

**REFERENCE DATA OF TWO SKINFOLD THICKNESSES
(TRICEPS AND SUBSCAPULAR)
FOR BOYS AND GIRLS FROM BIRTH TO THE AGE OF SIX YEARS,
BASED ON A NATIONAL REPRESENTATIVE GROWTH STUDY**

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Abstract: Two types of skinfold thicknesses (triceps and subscapular) of 5675 Hungarian children (2993 boys and 2682 girls) were measured using Lange skinfold caliper at the age of 0–6 years in a national representative longitudinal research "Health and demographic growth study of pregnant women and infants".

Means, standard deviations and percentiles of skinfold thicknesses are determined at single ages. Average values of boys are compared to those of girls. From birth to 2 years there is no significant difference between the skinfold averages of the two sexes. Later at 3, 4, 5 and 6 years the average values of girls are significantly higher compared to the boys.

Key words: Triceps and subscapular thicknesses; AGA, SGA, LGA children.

Introduction

In Hungary the measurement of skinfold thickness became a widespread tool for determining the nutritional level of adults and children of various ages in the last decade (Eiben and Pantó 1987/88, Blatniczki et al. 1988). In our paper we intend to complete the public results of the cross-sectional research work with the skinfold reference values of infants and small children.

Materials and Methods

The measurement of skinfold thickness in children forms a part of the nation-wide longitudinal study "Health and demographic growth study of pregnant women and infants" currently in progress. Examinations carried out between birth and 6 years of age involved also triceps and subscapular skinfold thickness measurements made by Lange-type caliper.

For the elaboration of the reference values only data of children born with weights between 2500–4500 g and who did not have long-lasting disease influencing their growth and development 2993 boys, 2682 girls at birth; 2469 boys and 2197 girls at the age of 6 years have been used. The number of children according to the classification of newborn by birth weight and gestational age show the *Table 1*. In the first six months of life the measurements were performed in each month, until one year bimonthly once, then during the second year trimonthly; and between 2 and 6 years once a year.

Table 1. Number of children according to the classification of newborn by birth weight and gestational age

Group of children	At birth		At the age of 6 years	
	Boys	Girls	Boys	Girls
SGA	265	284	202	218
AGA	2452	2235	2006	1793
LGA	313	269	257	217

Results and Discussion

The results of the yearly measurements from birth to six years are shown in the figures 1–4, however, by the statistical calculations the values of the intermediate measurements were also taken into consideration.

The *percentile values* of triceps and subscapular skinfold thicknesses are approximately identical at birth. From the age of 1 year the differences are getting more and more striking. The 50th percentile of subscapular skinfold is by 3 mm less than the triceps skinfold (Fig. 1–4).

The *triceps skinfold* reference averages of boys and girls well demonstrate that the skinfold thickness found at birth doubled by the end of the first year of age. Thereafter, until the age of 6 years, no such drastic changes take place. With the girls some increase, while with the boys a decrease in the skinfold can be observed. From birth to 2 years there is no significant difference between the skinfold averages of the two sexes. However, later at 3, 4, 5 and 6 years the average values of boys and girls differ strongly significantly (Fig. 5).

The *subscapular skinfold* thickness averages increase only with 75% by 1 year. Later, the skinfold thickness averages of girls decrease in smaller degree compared to those of the boys. By 2 years of age these averages are significantly higher in girls than in boys. At 3, 4, 5 and 6 years of age the difference of average values is highly significant (Fig. 6).

Furtheron we investigated how the birth weight does influence the difference of the average values of males and females. As it is known the Small for Gestational Age (SGA), Appropriate for Gestational Age (AGA), and Large for Gestational Age (LGA) groups have been formed considering the 10th and 90th percentile limit values of birth weight by gestational age (Battaglia and Lubchenco 1967, Joubert 1983).

