Longitudinal Study of Blood Pressure in School Children in Zürich

E. P. Leumann, H. G. Bodmer, W. Vetter, F. H. Epstein

Kinderklinik, Dept. für Innere Medizin und Inst. für Sozial- und Präventivmedizin der Universität Zürich und Schulärztlicher Dienst der Stadt Zürich

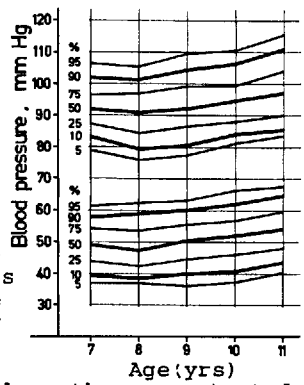
In 1977, a longitudinal study of blood pressure (BP) was initiated in Zurich to examine:

1) Correlations between BP and various variables,
2) Tracking of BP during a period of 5 yrs,
3) Influence of puberty on BP, and
4) Familial aggregation of BP.

Data collected in 1977 and 1978 concerning the first two goals (above) will be presented.

Methods: BP measurements were obtained at school in 1636 children (ages 7-11 yrs). 308 12-year-old children were rescreened one year later by one of the two nurses already engaged in the first examination. Methods used were mostly adopted from the Westland Study (1): seated position, left arm, largest cuff to easily fit the upper arm (10 cm and 12 cm wide). Random-zero-sphygmomanometers were used in order to reduce observer bias. Systolic (SBP) and diastolic II pressures (DBP) were measured, and the mean of two readings (1st/2nd or 3rd/4th) was used.

Results and Comments: Values of BP for boys are shown in Fig. 1 as percentiles. These values were remarkably low (mean SBP $\leq$ 98 mm Hg, mean DBP $\leq$ 55). No sex difference was observed. Highest readings were 140 (SBP) and 95 (DBP) in two 11-year-old children. Similarly low values have been obtained by the Westland Study (1) and by Spahr et al. at Sion (personal communication), who used the same protocol as the present study.



SBP in children 7-11 yrs of age correlated best with DBP and weight and, in decreasing order, with height, arm circumference, age and triceps skinfold thickness (Table 1). Correlations were higher in girls than in boys and better for SBP than for DBP.

Table 1. Correlations of SBP with Selected Variables

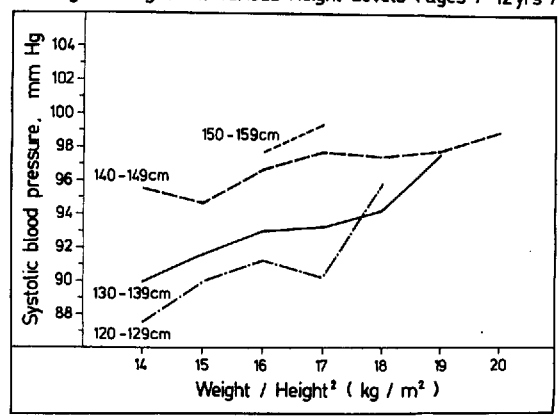
	Boys (n=805)	Girls (n=770)
Diastolic II r=	0.53	0.56
Weight	0.38	0.45
Height	0.32	0.39
Age	0.28	0.32
Skinfold Triceps	0.24	0.26

In children of similar height (grouped according to height at intervals of 10 cm), SBP correlated strongly with weight (Table 2) and the Quetelet index (weight/height^2, Fig. 2), weakly with triceps skinfold thickness, but not with age. Similar results have been observed at the Bogalusa Heart Study (2).

Table 2. Correlation between SBP and Weight at Various Height Levels

Height (cm)	n	r	
120-129	374	0.20	
130-139	572	0.25	$p < 0.001$
140-149	416	0.22	
150-159	127	0.39	

Fig. 2 Systolic Blood Pressure vs Weight / Height^2 at Various Height Levels (ages 7-12 yrs)



Tracking of BP: There was a highly significant correlation between BP measured in 1977 and BP recorded in 1978 (r = 0.52 for SBP and r = 0.37 for DBP). Similar tracking correlations have been observed at the Muscatine Study (3) in 11-year-old children measured two years apart (r = 0.45 for SBP and r = 0.26 for DBP).

Summary and Conclusions:

1) Height, weight and body mass are strong determinants of BP in children. In children of same height, there is no correlation between BP and age. In contrast, BP correlates strongly with both weight and body mass, but only weakly with triceps skinfold thickness.
2) Tracking of BP is detectable in childhood.
3) Severe elevation of BP in childhood is rare and screening studies for detection of hypertension are not warranted.

References

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(3) CLARKE, W. R. et al.: Tracking of blood lipids and blood pressures in school age children: the Muscatine study. Circulation 58, 626 (1978).

Address of first author: Ernst LEUMANN, M. D., Univ.-Kinderklinik, Steinwiesstrasse 75, CH-8032 Zürich, Switzerland.