The Cross Sectional Study of Anthropometric Parameters in Young Healthy Individuals having Parental History of Hypertension

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ABSTRACT

Backgound: The adverse association of cardiovascular risk factors in both children and adults with parental history of disease is well recognized. A family history of hypertension has been shown to be a risk factor for the subsequent development of disease. This study is aimed to compare any observed differences in the mean BPs, BMI, Hip waist ratio in children of hypertensive and normotensive parents. **Methodology:** A cross sectional study was conducted among the 100 students of faculty of medicine of a University. Blood pressure and anthropometric measurements were taken. **Results:** Among the 100 participants studied, 63% were male and the average age was 19.76 years (SD ±2.01) with a median of 20 years, varying from 18 to 24 years. The mean systolic blood pressure in males with history of hypertensive parents was 131.7 ± 13.5 as against 121.2 ± 10.1 in females with history of hypertensive parents. The difference was statistically significant ($p < 0.002$). The mean diastolic blood pressure was also significantly higher in males with history of hypertensive parents than females with history of hypertensive parents (86.2 ± 11.3 in males versus 78.7 ± 10.3 in females). The BMI positive correlation with systolic blood pressure (SBP) and diastolic blood pressure (DBP) was found. **Conclusion:** The findings of the present study suggest the need of monitoring the BP of children of hypertensive parents. Health care providers, therefore have an important role to play in educating families and children about approaches that are useful in preventing hypertension.

Key words: Waist-hip Ratio; BMI; Hypertension; hypertensive parents

INTRODUCTION

Hypertension is estimated to cause 4.5% of current global disease burden and is as prevalent in many developing countries, as in the developed world. Blood pressure-induced cardiovascular risk rises continuously across the whole blood pressure range. Indeed, hypertension accounts for more than 5.8% of total deaths, 1.9% of years of life lost and 1.4% disability adjusted life years all over the world. These figures are more dramatic in the formerly socialist economies countries.[1]

Hypertension is a chronic condition of concern due to its role in the causation of Coronary Heart Disease, stroke and other vascular complications. Increasing trend of hypertension is a worldwide phenomenon.[2] Essential hypertension, a major risk factor for cardiovascular disease (CVD), is prevalent in the adult population.[3,4] Hypertension is the most often prevalent atherosclerosis risk factor in families.[5] It is the commonest cardiovascular disorder, posing a major public health challenge to population and socio-economic and epidemiological transition. It is one of the major risk factors for cardiovascular mortality, which accounts for 20–50 percent of adult deaths.

The adverse association of cardiovascular risk factors in both children and adults with parental history of disease

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is well recognized.[6,7] A family history of cardiovascular disease (CVD) has been shown to be a risk factor for the subsequent development of disease. Familial aggregation has been shown to occur for hypertension,[8] myocardial infarction,[9] diabetes,[10] and obesity.[11] In fact hypertension in adults may be preceded by high blood pressure values in childhood.[12] Children with positive family history of cardiovascular diseases have significantly higher body mass index.[13]

Obesity is a common phenomenon occurring in the young adults of today. Obese persons are approximately 6 times as likely to develop heart disease as normal weighted persons.

Overweight and obesity is known to be a significant risk factor for hypertension. The World Health Report, 2002 "Reducing Risks, Promoting Healthy Life" has identified obesity as one of the ten leading risk factors, globally.[14]

Essential Hypertension is much more common in obese individuals. George Smith has also confirmed positive association of weight and Blood Pressure.[15] Further, it is confirmed that change in the Body Mass Index (BMI) from higher range to lower side is associated with decreased cardiovascular risk.[16]

The waist-hip ratio is used as an indicator of body-fat distribution. The waist–hip ratio is the preferred measure of obesity for predicting cardiovascular disease, with more universal application in individuals and population groups of different body builds. Benchmark studies of waist–hip ratio as dominant cardiovascular risk factors were reported in Swedish men and women in 1984.[17]

The present study was conducted to compare any observed differences can be explained in the mean BPs, BMI, Hip waist ratio in young adult of hypertensive and normotensive parents. The study aimed to measure the anthropometric parameters of young healthy adults having parental history of Hypertension and to correlate the anthropometric parameters of these individuals with those of the young healthy individuals who do not have parental history of Hypertension.