The triceps and subscapular averages of AGA newborns well demonstrate that the decline of the curves is nearly identical with that of the reference averages curves. According to this, the yearly averages of triceps skinfold values of the two sexes differ highly significantly at 3, 4, 5 and 6 years, while those of subscapular values have a strongly significant difference already in the 2nd year of life (Fig. 7).

In the SGA group of newborns the average triceps values of boys at one year show significant difference. With the advance of years their averages decrease, while those of the girls increase, by the age of 5 and 6 years the difference becomes significant (Fig. 8). Both in males and females the subscapular averages show a sinking tendency – in boys a stronger one – after one year. This difference proves to be significant at the age of 3 years, later it becomes strongly significant.

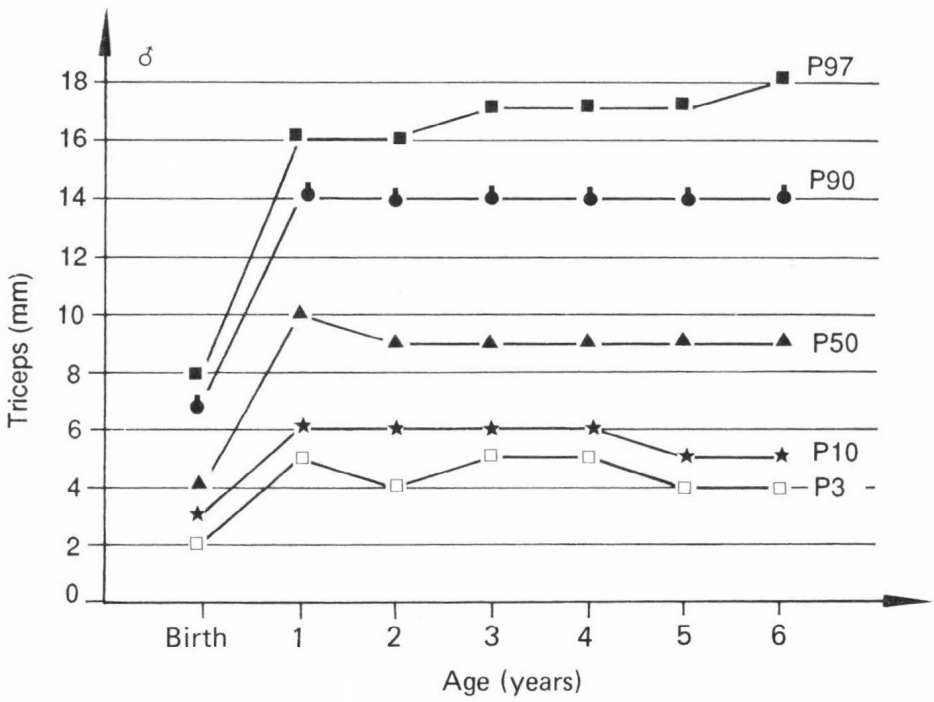


Fig. 1: Percentiles for triceps skinfold thickness of boys

