems that occur in practical life as concerns anthropometric data.

At the same time, we hope that the reported tables and growth curves will be of assistance primarily to odontologists dealing with children as regards the solution of practical problems.

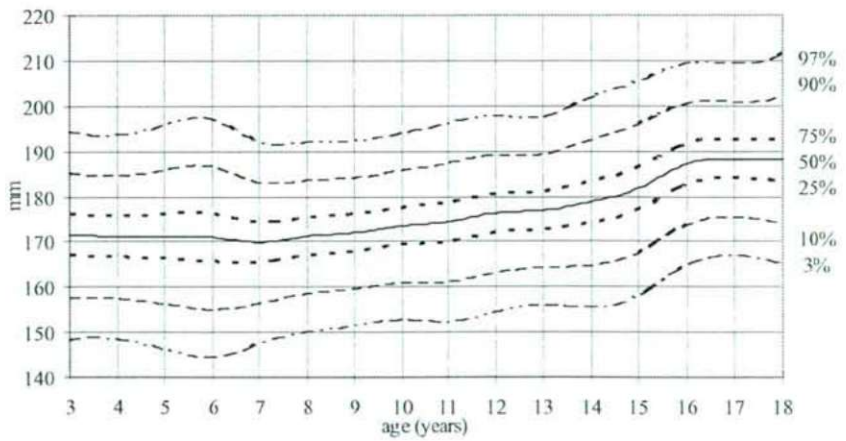

Fig. 1. Percentiles of boys' maximum head length (1)

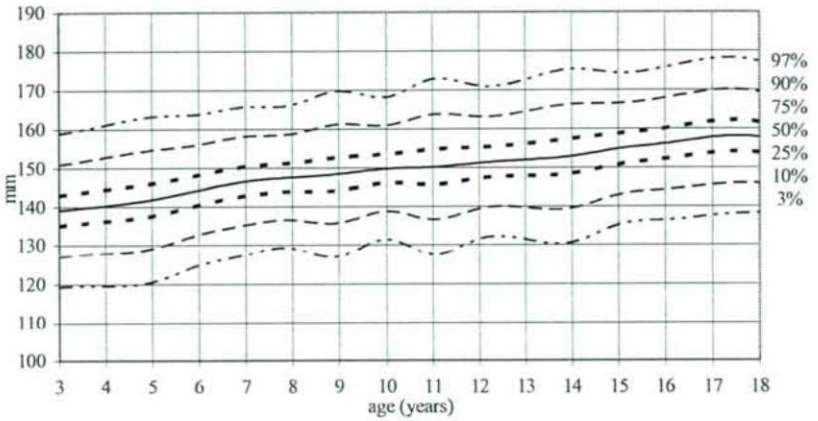

Fig. 2. Percentiles of boys' maximum head bredth (3)

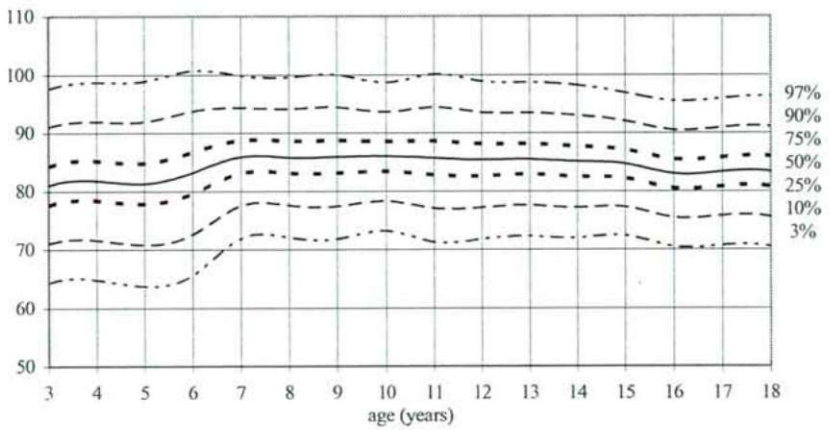

Fig. 3. Percentiles of boys' cephalic index (3:1)

