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A descriptive cross-sectional study on prevalence and lifestyle factors associated with hypertension among adults in an urban population

Divya A P[1], Bhavya A P[2]
[1] Professor, Department of Community Health Nursing, Mitali Institute of Nursing, Balaghat, Madhya Pradesh, India
[2] Professor, Department of Obstetrics and Gynaecological Nursing, Mitali Institute of Nursing, Balaghat, Madhya Pradesh, India
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Abstract
Hypertension is a critical public health issue, approximately one in four adults (roughly 25- 30%) in India has hypertension. Studies indicate 29.8% to over 30% of the adult population is affected, with higher rates in urban areas (33.8%) compared to rural (27.6%). High prevalence of hypertension is linked to obesity, tobacco use, alcohol consumption and increasing age, particularly affecting those 60 and above. Hence the current study aims to assess the prevalence of hypertension and its associated lifestyle risk factors and also to estimate awareness, treatment access, and adequacy of control of hypertension among the study subjects. A community based descriptive cross-sectional study with multistage sampling design for 600 samples with the age group of 30 to 69 years was conducted among urban population of Mysore, Karnataka. A modified WHO STEPS interview schedule, a population-based surveillance tool was used. The prevalence of hypertension was 30.66% (male: 37.3%, female: 24.4%) with mean systolic and diastolic BP 122.49 ± 11.53 mmHg and 82.62± 7.39 mmHg, respectively. Higher odds of being hypertensive were found in male subjects, age group of 50-59 years, married and belonging to nuclear family, subjects with secondary education level, and of upper socioeconomic status. Major lifestyle characteristics were also associated with hypertension. Among the total hypertensive of 242 subjects, 58 (23.9%) were aware about their hypertension status; out of those, 45 (77.5%) were seeking treatment and 18 (31.03%) had their blood pressure adequately controlled. The study concluded that approximately one- third of adults in urban city samples suffer from hypertension, driven heavily by lifestyle factors like physical inactivity, poor diet, tobacco and alcohol use, stress and central obesity. The prevalence of both prehypertension and hypertension found to be high and was in a need for early interventions and primary health care access along with awareness programs to control the burden of hypertension.

Keywords: Hypertension, prevalence, lifestyle factors, descriptive, cross-sectional study

Introduction

Hypertension is a serious, often asymptomatic, cardiovascular condition where blood pressure in the vessels is persistently elevated, acting as a 'silent killer' and a leading cause of premature death globally. According to WHO, an estimated 1.4 billion adults (30-79 years) worldwide had hypertension in 2024, with two- thirds residing in low and middle- income countries. [1] Nearly 44% of adults with hypertension are unaware of their condition which is why called as silent killer disease. Around 7.5 million deaths or 12.8% of the total of all annual deaths worldwide occur due to high blood pressure. [2] It is predicted to be increased to 1.56 billion adults with hypertension in 2025. [1] Major risk factors include high salt intake, lack of physical activity, unhealthy diets, obesity, and alcohol/tobacco use. High blood pressure is a major risk factor for heart attack, stroke, kidney damage and premature death. Other than coronary heart disease and stroke, its complications include heart failure, peripheral vascular disease, renal impairment, retinal haemorrhage, and visual impairment.

According to WHO, Hypertension (HTN) or high blood pressure is defined as a condition where systolic blood pressure (SBP) ≥ 140 mm Hg and/or diastolic blood pressure (DBP) ≥ 90mmHg, measured on separate occasions. The grey area falling between 120–139mmHg SBP and 80–89mmHg DBP is defined as "prehypertension" [3, 4]. Although prehypertension is not a medical condition in itself, prehypertensive subjects are at more risk of developing HTN. [1]