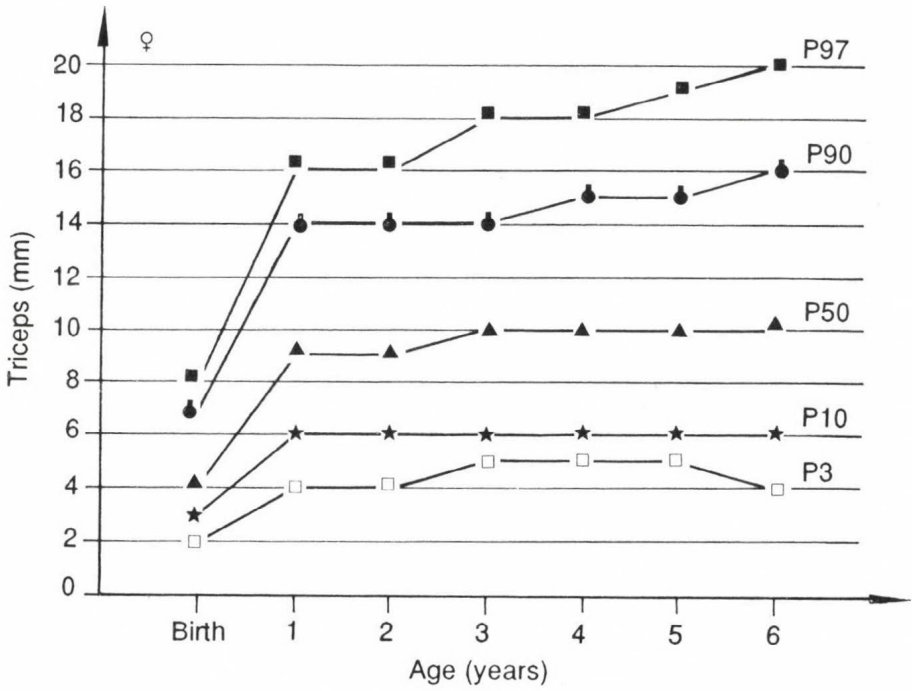


Fig. 2: Percentiles for triceps skinfold thickness of girls

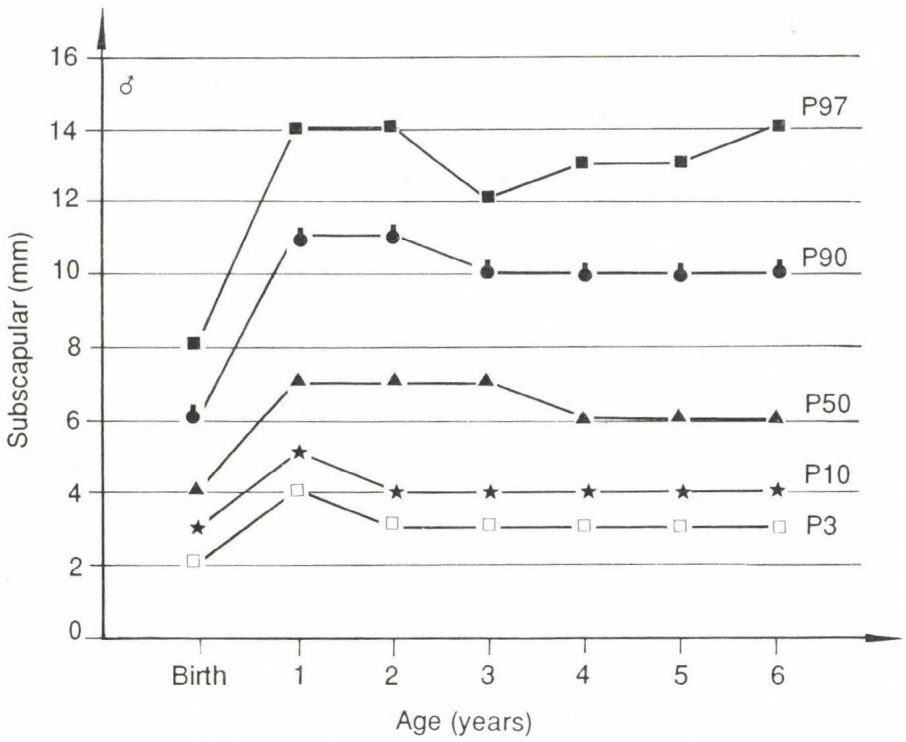


Fig. 3: Percentiles for subscapular skinfold thickness of boys

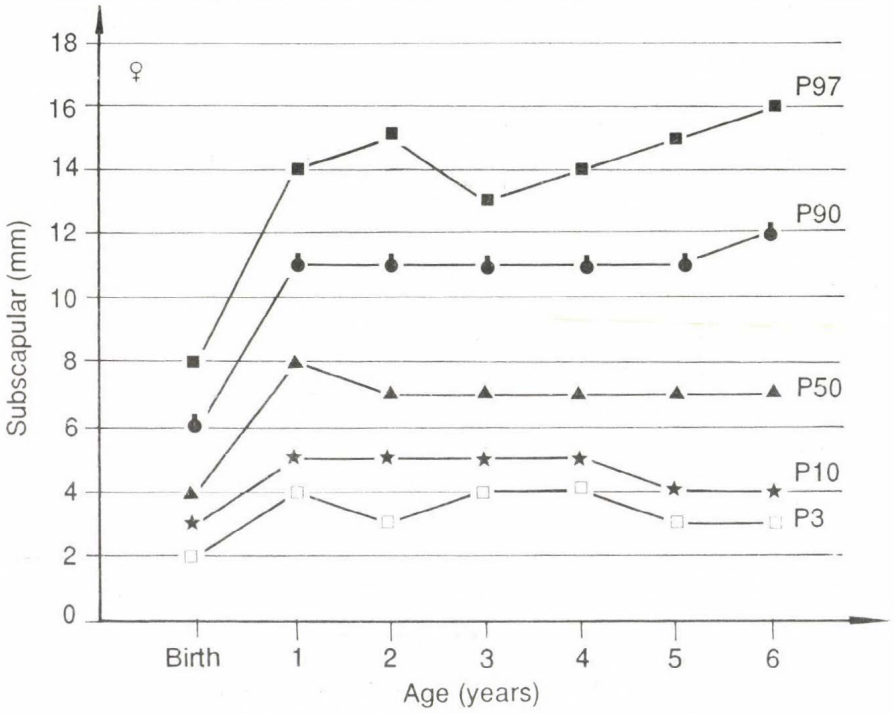


Fig. 4: Percentiles for subscapular skinfold thickness of girls

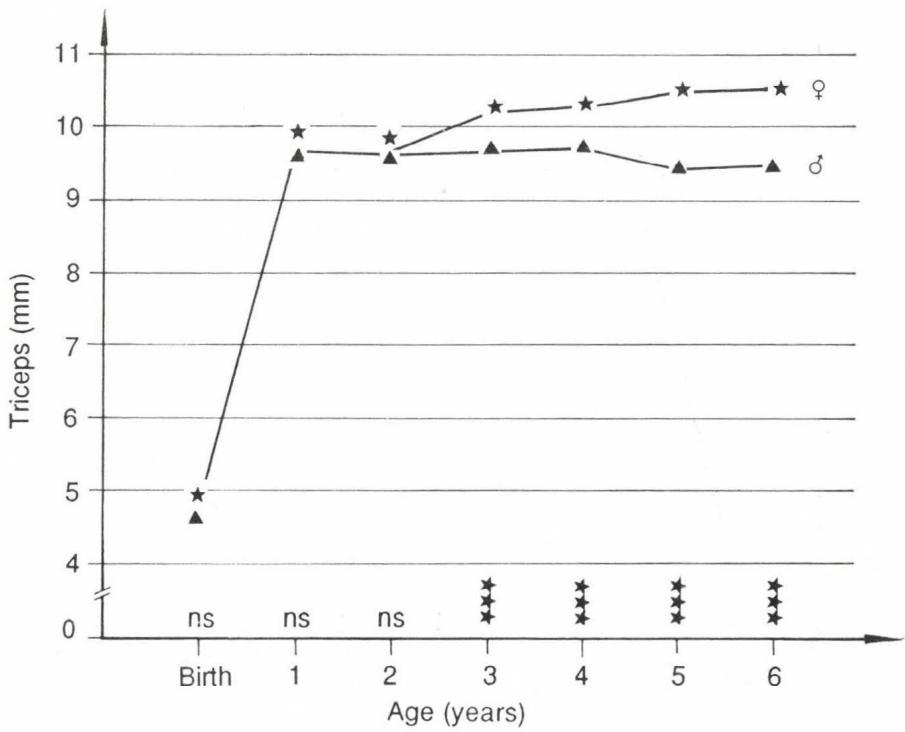


Fig. 5: Triceps skinfold thickness of boys and girls
 (* P < 0.05; ** P < 0.01; *** P < 0.001; n. s. = not significant)