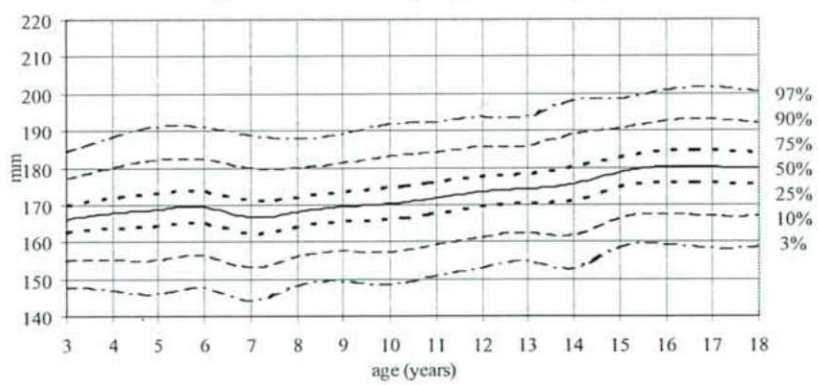

Fig. 4. Percentiles of girls' maximum head length (1)

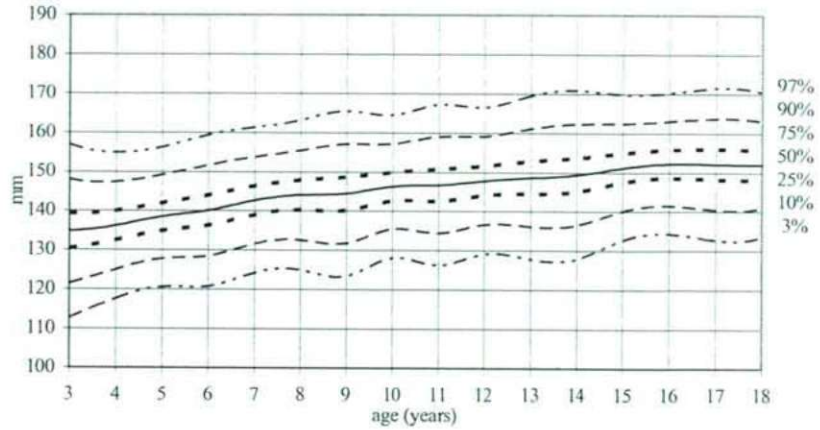

Fig. 5. Percentiles of girls' maximum head bredth (3)

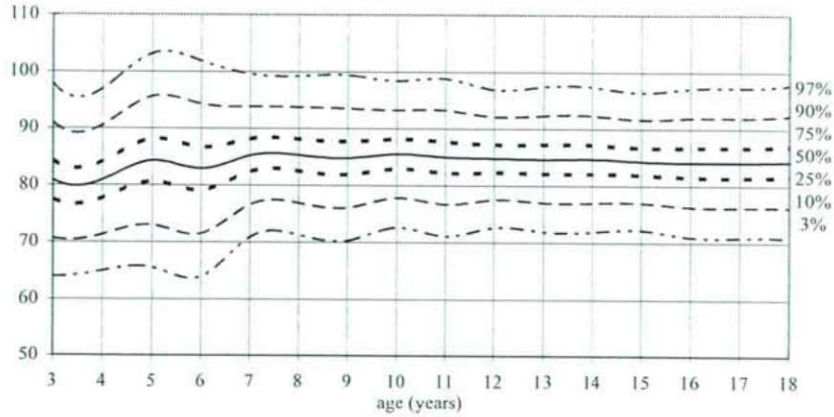

Fig. 6. Percentiles of girls' cephalic index (3:1)

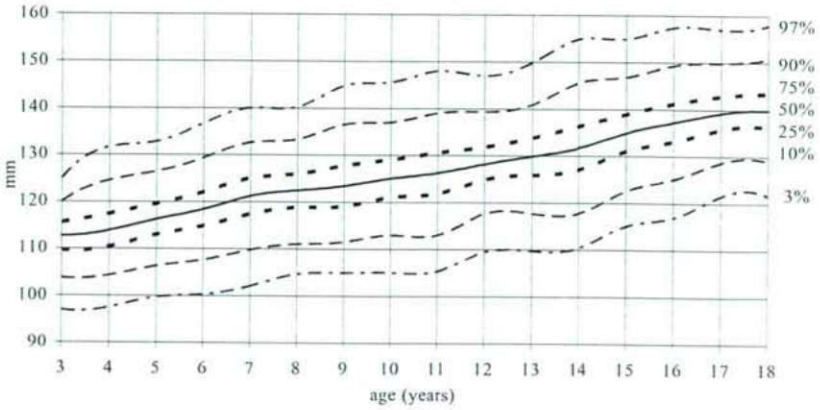

Fig. 7. Percentiles of boys' bizygomatic breadth (6)