Urban populations are particularly vulnerable because of changing lifestyles and increased stress levels. Early identification of lifestyle related risk factors can help in prevention and control of HTN. Urbanization is considered a determinant of health and one of the key drivers of non-communicable diseases (NCDs), especially in low- and middle-income countries (LMICs) [5, 15]. Rapid urbanization, increasing elderly population, mechanization, sedentary life, and dietary changes act together as a web of risk factors which entangles people in it and leads to several chronic diseases. [6, 7] In order to take effective prevention measures, identification of the risk factors is an essential prerequisite. Since people are unaware of excessive blood pressure, it is only through measurements that detection can be done. Although majority of patients with hypertension remain asymptomatic, some people with HTN report headaches, light-headedness, vertigo, altered vision, or fainting episode. [1, 8] The prevalence of HTN varies across regions and country income groups. The WHO Eastern Mediterranean region has the highest prevalence (38%) while the WHO Western Pacific region has the lowest prevalence (29%) [1]. Early identification of lifestyle related risk factors is essential for planning preventive strategies and promoting healthy living. Therefore, this study aims to estimate the

prevalence of hypertension and assess lifestyle factors associated with Hypertension among adults in an urban population.

Materials and Methods

1. **Study Area:** The present study is a descriptive cross-sectional study conducted in 6 selected wards out of 65 wards of Mysore city, Karnataka.

2. **Study Design:** A community based descriptive cross-sectional study was conducted among the eligible population aged 30 to 69 years residing in the selected community area for at least six months. Among 65 municipal wards of Mysore city corporation, 6 wards were selected by using simple random sampling.

3. **Sample Size:** A total of 600 participants aged between 30 to 69 years were included in the study. The minimum required sample size was calculated using the formula for estimating prevalence in the cross-sectional study. After accounting for the design effect and anticipated non-response rate, the sample size for the present study was calculated by taking most probable prevalence of hypertension as 50% and permissible allowable error as 5% with 95% confidence interval. Fixing the permissible error as 50%, the base sample size was calculated as n = 385. As multistage sampling was used, hence considering the design effect, the sample size was further increased by one and half times. Considering the nonresponse rate of 10% the final sample size in study was fixed as 600. In the present study, a prior written informed consent was also taken from the participants.

4. **Sampling technique:** A multistage sampling technique was used for this study. There were three stages and for each stage different sampling design was used. Firstly, out of 65 wards, 6 wards were selected by using simple random sampling. In the second stage, households were selected from each selected ward by using systematic random sampling and probability proportional to size was done. At the third stage, one member from target age group was interviewed from selected household. If the selected family has more than one available eligible person then one was chosen randomly by using lottery method. In case of nonavailability of eligible person in the selected household, during survey, the adjacent household was selected.

5. **Selection of Study Subjects**

5.1 Inclusion Criteria: Individuals aged 30–69 years in the selected study area who gave consent for participation were considered.

5.2 Exclusion Criteria: Individuals with serious physical or mental illness and who are unable to give response, who are pregnant, with whom anthropometry measurements cannot be performed were excluded from the study.

6. **Tools of the Study:** Structured interview schedule [modified and pretested WHO stepwise approach to chronic disease risk factor surveillance (STEPS)], digital weighing machine, steel anthropometry rod, measuring tape, and digital BP apparatus were used.

7. **Techniques of the Study:** A structured and pretested interview schedule was administered to obtain data on sociodemographic parameters and lifestyle characteristics from all study subjects.

7.1 Blood Pressure Measurement: Blood pressure was measured two times on the left arm of the selected subject using digital BP apparatus. The average of two readings was used.

7.2 Anthropometric Measurements: By using standardized techniques anthropometric measurements like height weight, BMI, waist and hip circumference were measured. Weight was measured by digital weighing machine having an accuracy of 0.1 kg and height by using a steel anthropometry rod with accuracy of 0.1 cm. Body Mass Index was calculated using the following formula: BMI = weight (kg)/height $(m)^2$. Waist circumference (cm) was measured using a non-stretchable measuring tape at the smallest horizontal girth at the midpoint between the lower margin of last palpable rib and top of iliac crest (hip bone). Hip circumference (in cm) was measured at the widest part of the hips by using non-stretchable measuring tape. Waist-to hip ratio (WHR) was calculated by dividing waist circumference by hip circumference. [16]

8. **Ethical consideration**

Ethical approval was obtained from the Institutional ethical committee, district health committee. A prior written informed consent was taken from the subjects in the study. Identified pre-hypertensive and hypertensive were referred to nearby primary health centre for confirmation.

