

Prevalence of Prehypertension in Young Healthy Individuals and its Associated Risk Factors

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Abstract

Background: This study is aimed to measure the prevalence of prehypertension in young healthy individuals with its correlation to the parental history of hypertension and anthropometric measurements.

Methods/Statistical analysis: Participants were the 100 students, 50 males and 50 females from Jawaharlal Nehru Medical College and were asked for the parental history of hypertension. Participants were examined for anthropometric parameters like height, Weight, BMI, waist hip ratio and blood pressure in right upper arm in sitting position. Students were labeled as prehypertensives according to the criteria of JNC 7 new classification of hypertension.

Results: Among the 100 participants, 52% were prehypertensives. 39% males and 13% females were prehypertensives. 14% prehypertensive males while only 2% females were having family history of hypertension. Prehypertensive males with BMI of 25 or more were 11% and prehypertensives females were 2%. 28% prehypertensives males and 9% prehypertensive females had their waist-hip ratio equal or more than the Standard cut-off. The study shows that the prevalence of prehypertension is quite high, which is more in males as compared to females, with a positive relation of prehypertension and parental history of hypertension and various anthropometric indices, of this waist hip ratio being the most prominent one as compared to BMI.

Conclusion: The findings of the present study suggest need of monitoring the anthropometry of obese children as well as children of hypertensive parents. Health care providers have an important role to play in educating families and children about approaches that are useful in preventing hypertension.

Keywords: Prehypertension, Prevalence, Anthropometric indices

1. Introduction

Hypertension is fast emerging as a modern epidemic in the world. Developed countries are considering it as a leading cause of death but even developing countries do not lag behind in being affected by it. High blood pressure is often called the “Silent Killer”.¹ It is one of the major risk factors for cardiovascular morbidity and mortality, which accounts for 20-50% of all deaths.² It is necessary to assess hypertension in the early stages so as to reduce the cardiovascular, cerebrovascular and renal complications etc and can be managed by the pharmacological and non pharmacological methods.

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 countries³.

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 phenomenon⁴. Essential hypertension, a major risk factor for cardiovascular disease (CVD), is prevalent in the adult population^{5,6}. Hypertension is the most often prevalent atherosclerosis risk factor in families⁷. It is the commonest cardiovascular disorder, posing a major public health challenge to population and socio-economic and epidemiological transition.

The adverse association of cardiovascular risk factors in both children and adults with parental history of disease is well recognized^{8,9}. 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 hypertension¹⁰, myocardial infarction¹¹, diabetes¹², and obesity¹³. In fact hypertension in adults may be preceded by high blood pressure values in childhood¹⁴. Children with positive family history of cardiovascular diseases have significantly higher body mass index¹⁵.

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, globally¹⁶.

Essential Hypertension is much more common in obese individuals. George Smith has also confirmed positive association of weight and Blood Pressure¹⁷. Further, it is confirmed that change in the Body Mass Index (BMI) from higher range to lower side is associated with decreased cardiovascular risk¹⁸.

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 1984¹⁹.

The present study was conducted to measure the incidence of prehypertension among young healthy individuals and to correlate the incidence of prehypertension in young healthy individuals with respect to parental history of hypertension and anthropometric measurements co-relation.

2. Materials and methods

Study Setting: This is a study conducted in Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital (A.V.B.R.H.), a 900 bedded tertiary teaching hospital of Datta Meghe Institute of Medical Sciences University (NAAC Accredited Grade A).

Institutional Ethical Committee: This study has been approved from the Institutional Ethical Committee of Datta Meghe Institute of Medical Sciences (Deemed University). [Ref. No. DMIMS (DU)/IEC/2010-11/81]

Participants and Sample size: The participants were the students from Jawaharlal Nehru Medical College of Datta Meghe Institute of Medical Sciences (Deemed University).

Inclusion Criteria: All apparently healthy students of Faculty of Medicine of Datta Meghe Institute of Medical Sciences (Deemed University), Wardha of age group between 18-25 years of both sexes.

Exclusion Criteria: History of taking Cardio active drug, alcoholics and smokers.

