

## Regional Differences in the Reference Blood Pressure in Young Indians

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*This study compares the blood pressure (BP) in young population of North India and South India. Age, height and sex specific BP was estimated for 6320 North Indian subjects aged 7-18 years and compared with BP values of South Indian subjects. North Indian boys and girls had lower diastolic BP (DBP) with no difference in systolic BP (SBP) than South Indian boys and girls between 7-12 years. Between 13-18 years North Indian boys and girls had significantly higher SBP with no difference in DBP. The significant regional differences in BP distribution among young Indians suggest considering geographic location of the population in evaluating blood pressure.*

**Key words:** Blood pressure, India, Young..

While Indians may have an enhanced inherent or genetic risk of coronary artery disease, South Indians seems to have higher risk compared to North Indians(1). Increased prevalence of hypertension in both South Indian men and women compared to other regions of the country have been noted (2,3). The regional differences that exist might be because of difference in the multiple risk factors associated with high blood pressure, including the childhood blood pressure itself (3-5). There is no data examining the distribution and the differences in blood pressure (BP) between young Indian populations. The objective of this study was to compare age, sex and height specific BP in children and adolescents of North and South India.

### Subjects and Methods

The subjects included in this study were school/college going children and adolescents of Allahabad located in North India. The study population consisted of a total of 7135 from North of which 6320 considered as reference sample after excluding undernourished (n = 347) and obese (n = 353) subjects. The subjects were examined as a part of comprehensive child care program conducted by MLN Medical College, Allahabad, in serial class wise, from 16 schools scattered all over the cities including the students from all the sections of the

society during the period between June 2001-May 2002. The parameters height, weight and blood pressure were measured using standardised methods as explained previously(6).

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) at specific height percentiles were estimated using regression model which has been described in detail by Krishna, *et al.*(6). The regression coefficients alpha (intercept) and beta (slope) values of the North Indian subject were computed separately by age and sex and then compared with the values obtained in South Indian age and sex matched subjects which was developed earlier. Separate analyses were performed for systolic and diastolic blood pressure. The effect of height on SBP and DBP was analysed. The intercept explains the age specific value of BP at given age year without the influence of height and the slope explains the effect of normalized height on BP. The comparison of intercept and slope between North and South Indian subjects was carried out by F test of general linear model using PROC GLM of SAS 9.1.  $P \leq 0.05$  was considered as statistically significant.

### Results

The SBP values for a given age was not

### What this Study Adds

- Regional differences in blood pressure distribution exist among healthy young individuals of North and South India.

significantly different among boys and girls of North and South India between 7-12 years but 13 year onwards North Indian boys and girls had significantly higher SBP ( $P < 0.0001$ ). The DBP level at given age year, when compared among North and South Indian boys and girls significant difference was observed between 7-13 years with South Indians having higher values. No difference was observed in DBP during 14-18 years.

The age specific BP tends to rise progressively throughout the childhood. The increase over the age range of 7-18 was more for North Indian than South Indians boys (22 vs 16 mm Hg SBP, 16 vs 9 mmHg DBP) and among North Indian girls and South Indian girls was 20 mm Hg vs 18 mm Hg in SBP and 17 vs 7 mm Hg DBP, respectively.

To understand the effect of height over the age years on BP the mean slope values were calculated. On comparing the effect of normalized height (slope) on SBP and DBP between North and South Indian boys as well as girls, no significant difference was observed.

### Discussion

This study shows the significant differences in blood pressure distribution among healthy young individuals of North and South India. Age contributes significantly to the variance in blood pressure in these populations. South Indian boys and girls had higher values of DBP during early childhood (between 7-12 years) and North Indian boys and girls had high SBP during their adolescence (13-18 yrs). Although the boys and girls from South India had significantly lower heights, there was no difference in BP was found after normalizing the height. The present study suggests that factors other than height may have a role in the North-South difference in BP distribution. This difference of BP that exists during adolescence may be related to body size, stature as the North Indian boys and girls were heavier and taller than South Indians.

A direct association of BMI with BP has been reported both in adults and children(7,8). This then do not account for higher values of DBP among South Indian children who are shorter and having less weight than those of North Indian population during early life. The similar regional difference of blood pressure values has been observed in adults with south Indian men and women having high prevalence of hypertension and high mean BP values than north Indian men and women(1,2,4).

Geographic location may account for the difference in distribution of BP. Regional difference exists in the BP among pediatric and adult population from various geographic areas of the world, China and US(9-11).

These results suggest that in addition to age, other determinants of blood pressure such as the geographic location of the population to be considered in evaluating BP levels in young. The regional differences in data are interesting especially the changing blood pressure as the child grows.

Socio-economic circumstances and related environmental exposures during childhood and even before birth, variation in time spent on physical activity by young and difference in other life risk factors may have contributed to difference in BP (12-14) which we have not studied, needs consideration.

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