9. **Operational definitions used in the study**

1. **WHO classification of hypertension**

a. Normal:120-129 mmHg systolic and diastolic 80-84 mmHg.
b. Pre-hypertension: 130-139mmHg systolic and diastolic 85-89 mmHg.
c. Grade1 HTN (mild): 140-159 mmHg systolic and diastolic 90-99 mmHg.
d. Grade2 HTN (moderate): 160-179 mmHg systolic and diastolic 100-109 mmHg.
e. Grade3 HTN (severe): ≥180 mmHg systolic and diastolic ≥110 mmHg.
f. Isolated systolic HTN: ≥140 mmHg systolic and diastolic <90 mmHg.
g. Isolated diastolic HTN: <140 mmHg systolic and diastolic ≥90 mmHg.

2. **WHO Body Mass Index (BMI) classification:** BMI= weight(kg)/ $height(m)^2$

Underweight: <18.5 kg/m^2
Normal weight: 18.5 – 24.9 kg/m^2
Overweight: 25.0 – 29.9 kg/m^2
Obesity: 30.0 kg/m^2 or higher

3. **Tobacco use:** Consumption or use of any tobacco product- including both smoked (cigarettes, cigars, bidis, waterpipes etc) and smokeless tobacco (ghutka, khaini, mawa, Chadha etc) on a daily or occasional basis

4. **Physical activity:** WHO recommends 150-300 minutes of moderate intensity or 75 -150 minutes of vigorous physical activity per week.

5. **Sleep hours:** 7-9 hours of adequate sleep for adults 18+ years
6. **Stress:** State of worry or mental tension caused by a difficult situation.

10. Data Processing

The information obtained from the survey was analysed using IBM SPSS version 31 software. Descriptive statistics (mean and standard deviation) were calculated for continuous variables and frequencies and percentages were calculated to summarize qualitative data. ANOVA and chi-square test were used. Binary logistic regression was applied to identify the lifestyle risk factors for hypertension. A significance level of 0.05 was used.

Table 1: Socioeconomic classification scale (Revised modified Kuppuswamy scale 2024)

Social class	Original classification based on monthly per-capita income (Rs.)	Updated scale for 2024 based on monthly per-capita income (Rs.)
Upper class(I)	100 and above	9,098 and above
Upper middle class (II)	50-99	4,549-9,097
Middle class (III)	30-49	2,729-4,548
Lower middle class (IV)	15-29	1,364-2,728
Lower class (V)	<15	<1,364

Results

A total of 600 study subjects participated in the study. The median age(±SD) of the participants was 38 (±10.4) for males and 39 (±10.6) for females, with ages ranging from 30 to 69 years. Women made up the majority, representing 311(51.9%) while men constituted 289 (48.1%) of the sample. Education levels varied with 73(12.1%) illiterate, 182(30.3%) having primary education, 216(36%) having secondary and 129 (21.6%) were graduated. In terms of marital status 463(77.1%) of the participants were married and 488 (81.3%) belonged to nuclear type of family. Two-third of the subjects belonged to the upper class of socioeconomic status, and most of the male participant's occupation was private or self- employed kind of work, whereas majority of female participants were homemakers 125 (20.9%). 385(64.1%) of the study subjects had family history of hypertension (Table 2).

Table 2: Sociodemographic characteristics of study participants (n=600)

Variables	N=600	Percentage
Age		
30-39	135	22.5
40-49	171	28.5
50-59	156	26.0
60-69	138	23.0
Sex		
Male	289	48.1
Female	311	51.9
Education		
Illiterate	73	12.1
Primary	182	30.3
Secondary	216	36.0
Graduation and above	129	21.6
Marital status		
Single	68	11.3
Married	463	77.1
Divorced/Separated	23	3.9
Widowed	46	7.7
Type of family		
Nuclear	488	81.3
Joint	112	18.7
Occupation		
Government	73	12.1
Private	184	30.7
Self employed	82	13.7
Retired	103	17.1
Homemaker	125	20.9
Others	33	5.5
Socio economic status		
Upper class	202	33.6
Upper middle class	146	24.4
Middle class	116	19.4
Lower middle class	71	11.8
Lower class	65	10.8
Family history of Hypertension		
Yes	385	64.1
No	163	27.2
Don't know	52	8.7