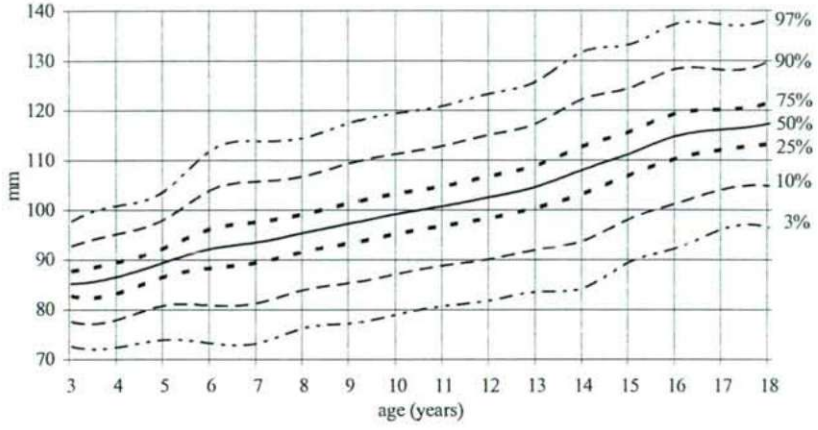

Fig. 8. Percentiles of boys' morphological facial height (18)

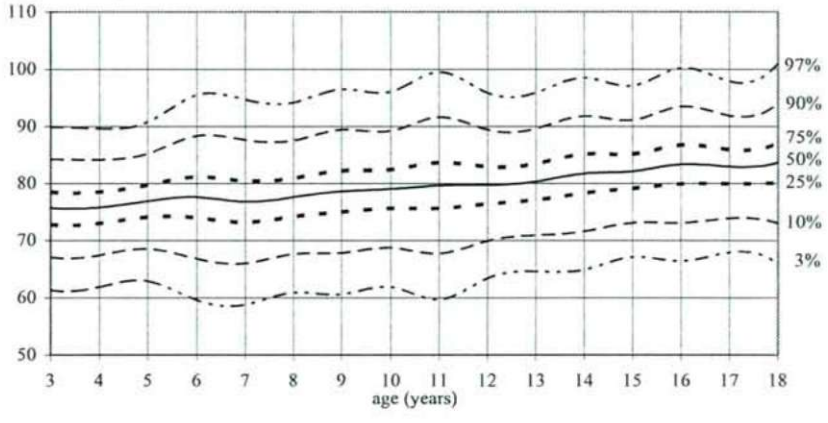

Fig. 9. Percentiles of boys' facial index (18:6)

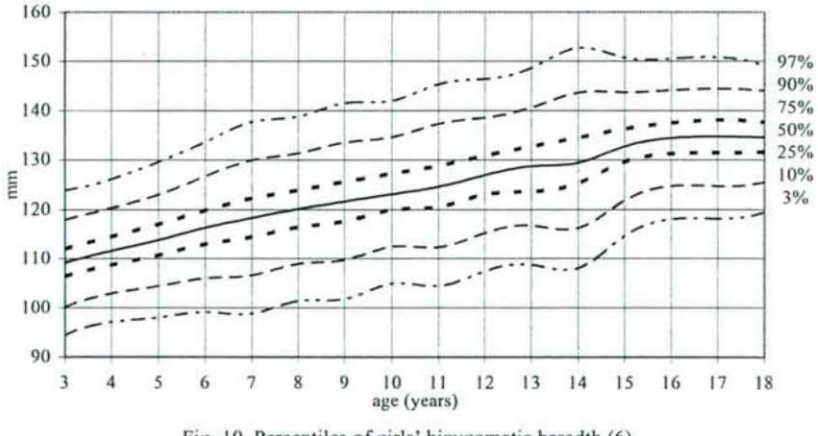

Fig. 10. Percentiles of girls' bizygomatic breadth (6)