METHODOLOGY

Study Setting

This is a study conducted in Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital (A.V.B.R.H.), a 909 bedded tertiary teaching hospital of Datta Meghe Institute of Medical Sciences University (NAAC Accredited Grade A).

Study design

This was a cross sectional study conducted in tertiary care rural hospital, a rural area of Wardha District.

Institutional Ethical Committee

Study protocol was submitted to the institutional ethical committee. After thorough review it was approved by the institutional ethical committee.

Participants and Sample size

The participants were the students from Jawaharlal Nehru Medical College of Datta Meghe Institute of Medical Sciences University.

All the students were contacted and self reported parental history regarding hypertension was taken. The list was finalized, of where the parental history of hypertension was there or not. Randomly 50 cases each of both the groups having parental history of hypertension and those whose having no history hypertension was selected. If the consent was not given, or was excluded because of any reason, other participant was included randomly from the list. Thus, 100 students were divided into two groups. 50 students will be chosen with History of Parental Hypertension who will constitute as the one group. 50 students with no Parental History of Hypertension will constitute the other group. The participants were approximately equally distributed across age (18–24), sex, and education

Data collection tools and variables

Data was collected by the pre-tested structured interview questionnaire. An interview had questions related to past history of Hypertension, past admissions for cardiovascular diseases and past treatment for cardio active drugs like antihypertensive, antilipidemic, etc and steroid. A personal history of smoking or other addictions and diet habits, parental history of hypertension was recorded. A detailed clinical examination was be carried out by the trained evaluator – intrarater relaibiility was found to be high. The anthropometric parameters measured in the study were height in cm, Weight in kg, skin fold thickness, body mass index, waist hip ratio.

Blood pressure was measured as per the WHO guidelines. Blood pressure was measured as per the WHO guidelines.[18] The classification of hypertension was taken as defined by WHO/ISH in 1999.[18] Body weight was measured (to the nearest 0.5 kg) with the

subject standing motionless on the weighing scale, and with the weight distributed equally on each leg. Height was measured (to the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale and with the head positioned so that the top of the external auditory meatus was level with the inferior margin of the bony orbit (Frankfurt's plane). The body mass index, or BMI (weight in kilograms divided by the square of the height in meters), is recommended by the World Health Organization as the most useful epidemiological measure of obesity. It is however a crude index that does not take into account the distribution of body fat, resulting in variability in different individuals and populations. WHO criteria were used for classification of the BMI. Waist Circumference was measured at the narrowest level and hip circumference was measured at the maximal level over light clothing, using a non-stretchable measuring tape, without any pressure to the body surface, and both were recorded to the nearest 0.1 cm. As the measurements were taken over light clothing, participants were asked to remove tight or loose garments and belts intended to alter the shape of the body, and the person performing the measurement inspected the tension of the tape on the subject's body to ensure that it had the proper tension (not too loose or too tight). The narrowest waist is easy to identify in most subjects. However, for some subjects there is no single narrowest waist because of either a large amount of abdominal fat or extreme thinness. In the present study, when the narrowest point of waist was difficult to identify (particularly in obese subjects), we measured waist circumference immediately below the end of the lowest rib, because in most subjects the narrowest waist is at the lowest rib. WHR was calculated as WC divided by hip circumference. To reduce subjective error all measurements were taken by the same person. The cut-off used for the waist-hip ratio (WHR) for males was 0.9 and for females it was 0.8 to define obesity.[19]

Triceps, subscapular, and suprailiac skinfold thicknesses were measured in duplicate using a Harpenden caliper. Participants with skinfolds too large to be accurately measured by the calipers (>50 mm) were assigned a skinfold thickness value of 50 mm.

No incentives in cash were given. Only referral health services were provided to those who were in need of them.

Inclusion Criteria

All apparently healthy students of Faculty of Medicine of Datta Meghe Institute of Medical Sciences University, Wardha. Age group between 18–24 years of both sexes.

Exclusion Criteria

History of taking Cardio active drugs like antihypertensive, antilipidemic, etc, Students who leave the examination midway due to any reason.