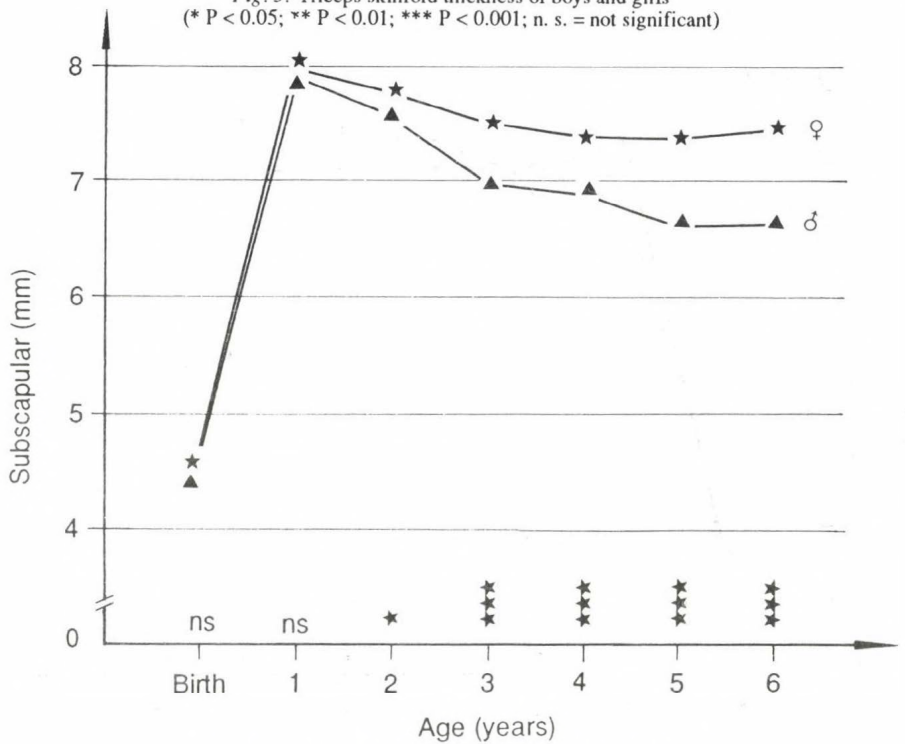


Fig. 6: Subscapular skinfold thickness of boys and girls
 (* P < 0.05; ** P < 0.01; *** P < 0.001; n. s. = not significant)