100 Students were contacted for the study.

The participants were matched across age (18-25) and sex.

Participants were evaluated according to pre-designed protocol.

Parental history of hypertension was recorded.

All the participants were examined only once on a single meeting. The participants were examined for various anthropometric parameters and their blood pressure was noted in right arm sitting position.

The anthropometric parameters measured in the study were height in cm, Weight in kg, body mass index, waist hip ratio and blood pressure in mmHg.

- **Body Weight** - 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** - It 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).

- **BMI** - 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.

- **Waist Circumference** - It 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.

- **Waist Hip Ratio** - 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 obesity²¹.

- **Blood pressure-** Blood pressure was measured once only by using standardized mercury sphygmomanometer in right upper arm in sitting position after ensuring that the subject has relaxed at least for 5 minutes. The seventh report of the Joint National Committee (JNC 7) proposed a new definition of blood pressure values below 140/90 mm Hg.³³ Prehypertension is considered to be blood pressure readings with a systolic pressure from 120 to 139 mm Hg or a diastolic pressure from 80 to 89 mm Hg. Readings greater than or equal to 140/90 mm Hg are considered hypertension. JNC 7 new classification of hypertension³³ is as follows-
Statistical Analysis: The collected data was depicted in tabular form and was statistically analyzed by using the standard tests to ascertain the clinical relevance of the present study.

3. Results and Discussion

Among the 100 participants, 52% were prehypertensives. 39% males and 13% females were prehypertensives. 14% prehypertensive males while only 2% females were having family history of hypertension. Prehypertensive males with BMI of 25 or more were 11% and prehypertensives females were 2%. 28% prehypertensives males and 9% prehypertensive females had their waist-hip ratio equal or more than the Standard cut-off.

With rapid economic development and increasing westernization of lifestyle in the past few decades prevalence of lifestyle diseases like hypertension has reached alarming proportions among Indians in the recent years. There is a strong linear relationship between high blood pressure (BP) levels and the risk of CVD. Though the terminology “prehypertension” (systolic blood pressure 120-139 mm Hg and/ or diastolic blood pressure 80-89 mm Hg) is known for many years, its global awareness increased tremendously after the JNC (Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure) – 7 report from the United States in 2003³⁴.

Many studies from different Indian States showed that the prevalence of prehypertension in the country is about 40-50 per cent; a prevalence much higher than that in the West. Individuals with prehypertension have two-fold higher risk of mortality associated with stroke and coronary artery disease when compared with normotensives (individuals with BP less than 120/80 mm Hg)³⁵. In addition, prehypertensives are at higher risk of developing hypertension and CVD in their later lives. Without lifestyle or pharmacological intervention these individuals were found to have more than two times higher risk (prehypertensive vs. normotensives - 37 vs. 17%) of progression to overt hypertension within four years of diagnosis³⁶.

Using the JNC-7 Report's criteria for BP classification, our findings showed that the prevalence of pre-HT was 52% of which 39% was contributed by males and remaining 13% were female. In our study it was seen that males are more prone to develop prehypertension in the early age as compared to females. The prevalence rate of pre-HT in our finding was comparable with those studies in developing areas, such as Taiwan³⁷, Korea³⁸ and Turkey³⁹, which ranged from 34% to 46%.

According to our study there exists a positive correlation accounting to 30% between parental history of hypertension and prevalence of prehypertension in young healthy individuals as compared to study of Maria C et al²¹ which states family history, particularly when both parents had hypertension, exhibited a robust association, both among the boys (OR = 13.32; 95%CI 2.25-78.94), and the girls (OR = 11.35; 95%CI 1.42-90.21).

This study also showed that obesity is one of the major risk factor for prehypertension. Among various parameters of obesity waist hip ratio has shown a very strong correlation of 71.15% with prehypertension while body mass index shows the correlation of 25% which is comparable with the Deshmukh PR et al¹⁶ study which stated that higher abdominal fat is known to be a significant risk factor for hypertension and other related metabolic disorders, 11.3% of hypertensives had BMI of 25 or more while 38.5% of hypertensives had a waist-hip ratio equal to or more than the cut-off point i.e. 0.8 for females and 0.9 for males. Others studies like Maria C et al²¹, Wang W J et al²⁸ also stated a positive correlation between BMI and hypertension.