Predictor variables

Past history of cardiovascular diseases like hypertension and past treatment for cardio active drugs like antihypertensive, antilipidemic, etc and steroid. A personal history of smoking or other addictions and diet habits, parental history of hypertension. The anthropometric parameters measured in the study were height in cm, Weight in kg, skin fold thickness, body mass index, waist hip ratio, blood pressure.

Some important outcome variables

variables having correlation with hypertension & BMI of children and parents.

Statistical Analysis

The collected data was depicted in tabular form and interpreted statistically and analyzed. The collected data was statistically analyzed by using the standard tests to ascertain the clinical relevance of the present study.

Appropriate statistical tests of significance like Chi square and multiple logistic regressions were applied wherever necessary and Excel and SPSS package were also used. Quality assurance measures were taken appropriately.

RESULTS

Among the 100 participants studied, 63% were male (Table 1) and the average age was 19.76 years (SD ±2.01) with a median of 20 years, varying from 18 to 24 years. The mean systolic blood pressure in males with history of hypertensive parents was 131.7 ± 13.5 as against 121.2 ± 10.1 in females with history of hypertensive parents. The difference was statistically significant (p=0.002) (Table 2). The mean diastolic blood pressure was also significantly higher in males with history of hypertensive parents than females with history of hypertensive parents (86.2 ± 11.3 in males versus 78.7 ± 10.3 in females).

Table 1: Distribution of study participants in relation to Blood Pressure

	Male	Female	Total
Hypertensive parents	31 (49.20)	19 (51.35)	50 (50.00)
Normotensive parents	32 (50.80)	18 (48.65)	50 (50.00)
Total	63 (100)	37 (100)	100 (100)

Table 2: Comparison of Mean Blood Pressure of the participants

Blood Pressure (Mean ± SD)	Male		Female	
	Hypertensive parents	Normo-tensive parents	Hypertensive parents	Normo-tensive parents
SBP (mm Hg)	131.7 ± 13.5	109.4 ± 14.1	121.2 ± 10.1	100.2 ± 12.3
DBP (mm Hg)	86.2 ± 11.3	70.2 ± 10.1	78.7 ± 10.3	61.1 ± 10.1

p < 0.01* (significant).

Table 3: Distribution of Body Mass Index in relation to family history of hypertensive parents

	Male		Female		
Body Mass Index	Body Mass Index <25	Body Mass Index >25	Body Mass Index <25	Body Mass Index >25	Total
Hypertensive parents	20 (64.52)	11 (35.48)	14 (73.69)	5 (26.31)	50 (50)
Normotensive parents	28 (87.49)	04 (12.51)	17 (94.45)	01 (5.55)	50 (50)
Total	48 (48)	15 (15)	31 (31)	06 (6)	100

p < 0.01* (significant).

Table 4: Distribution of Waist-hip ratio in relation to family history of hypertensive parents

	Male		Female		
	Hypertensive parents	Normotensive parents	Hypertensive parents	Normotensive parents	Total
Waist-hip ratio< cut-off1	13 (41.94)	28 (87.49)	09 (47.37)	15 (83.34)	33 (33.00)
Waist-hip ratio > cut-off2	18 (58.06)	04 (12.51)	10 (52.63)	03 (16.66)	67 (67.00)
Total	31 (100)	32 (100)	19 (100)	18 (100)	100 (100)

p < 0.01* (significant).

1WHR cut-off points: Male (<0.9) and Females (<0.8).

2WHR cut-off points: Male (>0.9) and Females (>0.8).

Males with BMI of 25 or more were 35.48% with history of Hypertensive parents, while only 12.5% of males were having BMI of 25 or more with history of normotensive parents. Females with BMI of 25 or more were 26.31% with history of Hypertensive parents, while only 5.55% of females were having BMI of 25 or more with history of normotensive parents (Table 3).

In male subjects, 22 (34.92%) had a Waist-hip ratio of more than 0.9. While 58.06% of the males with history of hypertensive parents had a waist-hip ratio equal to or more than 0.9. Among the male subjects, 12.51% with history of normotensive parents had a waist-hip ratio equal to or more than 0.9. In females 52.63% with history of hypertensive parents had a waist-hip ratio equal to or more than 0.8. Among the female subjects, 16.66% with history of normotensive parents had a waist-hip ratio equal to or more than 0.8 (Table 4).

