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Original Research Article

Prevalence of Prehypertension and Hypertension in Western UP Region at a Tertiary Care Centre: Analysis from a Cross-Sectional Survey

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ABSTRACT

Background: Hypertension is the commonest cardiovascular disorder, posing a major public health challenge to population. It is one of the major risk factors for cardiovascular mortality, which accounts for 20 – 50% of all deaths. The purpose of present study was to identify the prevalence of hypertension and prehypertension and find out any relationship of their blood pressure status with BMI, WC & WHR.

Material and Methods: Present study was a cross sectional study conducted among medical students belonging to Western UP Region of Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh (India). A total of 230 students were included in the study those who volunteered for participation in the study. Prehypertension was defined according to JNC 7 criteria as having either a systolic blood pressure of 120 to139 mmHg and/or diastolic blood pressure of 80 to 89 mmHg in persons who were not on treatment for hypertension. Hypertension was also defined as having an untreated systolic blood pressure (BP) of greater than or equal to 140 mmHg or diastolic BP greater than or equal to 90 mmHg or being on medication for hypertension. Anthropometric measurements including weight, height, waist and hip measurements were obtained using standardized techniques.

Results: Out of total 230 subjects participated in the study 82 were male and 148 were female. Age range of the subjects was 17-25 years with a mean age of 18.97 years. Out of total 230 subjects 91(39.6%) were prehypertensives, 15 (6.5%) had stage I hypertension and 06 (2.6%) had stage II hypertension. Out of total 230 subjects 52 (22.6%) subjects had BMI < 18.5, 108 (46.9%) had BMI between 18.5-23.9, 48 (20.9%) had BMI between 24-26.9 and 22 (9.6%) had BMI ≥27.

Conclusion: Prevalence of hypertension and pre-hypertension is high in the present study which supports the increasing trend in the study population which are under the epidemiological transition. Hence identification of subjects with pre-hypertension at an earlier age and using high risk strategy of prevention of hypertension among them is important in the prevention of hypertension in study population to prevent the emerging pandemic of hypertension.

Our results highlight the necessity to institute effective prevention and health promotion programs targeting younger age groups. Further studies are needed to determine the rate of cardiovascular events in the prehypertensive population and the impact of various interventions on the rates of these cardiovascular events.

Key Words: BMI, Central Adiposity, Hypertension, Obesity, Overweight.

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INTRODUCTION

Hypertension is the commonest cardiovascular disorder, posing a major public health challenge to population. It is one of the major risk factors for cardiovascular mortality, which accounts for 20 – 50% of all deaths.[1] In past, most researchers described hypertension to be a disease of older adults and elderly, there is a paucity of data on hypertension in teenagers and young adults. Data from the National Study of adolescent Health (Add Health) indicates that hypertension may be more common among young adults than previously thought.[2,3]

Epidemiological studies conducted in many parts of the world have consistently identified an important and independent link between high blood pressure and various disorders, especially coronary heart disease, stroke, congestive heart failure and impaired renal function.

Many factors like alcohol consumption and smoking also increase the risk. High fatty diet and body mass index have a positive correlation and physical activity is negatively related with hypertension.[4]

Based on the current evidence, the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7)[5] recommended a new classification for blood pressure in which normal blood pressure is defined as systolic blood pressure < 120 mmHg and diastolic blood pressure of < 80 mmHg, while persons with systolic blood pressure of 120 to139 mmHg and/or diastolic blood pressure of 80 to 89 mmHg are classified as having prehypertension. This new classification places a large number of persons previously considered as normal in this higher risk category and emphasizes the need for monitoring and possible intervention in persons with blood pressures between the range of normal and hypertensive.

Since the publication of JNC 7 a number of studies have reported associations between prehypertension and other risk factors for cardiovascular disease. These include obesity, high total cholesterol, diabetes mellitus and elevated C - reactive protein etc.[6-8]

Clinical trials have shown that weight loss with a dietary intervention can lower BP levels.[9,10] Conventionally, there are 2 categories of obesity: generalized obesity, measured by body mass index (BMI), and abdominal obesity, measured by waist circumference (WC). Debate ensues regarding the stronger indicator of obesity, BMI or WC, in association with hypertension.[11-15] Furthermore, since prehypertension was introduced as a new category by the Seventh Joint National Committee on the Prevention, Detection, Evaluation and Treatment of Hypertension (JNC-7) in 2003,[5] little research has been conducted to compare BMI and WC in their associations with prehypertension in the literature.