Table 3 depicts the mean values of lifestyle characteristics associated with hypertension prevalence in which 386(64.3%) of people consumed fewer than 5 servings of fruits and vegetables, while 214(35.6%) met WHO recommendations. [1] For salt intake 289 (48.1%) reported excessive use(>5g/day),212 (35.3%) moderate use, and 99(16.5%) minimal use. 399 (66.5%) of the subjects had inadequate physical activity which is less than 150 minutes of moderate activity per week, [35]226 (37.6%) of the participants consumed alcohol and 147 (24.5%) had history of tobacco usage. Study also showed that 267 (44.5%) of people reported less than 6 hours of sleep duration which was closely associated with stress level in various forms. The percentage of stress was closely associated with hypertension with about 432 (72%) among men and women. Body Mass Index of the study subjects showed 288 (48%) as either Overweight or Obese (BMI≥25kg/m^2) [17]. As per the waist circumference measured,290 (48.3%) subjects were at risk of abdominal obesity. This suggested a strong association between increased BMI and central obesity with hypertension.

Table 3: Lifestyle and behavioural characteristics of the study participants(n=600)

Lifestyle factor	Category	Frequency (N=600)	Percentage (%)
Fruits and vegetable consumption	Adequate (≥5 servings /day)	214	35.6
	Inadequate (5 servings/day)	386	64.3
Salt consumption	Minimal(<5g/day)	99	16.5
	Moderate	212	35.3
	Excessive (>5g/day)	289	48.1
Physical activity level	Adequate (≥150 min/week)	201	33.5
	Inadequate (<150 min/week)	399	66.5
Tobacco use	Yes	147	24.5
	No	453	75.5
Alcohol consumption	Yes	226	37.6
	No	374	62.3
Sleep duration	High (<6 hrs)	267	44.5
	Moderate (6-8 hrs)	189	31.5
	Low (>8 hrs)	144	24.0
Self - reported stress level	Yes	432	72.0
	No	168	28.0
BMI	Normal	312	52.0
	Overweight/Obesity	288	48.0
Waist circumference	Abdominal obesity	290	48.3

Table 4 outlines the mean values of systolic and diastolic BP according to age and gender of subjects. Participants had an average systolic BP of 122.49±11.53 and diastolic BP of 82.62±7.39 mmHg, respectively. Hypertension prevalence was higher among age (50-59 years) followed by age group (60–69 years). In comparison with gender men had higher prevalence (37.37%) compared to females (24.43%). There was significant difference among all the age groups with regard to systolic and diastolic BP among both men and women.

The prevalence of isolated systolic BP was found to be 9.5% [95% CI: (7.48–13.49)] and isolated diastolic BP was 14.1% [95% CI: 13.26–20.14]. The proportion was higher in male (12.1%) as compared to female (5.4%). Among both male and female groups, prevalence was higher among the higher age group. The prevalence of isolated diastolic BP was higher among younger male subjects (14.4%) against female subjects (10.7%). With increase in age systolic and diastolic BP was higher in male subject which was closely associated with hypertension, whereas in females systolic BP increased with age but no association between age and diastolic BP was noticed. The overall prevalence of hypertension was 30.66% [95% CI: (29.4–32.2)]. The gender specific prevalence was 37.3% [95% CI: 35.5–41.2] for male and 24.4% [95% CI: 21.6–30.1] for female. Prehypertension was prevalent in 36.6% [95%CI: (35.4–40.2)] of men and 33.1% [95%CI: (29.4–35.2)] of women. In men, hypertension was significantly associated with age but in women, age had no effect on their hypertension status. Pre diagnosed or known status of hypertension among the study subjects was more among males (13.49%) than females (6.10%) (Table 5).

Table 4: Mean values of systolic and diastolic blood pressure (mm Hg) and isolated systolic and diastolic BP by age group and gender.