Using linear regression analysis with BP as the dependent variable, a significant correlation was found between SBP and DBP of children and mothers and SBP of children and fathers. The highest correlation was found between SBP of mothers and SBP of children in both sexes ($r = 0.233$ for boys and 0.065 for girls; $p < 0.001$).

Linear regression analysis of children's blood pressure and parents' BMI showed significant correlation between mother's BMI and children's SBP ($r = 0.256$; $p < 0.001$) and DBP ($r = 0.249$; $p < 0.001$) and also between father's BMI and children's SBP ($r = 0.246$; $p < 0.001$) and DBP ($r = 0.315$; $p < 0.001$).

DISCUSSION

A population study performed by Brandao, *et al*.[20] showed a significant correlation only for SBP in the first family relatives of children. In the study by Holland and Beresford, no significant association was found with respect to SBP.[21]

In our study, the mean SBP, DBP and MABP of childrens of hypertensive parents was higher than childrens of normotensive parents. Investigators from the Framingham Heart Study evaluated familial BP associations and showed

that both paternal and maternal SBP and DBP correlated significantly with that of offspring even after adjustment for covariates known to influence BP.[22]

In the study of Clarke, *et al*.[23] on a sample of children from the Muscatine Study, both the SBP and DBP aggregated more strongly in the families of children with labile high blood pressure than in the families with low or middle blood pressure. Burke *et al*.[7] in his study that young adults, parental hypertension was associated with higher sex- and age-adjusted systolic and diastolic blood pressure levels.

Kelkadi *et al*.[24] in their study mentioned that the strategies for prevention of essential hypertension should start in childhood. Our previous studies did not show any increasing trend of hypertension in children and adolescents of our community. Kelkadi *et al*.[25] in their study showed a higher prevalence of some factors associated with increased risk of atherosclerosis in children of parents with premature myocardial infarction.

Głowińska *et al*.[13] 2002 conducted the study in which children with positive family history of cardiovascular diseases have significantly higher body mass index. Bruke *et al*.[7] in the study observed that Age- and sex-adjusted subscapular skinfold thickness was 1.0 mm greater in those young adults with a positive parental history of hypertension. The differences in blood pressure levels remained significant even after adjustment for age, sex, and subscapular skinfold thickness.So also in his study Significantly higher systolic blood pressure levels were detected in the young adult children in the mother only, father only, or both parents hypertensive groups compared to the no parental history group. Although blood pressure levels were highest in participants with two hypertensive parents and lowest in those with no parental history of hypertension, no significant differences were observed between the father only, mother only, and both parents hypertensive groups.

Wang *et al*.[26] in the study conducted to identify the relationship of body mass index (BMI) and blood pressure in which, the BMI positive correlation with systolic blood pressure (SBP) and diastolic blood pressure (DBP) was found independent in 7–15 years children and adolescents ($P < 0.0001$) and the partial relation coefficients(r) between BMI and SBP and DBP were 0.323 87 and 0.245 88 respectively.

Limitation of the study

There are a number of limitations of this study. Despite the attempt to obtain a complete assessment of parental history, a substantial number of participants were unaware of their parents' disease status (especially paternal history). Because we classified unknown responses as a negative history, this tendency would bias our results toward the null. Therefore, the differences presented probably underestimate

the true risk factor difference attributable to parental history. Another potential drawback of these data is the lack of validation of parental disease by medical record review. Other investigators have detected a relatively good concordance (78%) between a reported family history and medical record validation, suggesting that, despite some imprecision, the reported history gives a reasonable estimate of family history for the diseases we have assessed in this paper.[27] Even if some discordance occurs, there is no reason to suspect that this would result in artifactual risk differences; rather, as with any misclassification error, it would be more likely to increase the variability of the parental history measures and lead to an underestimate of the real risk factor differences between these groups.

CONCLUSION

The findings of the present study suggest the need of monitoring the BP of children of hypertensive parents. Health care providers, therefore have an important role to play in educating families and children about approaches that are useful in preventing hypertension.

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