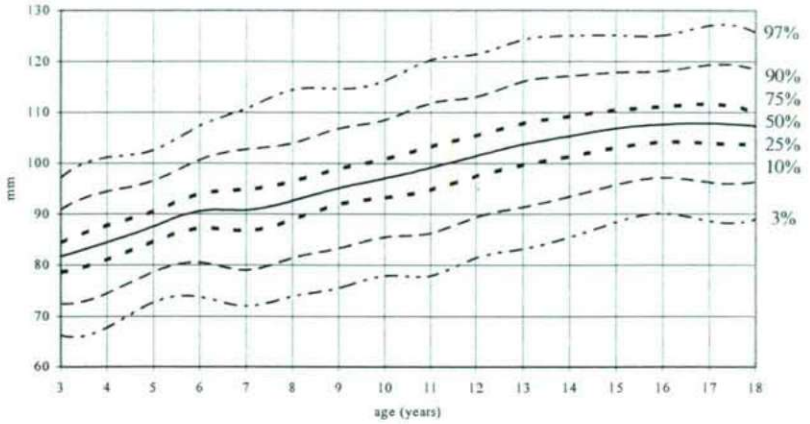

Fig. 11. Percentiles of girls' morphological facial height (18)

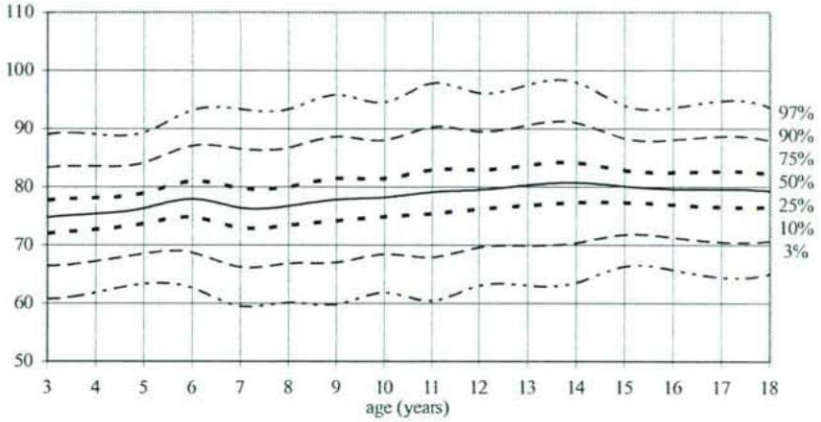

Fig. 12. Percentiles of girls' facial index (18:6)

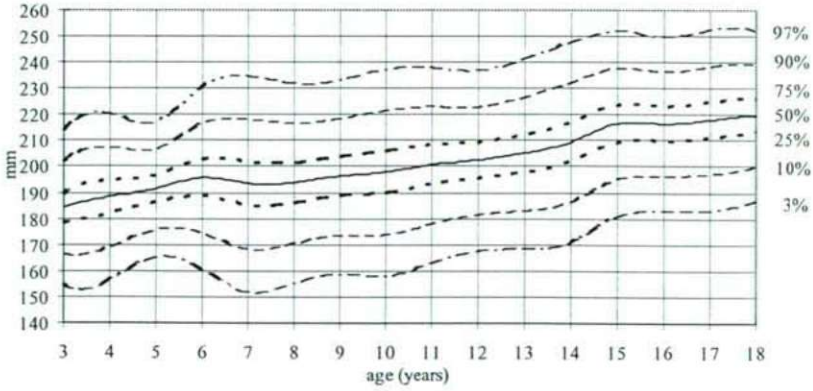

Fig. 13. Percentiles of boys' total head height (16)

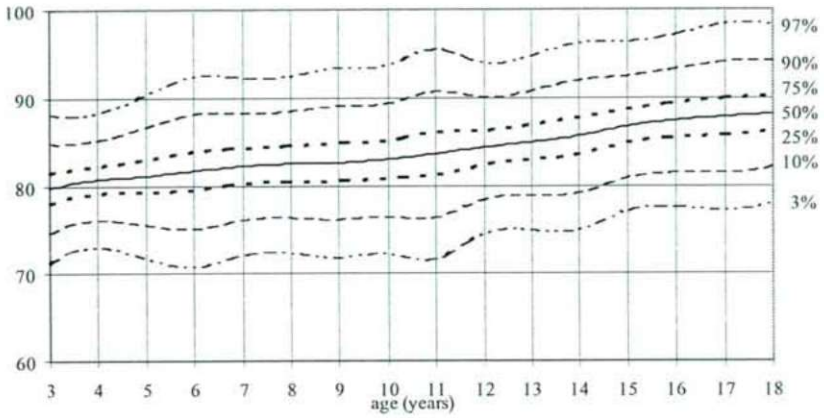

Fig. 14. Percentiles of boys' transverse cephalofacial index (6:3)