Age group (years)	N (600)	Systolic BP (mean ± SD)			Diastolic BP (mean ± SD)		
		Male	Female	Total	Male	Female	Total
30-39	135	121.18±9.56	116.74±9.86	118.55±9.99	81.80±9.12	77.87±6.43	79.83±7.23
40-49	169	122.14±10.72	120.68±10.24	121.75±10.48	82.72±6.64	80.76±8.54	81.72±7.59
50-59	158	130.36±12.23	124.18±13.46	127.27±12.34	88.34±9.14	80.89±8.65	84.61±8.40
60-69	138	133.57±14.43	126.21±12.24	124.39±13.34	86.36±8.56	82.34±10.23	84.35±9.34
Total	600	126.31±11.48	121.45±11.41	122.49±11.53	84.55±8.36	79.71±8.46	82.62±7.39
Test of significance		F=14.484 df=3 p=0.001	F=14.616 df=3 p=0.001	F=28.546 df=3 p=0.001	F=4.813 df=3 p=0.001	F=4.712 df=3 p=0.001	F=8.711 df=3 p=0.001
Age group (years)	N (542) *	Isolated Systolic BP (mean ± SD)			Isolated Diastolic BP (mean ± SD)		
		Male	Female	Total	Male	Female	Total
30-39	134	4 (5.9)	2 (2.9)	6 (4.4)	12 (17.9)	9 (13.2)	21(15.6)
40-49	157	9 (10.8)	5 (5.8)	14 (8.9)	8 (9.4)	7 (8.1)	15(9.5)
50-59	147	8 (10.3)	6 (7.4)	14 (9.5)	11 (14.2)	9 (11.1)	20(13.6)
60-69	104	14(22.5)	4 (5.2)	18 (13.4)	10 (16.1)	8 (10.5)	18(17.3

Total	542	35(12.1)	17 (5.4)	52(9.5)	41(14.4)	33(10.7)	74(14.0)
Test of significance		χ2=22.236 df=3 p=0.001	χ2=9.485 df=3 p=0.005	χ2=32.116 df=3 p=0.001	χ2=11.327 df=3 p=0.006	χ2=3.143 df=3 p=0.002	χ2=22.236 df=3 p=0.002

*Excluding Known hypertensive

Table 5: Prevalence of prehypertension and hypertension by gender and age groups (N=600)

		Age group (years)				
Category	**N=600**	**30-39**	**40-49**	**50-59**	**60-69**	**Test of significance**
Male (N= 289)		67	83	77	62	
Normal	36	14(38.0)	13(36.1)	6(16.6)	3(8.3)	χ2= 21.317 df = 9 p = 0.008
Prehypertension	106	32(30.1)	37(34.9)	25(23.6)	12(11.3)	
Hypertension	108	20(29.8)	20(24.1)	33(30.6)	35(32.5)	
History of HTN	39	1(2.6)	13(33.3)	13(33.3)	12(30.8)	
Female (N=311)		68	86	81	76	
Normal	113	42(37.2)	27(23.8)	18(15.9)	26(23.1)	χ2 = 11.794 df = 9 p = 0.001
Prehypertension	103	21(20.3)	41(39.9)	19(18.4)	22(21.4)	
Hypertension	76	5(7.3)	1618.6)	37(45.6)	18(23.6)	
History of HTN	19	0(0.0)	2(10.5)	7(36.8)	10(52.7)	

Table 6 shows the associated lifestyle risk factors of prehypertension and hypertension. Age, gender, marital status, occupation, education status, family history of hypertension and lifestyle characteristics such as consumption of fruit and vegetables, salt usage, tobacco and alcohol use, physical activity, sleep duration, stress level was significantly associated with the hypertension status of the study subjects (p< 0.05). Both the rate of prehypertension and hypertension were higher among male. Hypertension was more prevalent in the age group of 50–59 years, while prehypertension was more in 40–49-year age group. Hypertension was found to be more among secondary level educated subjects (50.8%), and with regard to prehypertension, primary educated subjects (38.3%) suffered more. With regard to socioeconomic status, both hypertension and pre hypertension prevalence was more among upper class study subjects. Poor diet, high salt intake, tobacco and alcohol use, stress level was found to be risk factors for being hypertensive in the study subjects.

