



RISK FACTORS OF PREHYPERTENSION AMONG YOUNG ADULTS

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ABSTRACT **Introduction:** cardiovascular diseases. Prehypertension, defined as systolic blood pressure (SBP) of 120–139 mm Hg or diastolic blood pressure (DBP) of 80–89 mm Hg, has been linked to an elevated risk of hypertension and cardiovascular morbidity. This study aims to identify the risk factors associated with prehypertension among young adults aged 18–24 years. **Methodology:** A cross-sectional study was conducted over 24 months (August 2022–August 2024) at Sri Siddhartha Medical College, Tumkur, involving 268 participants. Data on sociodemographic factors, lifestyle habits, and family history of hypertension were collected using a pre-tested questionnaire. Anthropometric and blood pressure measurements followed standard protocols. Statistical analysis was performed using SPSS v20.0, employing chi-square tests to test the association of risk factors. **Results:** Among the participants, 44% had normal BP, 41% were prehypertensive, and 14.9% were hypertensive. Prehypertension was more prevalent in males (48.3%) compared to females (40.8%). Significant associations were observed with BMI, as 85.7% of morbidly obese participants were hypertensive ($p < 0.001$). Smoking was linked to higher hypertension rates (29.3% vs. 11.5% in non-smokers, $p = 0.004$). Lack of regular exercise and a family history of hypertension were also strongly associated with elevated BP. **Conclusion:** Prehypertension is highly prevalent among young adults, with risk factors including male gender, elevated BMI, smoking, and sedentary lifestyle. Lifestyle interventions and early screening are essential to mitigate progression to hypertension.

KEYWORDS : Prehypertension, Young Adults, Blood Pressure, Risk Factors, Lifestyle.

INTRODUCTION:

Hypertension is not only a well-known risk factor for cardiovascular disease but also a public health challenge worldwide. More than 1.5 billion individuals are estimated to currently have hypertension. Studies have indicated that blood pressure (BP) values of 120–139/80–89 mm Hg are associated with an increased risk of cardiovascular morbidity and mortality compared with BP levels below 120/80 mm Hg. The concept of prehypertension has been defined for a detailed study of the risks of elevated Bp2. The report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-8) proposed high BP category, including 120–139 mm Hg systolic BP (SBP) or 80–89 mm Hg diastolic BP (DBP), designated as prehypertension3. Based on data obtained from the National Health and Nutrition Examination survey (NHANES) 2000–2010, the reported overall worldwide prevalence of prehypertension is 35%4. Various studies conducted in India have shown the prevalence of pre-hypertension in the age group 20–30 years to be ranging from 24.6% to 65%5.

According to JNC-8, individuals with prehypertension have a higher risk of developing hypertension compared with those with ideal BP levels; also, they have an increased risk of cardiovascular morbidity and mortality. Prehypertension is often closely linked to target organ damage, such as early arteriosclerosis, small vascular damage, coronary artery calcification, vascular remodelling, and left ventricular hypertrophy. This study aims to assess the risk factors associated with pre-hypertension among young adults aged 18–24 years.

Methodology:

This cross-sectional study was conducted over a 24-month period (August 2022 to August 2024) at the outpatient department of General Medicine, Sri Siddhartha Medical College, Hospital, and Research Centre in Agalakote, Tumkur. The study targeted young adults aged 18–24 years, excluding known hypertensives already on treatment, pregnant individuals, patients with cardiac diseases on medication, and those who did not consent to voluntary participation. Data collection involved a semi-structured pre-tested questionnaire capturing socio-demographic variables, dietary habits, tobacco and alcohol use, physical activity, and family history of hypertension. Anthropometric measurements and blood pressure were recorded following standard protocols. The sample size comprised randomly selected patients attending the outpatient department. Statistical analysis was performed using SPSS Version 20.0, with categorical

variables expressed as frequencies and proportions. The chi-square test was used to test the association. A p-value < 0.05 was considered statistically significant.

RESULTS :

The study included 268 participants, with 53.4% males and 46.6% females, all attending the General Medicine department at Sri Siddhartha Medical College. Among them, 84.7% had no history of smoking, and 15.3% reported being smokers. Regarding alcohol consumption, 92.5% were non-drinkers, and 7.5% consumed alcohol. Most participants (88.8%) did not engage in regular exercise, while only 11.2% reported regular physical activity. Additionally, 25.7% had a family history of hypertension. The distribution of Body Mass Index (BMI) showed 13.8% in the normal range (18.5–22.9 kg/m²), 32.5% as overweight (23.0–24.9 kg/m²), 40.7% as pre-obese (25.0–29.9 kg/m²), 10.4% as obese (30.0–39.9 kg/m²), and 2.6% as morbidly obese (40.0–49.9 kg/m²).