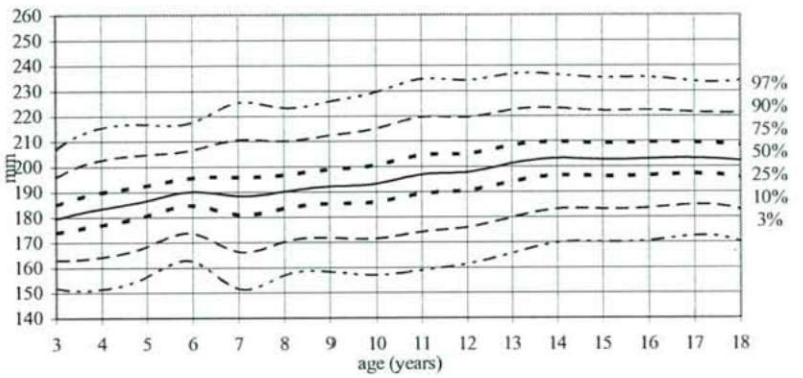

Fig. 15. Percentiles of girls' total head height (16)

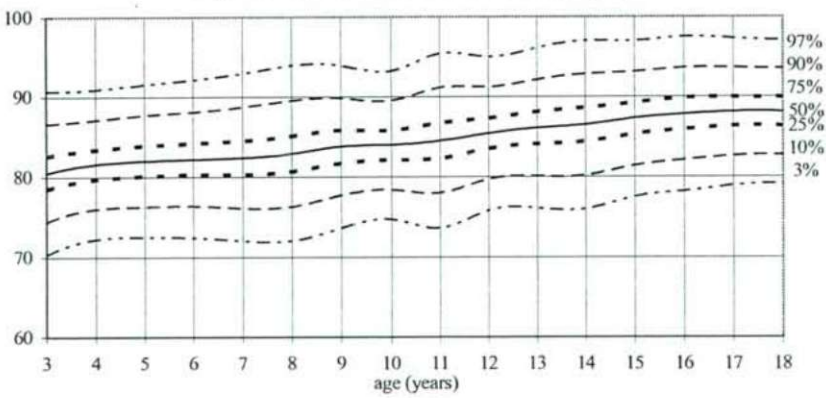

Fig. 16. Percentiles of girls' transverse cephalofacial index (6:3)

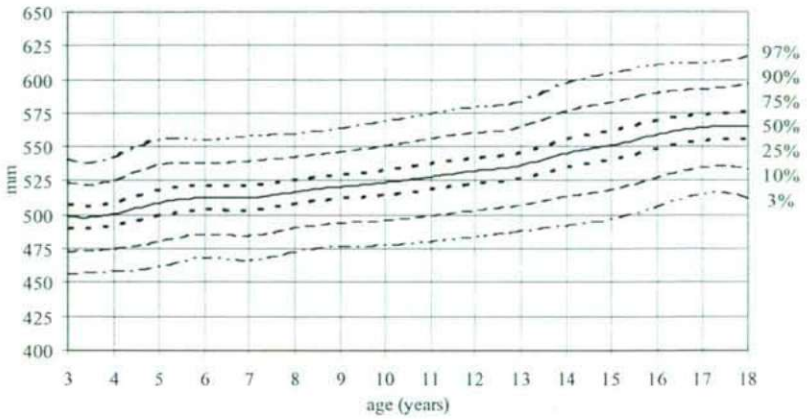

Fig. 17. Percentiles of boys' head circumference (45)

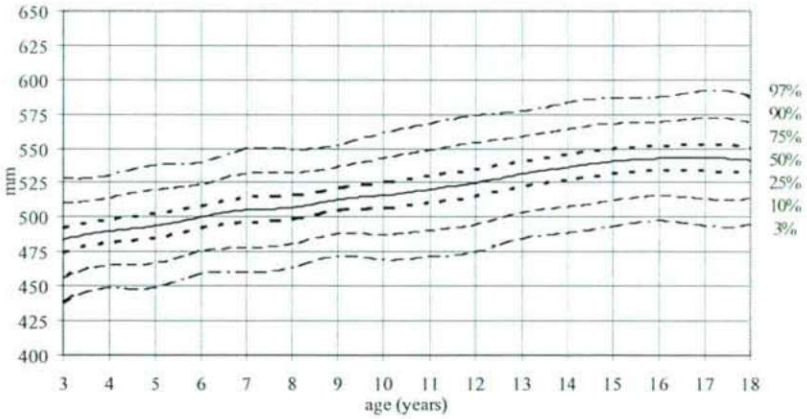

Fig. 18. Percentiles of girls' head circumference (45)

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