The binary logistic regression analysis showed that odds of being hypertensive were higher among the male subjects (OR:2.86), age group 50-59 (OR:5.37), married subjects (OR: 6.12), subjects with secondary education (OR: 2.17), subjects having private job (OR:4.32), and those who were from upper socioeconomic class (2.62). With regard to anthropometric risk factors, being overweight and obese (OR: 4.73), and having abdominal obesity (OR: 3.89) had higher odds of hypertension. Alcohol use (OR: 1.65), inadequate fruits and vegetables (OR: 3.55), salt intake (OR: 3.96), stress level (OR: 6.83) also had higher odds of being hypertensive. Gender, age, marital status, occupation, BMI, abdominal obesity, and tobacco use were significantly associated with hypertension. Education, socioeconomic status, and alcohol use were not statistically associated with hypertension.

Being female, younger in age, unmarried, highly educated, and staying away from any kind of addiction could serve as protective factors against hypertension (Table 6). Among the total hypertensive of 242 subjects, 58 (23.9%) were aware about their hypertension status; out of those, 45 (77.5%) were seeking treatment and 18 (31.03%) had their blood pressure adequately controlled. As age, education status, and socio-economic status were advancing, the awareness of hypertensive status among study subjects was also increasing.

Table 6: Prevalence of prehypertension and hypertension according to sociodemographic characteristics and lifestyle factors.

Variables	**N**	**Normal**	**Pre, hypertension**	**Hypertension**	**Test of significance**
Sex					p=0.001 df=2 χ2=55.169
Male	289	36(24.1)	106(50.7)	147(60.8)	
Female	311	113(75.9)	103(49.3)	95(39.2)	
Age					p=0.001 df=4 χ2=23.432
30-39	135	56(37.5)	53(25.3)	26(10.7)	
40-49	171	40(26.8)	78(37.3)	51(21.1)	
50-59	156	24(16.2)	44(21.1)	92(38.1)	
60-69	138	29(19.5)	34(16.3)	73(30.1)	
Education					p=0.001 df=4 χ2=15.237
Illiterate	73	24(16.2)	31(14.8)	18(7.4)	
Primary	182	56(37.5)	80(38.3)	46(19.1)	
Secondary	216	48(32.2)	45(21.5)	123(50.8)	
Graduation and above	129	21(14.1)	53(25.4)	55(22.7)	
Marital status					p=0.001 df=2 χ2=14.194
Single	68	53(35.6)	8(3.9)	7(2.8)	
Married	463	80(53.7)	172(82.2)	211(87.3)	
Divorced/Separated	23	7(4.6)	7(3.3)	9(3.7)	
Widowed	46	9(6.1)	22(10.6)	15(6.2)	
Type of family					p=0.001