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

Table .1. Distribution of participants in relation to Blood Pressure

	Male	Female	Total
Prehypertensive	39 (39.00)	13 (13.00)	52 (52.00)
Normotensive	11 (11.00)	37 (37.00)	48 (48.00)
Total	50 (50.00)	50 (50.00)	100 (100)

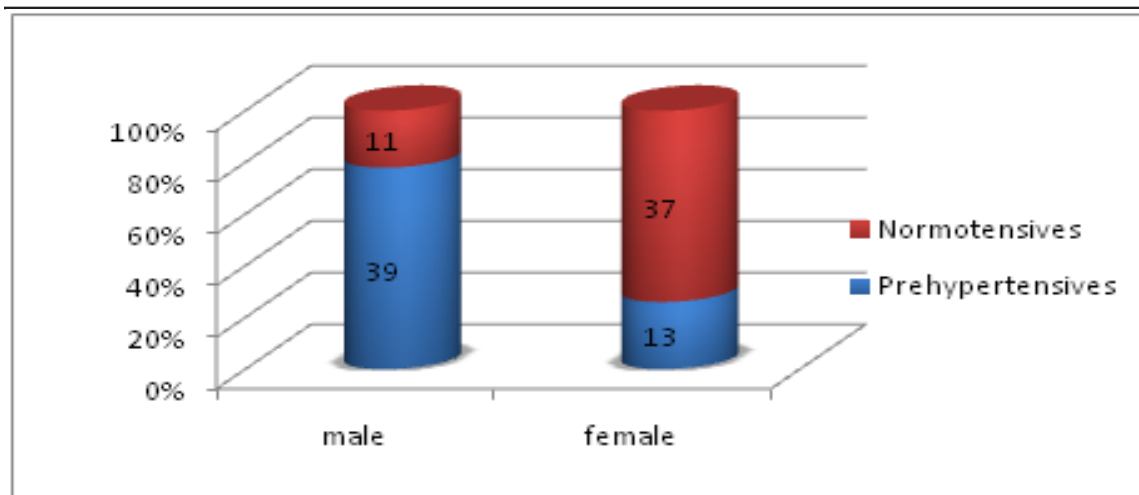


Table .2. Correlation of parental history of hypertension of the individual to prehypertension

Parental History of Hypertension	Male Prehypertensives	Female Prehypertensives
Both	2	1
Father	7	1
Mother	5	0
None	25	11
Total	39	13

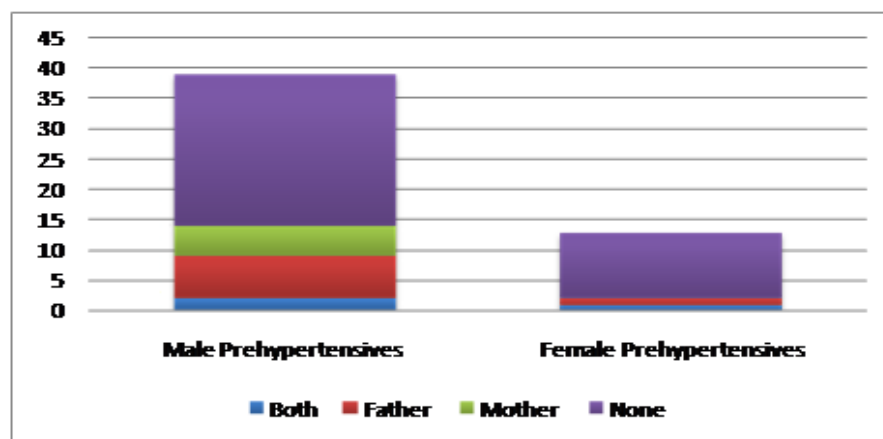


Table 3: Co Relation of BMI of the individual to prehypertension

BMI	Male Prehypertensives	Female Prehypertensives
>25 (obese)	11	2
≤25 (non obese)	28	11