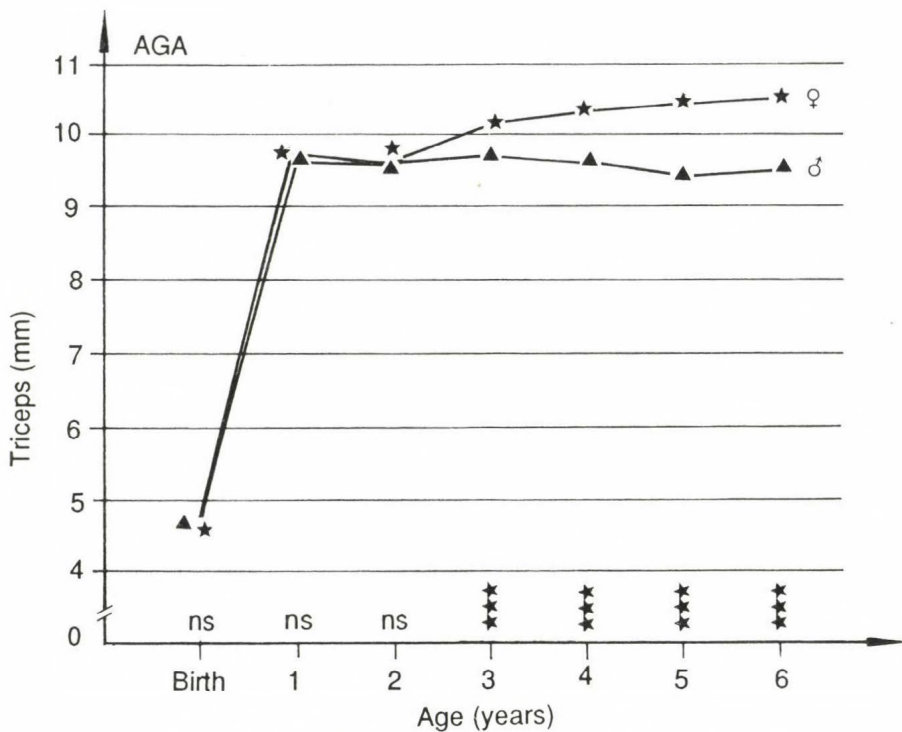


Fig. 7: Boys' and girls' triceps skinfold thickness in AGA group (* P < 0.05; ** P < 0.01; *** P < 0.001; n. s. = not significant)

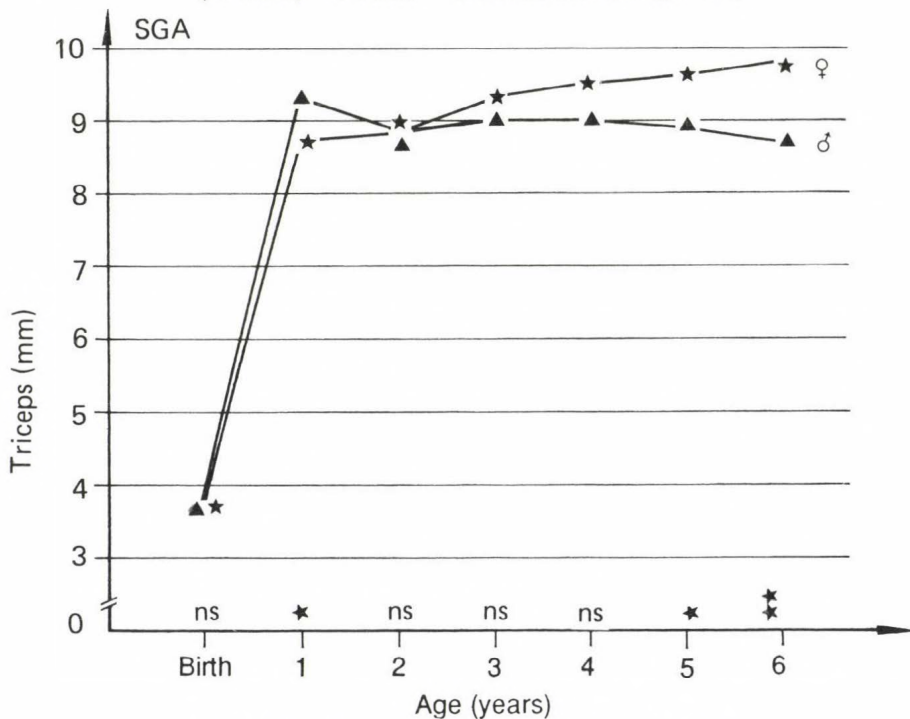


Fig. 8: Boys' and girls' triceps skinfold thickness in SGA group (* P < 0.05; ** P < 0.01; *** P < 0.001; n. s. = not significant)

In the LGA group a similar tendency can be experienced, both the triceps and subscapular averages of males compared to females exhibit a significant difference beginning from 4 years of age.

We presented the first Hungarian triceps and subscapular reference percentiles from birth to the age of 6 years. We stated that from 3 years both the triceps and subscapula averages are strongly significantly higher in girls than in boys.

Investigating the difference of skinfold thicknesses by the birth weight groups, it can also be stated that the girls' averages between the ages of 3 and 6 years are significantly higher compared to the boys.

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