Nuclear	488	116(77.8)	147(70.3)	225(92.9)	df=2 χ2=31.213
Joint	112	33(22.2)	62(29.7)	17(7.1)	
Occupation					p=0.001 df=6 χ2=37.813
Government	73	19(12.7)	22(10.5)	32(13.2)	
Private	184	16(10.7)	53(25.3)	115(47.5)	
Self employed	82	32(21.5)	39(18.7)	11(4.5)	
Retired	103	31(20.8)	65(31.1)	7(2.8)	
Homemaker	125	45(30.2)	11(5.2)	69(28.5)	
Others	33	6(4.1)	19(9.2)	8(3.3)	
Socio economic status					p=0.001 df=2 χ2=28.645
Upper class	202	30(20.1)	88(42.1)	84(34.7)	
Upper middle class	146	25(16.7)	48(22.9)	73(30.1)	
Middle class	116	48(32.2)	25(11.9)	43(17.7)	
Lower middle class	71	17(11.5)	31(14.9)	23(9.5)	
Lower class	65	29(19.5)	17(8.2)	19(7.8)	
Family history of Hypertension					p=0.001 df=2 χ2=54.178
Yes	385	26(17.4)	143(68.4)	216(89.3)	
No	163	107(71.8)	41(19.7)	15(6.2)	
Don't know	52	16(10.8)	25(11.9)	11(4.5)	
Fruits and vegetable consumption					p=0.001 df=2 χ2=52.119
Adequate (≥5 servings /day)	214	113(75.8)	69(33.1)	32(13.3)	
Inadequate (5 servings/day)	386	36(24.2)	140(66.9)	210(86.7)	
Salt consumption					p=0.001 df=2 χ2=18.237
Minimal(<5g/day)	99	89(59.7)	7(3.3)	3(1.2)	
Moderate	212	41(27.5)	72(34.5)	99(40.9)	
Excessive (>5g/day)	289	19(12.8)	130(62.2)	140(57.9)	
Physical activity level					p=0.001 df=4 χ2=49.438
Adequate (≥150 min/week)	201	138(92.6)	49(23.4)	14(5.8)	
Inadequate (<150 min/week)	399	11(7.4)	160(76.6)	228(94.2)	
Tobacco use					p=0.001 df=2 χ2=38.976
Yes	147	13(8.7)	77(36.8)	57(23.5)	
No	453	136(91.3)	132(63.2)	185(76.5)	
Alcohol consumption					p=0.001 df=2 χ2=21.147
Yes	226	11(7.4)	44((21.1)	171(70.6)	
No	374	138(92.6)	165(78.9)	71(29.3)	
Sleep duration					p=0.001 df=2 χ2=33.189
High (<6 hrs)	144	78(52.4)	31(14.8)	35(14.4)	
Moderate (6-8 hrs)	189	57(38.2)	46(22.1)	86(35.5)	
Low (>8 hrs)	267	14(9.4)	132(63.1)	121(50.1)	
Self - reported stress level					p=0.001 df=2 χ2=47.511
Yes	432	15(10.1)	186(88.9)	231(95.4)	
No	168	134(89.9)	23(11.1)	11(4.6)	
BMI					p=0.001 df=2 χ2=19.236
Normal	312	147(98.6)	157(75.1)	8(3.3)	
Overweight/Obesity	288	2(1.4)	52(24.9)	234(96.7)	
Waist circumference					
Abdominal obesity	290	0(0.0)	11(3.8)	279(96.2)	

Discussion

The National pooled prevalence of hypertension among adults in India stands at approximately 22.6% to 26.3%, according to national demographic health surveys and empirical analysis. [18] This means 1in 4 adults across the country suffers from high blood pressure. Urban populations typically demonstrate higher awareness and treatment rates (around 24% to 67% depending on the specific slum or city cohort surveyed) compared to rural counterparts, yet blood pressure control remains low among diagnosed individuals. [19] This community based descriptive cross-sectional study determined a high prevalence of prehypertension and hypertension in urban areas of selected wards of Mysore city, which was 35.1% and 30.6%, respectively. In the present study it was found that only twenty five percent of the subjects were in normal category, which displays the seriousness of chronic disease.

In comparison to the prevalence reported in other studies the prevalence of hypertension in the present study (30.66%) was higher. [7, 9–12] An estimated 1.4 billion adults aged 30-79 years worldwide had hypertension, which is 33% of global population, according to World Health Organization (2024) [1], the overall prevalence of hypertension in India was 35.5%, affecting an estimated 315 million individuals across India. [13] The prevalence of prehypertension in the present study was 35.1% (male:36.6% and female:33.1%). The prevalence reported in the study conducted by Maharashtra (25%) [14, 34], Nellore (22.3%) [20] was low and Bihar (37.95%) [21], was comparatively high in comparison with the current study. Differences in hypertension and pre-hypertension prevalence across studies and the current study could be due to the type of research method used, study population, measurements, regional, cultural differences, and lifestyle characteristics of the study subjects. With respect to gender, men exhibit higher prevalence of hypertension and pre-hypertension than their female counterparts (M:37.3% and F:24.3%) and (M:36.6% and

F:33.1%), respectively which aligns with the other studies. [21–24]