The purpose of present study was to identify the prevalence of hypertension and prehypertension and find out any relationship of their blood pressure status with BMI, WC & WHR.

MATERIALS AND METHODS

Present study was a cross sectional study conducted among medical students belonging to Western UP Region of Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh (India) from April 2016 to May 2016. A total of 230 students were included in the study those who volunteered for participation in the study. A predesigned and pretested questionnaire was filled by the students after the purpose of study was explained to them. Blood pressure was measured from the right arm of the seated participant after five minutes rest and was recorded to the nearest 2 mmHg using 1st and 5th Korotkoff sounds. Three blood pressure measurements were taken and the mean of the last two measurements was used in the analysis. Anthropometric measurements including weight, height, waist and hip measurements were obtained using standardized techniques. Height was measured with a portable stadiometer and recorded to the closest 0.1 cm. Subjects were requested to stand upright without shoes with their back against the wall, heels together and eyes directed forward. Weight was measured with a traditional spring balance that was kept on a firm horizontal surface. Subjects were asked to wear light clothing and weight was recorded to the nearest 0.1 kg. Measurements were conducted by trained personnel and all instruments were calibrated prior to study.[2,16] Proforma were analyzed after excluding the incomplete ones.

Prehypertension was defined according to JNC 7 criteria as having either a systolic blood pressure of 120 to139 mmHg and/or diastolic blood pressure of 80 to 89 mmHg in persons who were not on treatment for hypertension. Hypertension was also defined according to JNC 7 criteria as having an untreated systolic blood pressure (BP) of greater than or equal to 140 mmHg or diastolic BP greater than or equal to 90 mmHg or being on medication for hypertension. Normal blood pressure was defined as having both a systolic BP of < 120 mmHg and a diastolic BP of < 80 mmHg in the absence of antihypertensive medication.[5]

Body mass index (BMI) was calculated as weight in kilograms divided by the square of the height in metres. Overweight was defined as a BMI greater than or equal to 25 (kg/m^2), while obesity was defined as BMI greater than or equal 30 (kg/m^2).[17]

Increased (high-risk) waist circumference was defined as recommended by Lean et al., as greater than 94 cm in men and greater than 80 cm in women. Increased waist to hip ratio was defined as greater than or equal to 0.95 for males and greater than or equal to 0.80 for females.[18].

RESULTS AND OBSERVATIONS

Out of total 230 subjects participated in the study 82 were male and 148 were female. Age range of the subjects was 17-25 years with a mean age of 18.97 years. Out of total 230 subjects 91(39.6%) were prehypertensives, 15 (6.5%) had stage I hypertension and 06 (2.6%) had stage II hypertension. (Table 1)

Out of total 230 subjects 52 (22.6%) subjects had BMI < 18.5, 108 (46.9%) had BMI between 18.5-23.9, 48 (20.9%) had BMI between 24-26.9 and 22 (9.6%) had BMI ≥27. (Table 2)

Out of total 230 subjects 39 were alcohol consumers. The association of hypertension with alcohol consumption and non-consumption is significant (P value <0.05).

Out of total 230 subjects 12 were smokers. The association of hypertension with smoking and nonsmoking is significant (P value <0.05). Out of total 230 subjects 52 (22.6%) subjects had BMI < 18.5, 108 (46.9%) had BMI between 18.5-23.9, 48 (20.9%) had BMI between 24-26.9 and 22 (9.6%) had BMI ≥27. The association of hypertension with obesity is significant (P value <0.05). (Table 3)

Table 1: Distribution of the subjects according to the JNC 7 classification

Hypertension	Males n (%)	Females n (%)	Total n (%)
Normal	31(13.5)	87(37.8)	118(51.3)
Pre HTN	40(17.4)	51(22.2)	91(39.6)
Stage I	7(3.1)	8(3.5)	15(6.5)
Stage II	4(1.7)	2(0.9)	06(2.6)
Total	**82(35.7)**	**148(64.3)**	**230(100)**