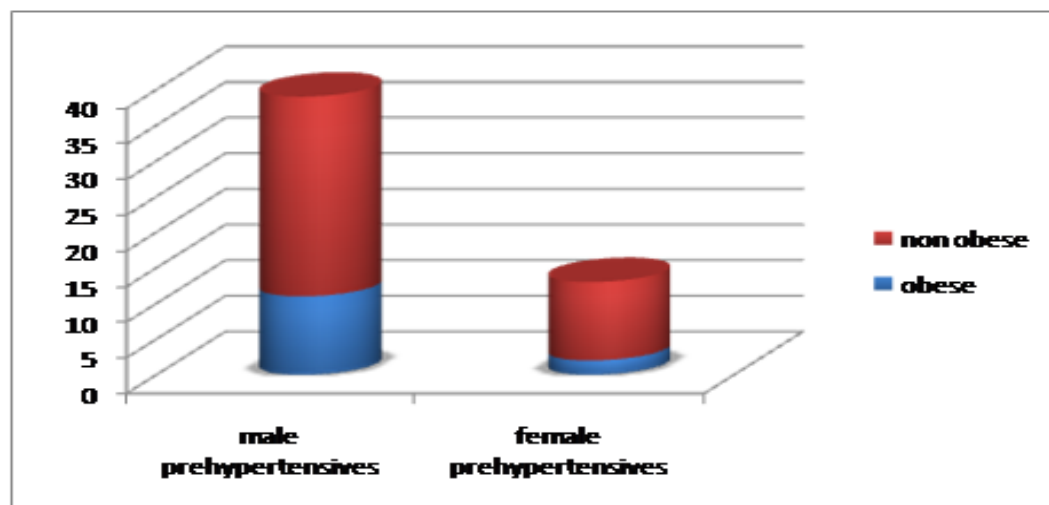
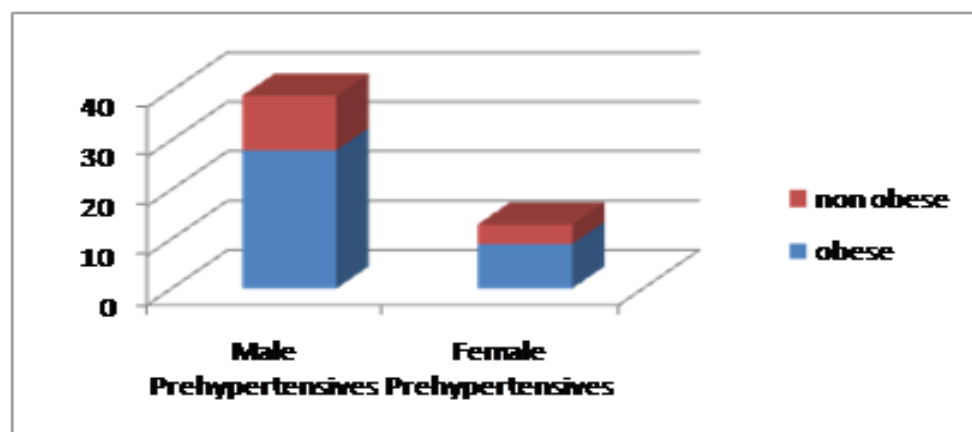


Table .4. Co Relation of waist hip circumference ratio of the individual to prehypertension

Waist Hip Circumference ratio	Male Prehypertensives	Female Prehypertensives
>0.9 in males (obese)	28	9
>0.8 in females (obese)		
≤0.9 in males (non obese)	11	4
≤0.8 in females (non obese)		



4. Conclusion

The study shows that the incidence of prehypertension is quite high, which is more in males as compared to females, with a positive relation of prehypertension and parental history of hypertension and various anthropometric indices, of this waist hip ratio being the most prominent one as compared to BMI. The findings of the present study suggest need of monitoring the anthropometry of obese children as well as children of hypertensive parents. Health care providers have an important role to play in educating families and children about approaches that are useful in preventing hypertension.

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