Although significant differences exist in the prevalence, pathophysiology and outcomes of hypertension in males and females, which could be due to combination of biological (sex) and psychosocial (gender) mediated factors. [25] The gender disparity in hypertension prevalence could be also due to behavioural risk factors like high body mass index (BMI) [26] and, to a lesser degree, smoking and low physical activity. [28] Men and women differ in these key behavioural risk factors in somewhat complex ways. Women with no alcohol and smoking might be a protective factor against hypertension, although this gender difference has narrowed over the previous decades. [27]

Hypertension prevalence increases sharply as people get older, making age as an important risk factor for hypertension. As the age was advancing so did the prevalence of hypertension among both the sexes. [1, 7, 9, 21–23, 28, 31] Studies done by Prakash Mathiyalagen *et al*, Justyna Leszczak *et al*, confirms that advancing age is the most significant non-modifiable risk factor for the prevalence of hypertension. [29, 30] Cross sectional studies, systematic reviews and longitudinal epidemiologic data consistently demonstrate a linear or progressive curve where blood pressure risk scales upward with every subsequent decade of life. [31]

In the current study, marital status, education, occupation, socioeconomic status, BMI, abdominal obesity, alcohol use, salt intake, stress level and physical activity were significantly associated with the hypertension. The higher education level was negatively correlated to hypertension in the present study, which could be due to better knowledge, healthy lifestyle and awareness. But pre-hypertension rate was more which may be due to occupational stress and sedentary lifestyle. Inadequate physical activity significantly increases the risk and prevalence of hypertension. People who are inactive have a 30 to 50% greater risk of developing high blood pressure compared to active individuals. As per WHO report physical inactivity often leads to weight gain and obesity, which places extra pressure on artery walls and raises blood pressure. [1, 17]

To measure overweight and obesity anthropometric measurements like BMI, waist and hip circumference were taken and found 48% of central/abdominal obesity. The current study showed higher the BMI, overweight status and obesity, significant risk of developing hypertension. Study conducted by Sukanta das proved positive relation between increasing BMI and association of hypertension. [1–4, 9, 17, 21–24, 32] Few other studies also say the epidemiological prevalence of obesity related hypertension is driven by a nearly linear relationship between rising BMI and increased BP, with population studies like the Framingham Heart Study, attributing 65% to 78% of primary hypertension cases directly to excess adiposity. [26]

As per WHO report, alcohol consumption was the third largest risk factor in the developed countries and tobacco use was being the major cause of death worldwide. [16] Unhealthy lifestyle behaviours including tobacco use, alcohol consumption, high salt intake in any forms (extra salt in food, pickles, papads, processed food, mixtures, masala food etc), consuming less vegetables and fruits in diet, have a strong, direct statistical and physiological association with high prevalence and severity of hypertension. This study implied the positive association between alcohol and tobacco use and hypertension, showing more prevalence among tobacco and alcohol users compared to non- users. This finding is supported by other studies also. [9, 11, 13, 17, 26] This study also showed high stress and sleeping less than 7 hours a night significantly increases the prevalence and risk of developing hypertension. High stress keeps the nervous system active and raises stress hormones like cortisol and adrenaline, which constricts the blood vessels and drives up blood pressure. Stress also ruins sleep quality, creating a cycle that further strains the heart. [33]

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Conclusion & Recommendation

The results from the current study concludes that approximately one- third of adults in urban city samples suffer from hypertension, driven heavily by lifestyle factors like physical inactivity, poor diet and central obesity. The prevalence of both prehypertension and hypertension found to be high in selected wards of urban Mysore. This shows a major public health challenge making the people vulnerable to several chronic diseases and other co. morbidities. Specifically, men are at more risk of being hypertensive than female. Increasing age is proved to be an independent risk factor for hypertension. Programs are needed to improve the surveillance systems and implementation of community-based screening programs for early detection of hypertension is also needed. Early detection through community-based screening and targeted interventions focusing on lifestyle modification are essential to reduce the burden of hypertension. Findings emphasize the need for interventions targeting diet modification, physical activity promotion, and alcohol and tobacco cessation for hypertension control. Strengthening primary healthcare access and awareness programs in urban settings can help mitigate the growing burden of hypertension.

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