Table 2: Distribution of the subjects according to the BMI

BMI	Males n (%)	Females n (%)	Total n (%)
<18.5	12(5.2)	40(17.4)	52(22.6)
18.5 - 23.9	47(20.4)	61(26.5)	108(46.9)
24 - 26.9	16(6.9)	32(13.9)	48(20.9)
≥27	7(3.1)	15(6.5)	22(9.6)
Total	**82(35.7)**	**148(64.3)**	**230(100)**

Table 3: Association of hypertension with various risk factors

Risk Factor		Number of Subjects	Hypertension		P value
			Yes	No	
Alcohol consumption	YES	39	11	28	<0.05*
	NO	191	10	181	
Smoking	YES	12	05	07	<0.05*
	NO	218	16	202	
Obesity	BMI <23.9	160	03	157	<0.05*
	BMI 24 – 26.9	48	08	40	
	BMI ≥27	22	10	12	
WC	> cut off value	134	15	119	<0.05*
	< cut off value	96	06	90	
WHR	> cut off value	112	11	101	>0.05
	< cut off value	118	10	108	

DISCUSSION

The present study found that the proportion of prehypertension and hypertension in college students were 39.6% and 9.1% respectively. These results were similar to the study done by J. Jain et al. in Central India and Al-Majed HT & Sadek AA in Kuwait.2,19 In present study the prevalence of hypertension in males and females were 4.8% in males and 4.4% in females. Prevalence of prehypertension in males and females were 17.4% and 22.2%. Findings were similar to J. Jain et al. in Central India whereas in other studies prevalence of both prehypertension and hypertension was found more in males than females.2,20,21

Regarding the smoking habit, the percentage of students who smoked in relation to the status of blood pressure, that is, hypertension was found in 41.7% of the subjects who were smokers in comparison to 7.3% those who were non-smokers (P value <0.05). Whereas in an another study done by Makwana N et al. hypertension was found in 28.21% of the subjects who were smokers in comparison to 4.74% those who were non-smokers (P value 0.8379).22 J. Jain et al found in 40% of the subjects who were smokers in comparison to 7.5% those who were non-smokers.[2]

In present study out of total 230 subjects, 48 (12.66%) were found overweight in which females outnumbered twice than males. Similarly out of total 230 subjects, 22 (18%) were found obese with m: f ratio of 7:15. Whereas in another study done by J. Jain et al, out of total 300 subjects, 38 of subjects were found as overweight and 54 as obese.2

Overall, the high prevalence of prehypertension in the younger age groups suggest that although the absolute risk of CVD attributable to prehypertension may be low, the population attributable risk may be relatively high and therefore will have important public health implications.

In present study out of total 230 subjects 134 had central obesity as defined by WC cut off values for men >90 cm and women >80 cm. Significant number of study participants had central adiposity as defined by WHR (48.7%). Whereas in another study done by Renu lohitashwa and Parvati Patil et.al in 2013 showed overall WHR (73.3%) and prevalence being more in female subjects (84.3%).23

The public health implication of this increased burden of at-risk people in our population is worthy of serious evaluation. It has been estimated that a 5 mmHg reduction in systolic blood pressure in the population will produce a 14% reduction in the risk of stroke and a 9% reduction in the risk of coronary heart disease.[5] If we apply a population approach to disease prevention we could therefore expect that a small reduction in mean population blood pressure will result in relatively large reductions in overall CVD risk. This can be achieved through either lifestyle or pharmacological intervention. It is unlikely that developing countries can afford pharmacological intervention and lifestyle intervention may be difficult to implement and maintain. Any intervention strategy will therefore require a multi-level, multi-sectorial approach.[24-28]

CONCLUSION

Prevalence of hypertension and pre-hypertension is high in the present study which supports the increasing trend in the study population which are under the epidemiological transition. Pre-hypertension has been identified as important precursor of hypertension by us as most of them developed hypertension by 60 years of age. Hence identification of subjects with pre-hypertension at an earlier age and using high risk strategy of prevention of hypertension among them is important in the prevention of hypertension in study population to prevent the emerging pandemic of hypertension.

Our results highlight the necessity to institute effective prevention and health promotion programs targeting younger age groups. Health care providers and health planners should be made aware of the large numbers of persons at increased risk for cardiovascular disease and steps should be taken to identify and treat modifiable risk factors in such persons. Further studies are needed to determine the rate of cardiovascular events in the prehypertensive population and the impact of various interventions on the rates of these cardiovascular events.

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