Regarding blood pressure, 44% had normal readings ($< 120/80$ mm Hg), 41% were prehypertensive (120–139/80–89 mm Hg), and 14.9% were hypertensive ($\geq 140/90$ mm Hg).

Males exhibited higher rates of pre-hypertension (48.3%) and hypertension (13.3%) compared to females (40.8% and 1.6%, respectively), with significant differences ($p < 0.001$). Smoking was associated with a higher prevalence of hypertension (29.3% among smokers vs. 11.5% among non-smokers, $p = 0.004$). Obesity was strongly linked to increased hypertension risk, with morbidly obese participants showing 85.7% hypertension prevalence ($p < 0.001$). Prehypertension and hypertension were also significantly associated with lack of regular exercise and a family history of hypertension, highlighting the importance of lifestyle modifications in blood pressure management.

DISCUSSION:

The prevalence of pre hypertension in the study population is 44.8%. The results are consistent with a study done by Vimala et al in Kerala where the prevalence of pre-hypertension was 52.52% in the age group of 18–30 years. In the present study to assess risk factors associated with prehypertension 69 men (48.3%) were classified with prehypertension, 51 females (40.8%) were classified as having prehypertension. our study shows that prehypertension is more prevalent in males than females. which is similar to a study conducted by Jayanthi et al 7 in which out of 385 study population 98 (25.45%) were

in the pre hypertensive range,63 was male and 35 were female.

Similar to the present study, most of the studies have reported a higher prevalence of prehypertension among males than females. Mungreiphy NK et al 6 conducted a study among 360 young adults in the age group of 20 to 30 years in three different places in India (Delhi, Manipur and Kerala) and found the prevalence of pre-hypertension among males to be higher at around 54% and in females at around 10%. In the present study the risk of pre-hypertension increased with increasing levels of BMI and this trend was statistically significant. Results are similar to a study done by Singh RB et al 4 wherein they found out the mean BMI (kg/m2) among pre-hypertensive women as 22.6 ± 2.3 and normotensive women as 20.1 ± 2.5. Among men the mean BMI was 22.6 ± 3.1 and among normotensive men it was 20.2 ± 2.5.

In the present study, the proportion of prehypertensives with a family history of hypertension was significantly higher than normotensives. In present study among participants who reported a family history of hypertension, 25 individuals (36.2%) had normal systolic BP, 40 participants (58.0%) were in pre-hypertension levels. which is in accordance with study conducted by AlMajed et al 2 revealed that the proportion of subjects with a family history of hypertension was significantly higher among pre hypertensives (42.6%) as compared to normotensives (40.0%).

The prevalence of prehypertension in alcoholics was 39.0% and 46.3% in normotensive. No significant association found between alcohol and pre hypertension. Contradictory to a study done by Singh et al 8. where a significant association found between alcohol and pre hypertension. It was also found that the study participants were smokers and significantly associated with higher proportion of pre-hypertension.

Alcohol intake was also significantly associated with Hypertension in a study done by Kini et al 10. Binge drinking increases the risk of atherosclerosis and also increase the weight which further elevate the blood pressure. Jaya prasad et al 7, in their study also found an association between alcohol consumption, smoking, addition of salt and obesity and pre hypertension. Similar results were observed by Gupta et al and Madhu et al 9.

CONCLUSION:

The prevalence of pre HTN is more prevalent among males (48.3%) compared to females(40.6%). Mean SBP and DBP levels were higher among subjects with elevated BMI, especially among males. Subjects with family history of hypertension were more prone to hypertension. Individuals with no physical activity were at a higher risk of developing hypertension.

Table 1: Demographic and Lifestyle Characteristics of Participants

Variables		Frequency	Percent age
Gender	Female	125	46.6
	Male	143	53.4
History of smoking	No	227	84.7
	Yes	41	15.3
History of alcohol consumption	No	248	92.5
	Yes	20	7.5
Regular exercise	No	238	88.8
	Yes	30	11.2
Family history of hypertension	No	199	74.3
	Yes	69	25.7
Body Mass Index (kg/m2)	Normal (18.5-22.9)	37	13.8
	Overweight (23.0-24.9)	87	32.5
	Pre-obese (25.0-29.9)	109	40.7
	Obese (30.0-39.9)	28	10.4
	Morbid obese (40.0-49.9)	7	2.6
Systolic BP	Normal (<120 mm Hg)	127	47.4
	Pre-hypertension (120-139 mm Hg)	120	44.8
	Hypertension (≥140 mm Hg)	21	7.8
Diastolic BP	Normal (<80 mm Hg)	164	61.2
	Pre-hypertension (80-89 mm Hg)	66	24.6
	Hypertension (≥90 mm Hg)	38	14.2
Blood pressure	Normal (<120/ 80 mm Hg)	118	44
	Pre-hypertension (120-139/ 80-89 mm Hg)	110	41

Hypertension (≥140/ 90 mm Hg)	40	14.9
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Table 2: Association between Systolic Blood Pressure Categories and Participant Characteristics

Variable	Systolic BP			p Value*	
	Normal	Pre-hypertension	Hypertension		
Gender	Female	72 (57.6%)	51 (40.8%)	2 (1.6%)	<0.01
	Male	55 (38.5%)	69 (48.3%)	19 (13.3%)	
Smoking	No	108 (47.6%)	104 (45.8%)	15 (6.6%)	0.2
	Yes	19 (46.3%)	16 (39.0%)	6 (14.6%)	
Alcohol consumption	No	121 (48.8%)	106 (42.7%)	21 (8.5%)	0.046
	Yes	6 (30.0%)	14 (70.0)	0 (0%)	
Regular physical exercise	No	106 (44.5%)	111 (46.6%)	21 (8.8%)	0.019
	Yes	21 (70.0%)	9 (30.0%)	0 (0%)	
Family history of hypertension	No	102 (51.3%)	80 (40.2%)	17 (8.5%)	0.038
	Yes	25 (36.2%)	40 (58.0%)	4 (5.8%)	
BMI	Normal	31 (83.8%)	6 (16.2%)	0 (0%)	<0.01
	Overweight	54 (62.1%)	32 (36.8%)	1 (1.1%)	
	Pre-obese	39 (35.8%)	63 (57.8%)	7 (6.4%)	
	Obese	3 (10.7%)	16 (57.1%)	9 (23.1%)	
	Morbid obese	0 (0%)	3 (42.9%)	4 (57.1%)	

*p value <0.005 is statistically significant

Table 3: Association between Diastolic Blood Pressure Categories and Participant Characteristics

Variable	Diastolic BP			p Value*	
	Normal	Pre-hypertension	Hypertension		
Gender	Female	77 (62.6%)	44 (35.2%)	4 (3.2%)	<0.001
	Male	87 (60.8%)	22 (15.4%)	34 (23.8%)	
Smoking	No	140 (61.7%)	61(26.9%)	26 (11.5%)	0.04
	Yes	24 (58.5%)	5 (12.2%)	12(29.3%)	
Alcohol consumption	No	154 (62.1%)	57 (23.0%)	37 (14.9%)	0.08
	Yes	10 (50.0%)	9 (45.0%)	1 (5.0%)	
Regular physical exercise	No	139 (58.4%)	62 (26.1%)	37 (15.5%)	0.027
	Yes	25 (83.3%)	4 (13.3%)	1 (3.3%)	
Family history of hypertension	No	120 (60.3%)	51 (25.6%)	28 (14.1%)	0.81
	Yes	44 (63.8%)	15 (21.7%)	10 (14.5%)	
BMI	Normal	26 (70.3%)	10 (27.0%)	1 (2.7%)	<0.001
	Overweight	64 (73.6%)	20 (23.0%)	3 (3.4%)	
	Pre-obese	66 (60.6%)	26 (23.9%)	17 (15.6%)	
	Obese	8 (28.6%)	9 (32.1%)	11 (39.3%)	
	Morbid obese	0 (0%)	1 (14.3%)	6 (85.7%)	

*p value <0.005 is statistically significant

Table 4: Association between Blood Pressure Categories and Participant Characteristics

Variable	BP			p Value*	
	Normal	Pre-hypertension	Hypertension		
Gender	Female	64 (51.2%)	57 (45.6%)	4 (3.2%)	<0.001
	Male	54 (37.8%)	53 (37.1%)	36 (25.2%)	
Smoking	No	99 (43.6%)	100 (44.1%)	28 (12.3%)	0.07
	Yes	19 (46.3%)	10 (24.4%)	12(29.3%)	
Alcohol consumption	No	112 (45.2%)	97 (39.1%)	39 (15.7%)	0.067
	Yes	6 (30.0%)	13 (65.0%)	1 (5.0%)	
Regular physical exercise	No	97 (40.8%)	102 (42.9%)	39 (16.4%)	0.07
	Yes	21 (70.0%)	8 (26.7%)	1 (3.3%)	
Family history of hypertension	No	96 (48.2%)	75 (37.7%)	28 (14.1%)	0.06
	Yes	22 (31.9%)	35 (50.7%)	12 (17.4%)	
BMI	Normal	26 (70.3%)	10 (27.0%)	1 (2.7%)	<0.

Overweight	54 (62.1%)	30 (34.5%)	3 (3.4%)	001
Pre-obese	36 (33.0%)	56 (51.4%)	17 (15.6%)	
Obese	2 (7.1%)	13 (46.4%)	13 (46.4%)	
Morbid obese	0 (0%)	1 (14.3%)	6 (85.7%)	

*p value <0.005 is statistically significant

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