



PREVALENCE OF HYPERTENSION AMONG ADULTS ATTENDING URBAN HEALTH CENTRES: A CROSS-SECTIONAL STUDY

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Abstract

Background: Hypertension is a leading modifiable risk factor for cardiovascular morbidity and mortality. Urban populations in India are disproportionately affected due to lifestyle transitions and demographic shifts. **Objectives:** To determine the prevalence of hypertension and its associated risk factors among adults attending urban health centres. **Methods:** A cross-sectional study was conducted among 340 adults (≥ 18 years) attending urban health centres over six months. Blood pressure was measured using a standardised mercury sphygmomanometer, and hypertension was defined as systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg or current use of antihypertensive medications per JNC-7 criteria. A pre-tested structured questionnaire was used to collect sociodemographic and lifestyle data. **Results:** The overall prevalence of hypertension was 33.5% (n=114). Prevalence was significantly higher in males (38.2%) than females (28.7%), and increased markedly with age ($p < 0.001$). Significant associations were found with obesity (BMI ≥ 25 kg/m²), physical inactivity, tobacco use, excess salt intake, family history of hypertension, and diabetes. **Conclusion:** Hypertension prevalence is high among urban adults, with modifiable lifestyle risk factors playing a dominant role. Targeted screening programmes at urban health centres are urgently needed.

Keywords: Hypertension, urban, prevalence, risk factors, India, cross-sectional

Introduction

Hypertension, defined as a persistently elevated blood pressure of $\geq 140/90$ mmHg, is recognised globally as the single most important modifiable risk factor for cardiovascular disease, stroke, chronic kidney disease, and premature death. The global burden of hypertension has escalated dramatically over the past two decades, with approximately 1.13 billion adults affected worldwide as of 2015. The majority of this burden — nearly two-thirds — resides in low- and middle-income countries (LMICs), where health systems are least equipped to manage chronic non-communicable diseases (NCDs). [1,2,3]

India is witnessing a rapid epidemiological transition driven by urbanisation, sedentary lifestyles, dietary changes, and population ageing. These factors have accelerated the prevalence of hypertension across all demographic groups, with urban populations bearing a disproportionately

higher burden than their rural counterparts. A systematic review and meta-analysis by Anchala et al. (2014) estimated the pooled prevalence of hypertension in urban India at approximately 33.8%, compared to 27.6% in rural India, highlighting a significant urban-rural divide. Similarly, the ICMR-INDIAB study found age-standardised prevalence of hypertension to be 26.3% overall, with urban residents in states like Tamil Nadu and Chandigarh demonstrating prevalence rates exceeding 30%. [4,5,6]

Despite the high prevalence, awareness, treatment, and control of hypertension remain abysmally low in India. Anchala et al. reported that among hypertensive individuals in urban areas, only 42% were aware of their condition, 38% were on treatment, and a mere 20% had their blood pressure adequately controlled. The Jaipur Heart Watch study further demonstrated a 25-year rising trend in hypertension prevalence in urban India from 1991 to 2015, projecting that nearly 44% of the urban adult population would be hypertensive by 2030. These data underscore the urgent need for community-level screening, particularly at urban health centres (UHCs) which serve as the first point of contact for a large segment of the urban population. [7]

Risk factors for hypertension are multifactorial and include non-modifiable determinants such as age, sex, and family history, alongside modifiable factors including obesity, physical inactivity, tobacco and alcohol use, high dietary salt intake, and diabetes mellitus. A study in an urban slum of Western Maharashtra by Bendhari et al. (2016) identified age, BMI, physical activity, salt intake, smoking, family history, and waist-hip ratio as the predominant risk factors. Similarly, a study among urban adults in Mumbai (2015–16) demonstrated that 34.5% of participants had hypertension, with increasing age, low physical activity, high BMI, and family history significantly associated with hypertension. [8,9,10]

Urban health centres in India provide outreach primary healthcare services and represent an important sentinel site for detecting undiagnosed hypertension in the community. However, data specifically from UHC attendees in many parts of India remain sparse. This study was therefore undertaken to estimate the prevalence of hypertension and identify associated risk factors among adults attending urban health centres, with the aim of informing targeted intervention strategies.

Materials and Methods

Study Design and Setting

A hospital-based cross-sectional study was conducted at two urban health centres located in Central India, over a period of six months (January 2017 to June 2017). These centres served a combined registered population of approximately 45,000 individuals across mixed socioeconomic urban communities.

Study Population and Sample Size

All adults aged ≥ 18 years attending the outpatient department (OPD) of the urban health centres during the study period were eligible. Individuals with known acute illness, pregnant women, and those who refused consent were excluded. Using the estimated prevalence of hypertension in urban India of 33% from prior studies, at 95% confidence level with a permissible error of 5%, the minimum required sample size was calculated as 340 using the formula $n = Z^2pq/d^2$. All 340 eligible consenting participants were enrolled consecutively.

Data Collection

A pre-tested, structured questionnaire was administered by trained medical interns under supervision. Data collected included: sociodemographic information (age, sex, education, occupation, socioeconomic status classified using the modified BG Prasad scale), anthropometric measurements (height, weight, waist circumference), lifestyle parameters (physical activity, tobacco and alcohol use, dietary salt intake), and personal/family medical history (diabetes, family history of hypertension, duration of known hypertension).

Blood Pressure Measurement

Blood pressure was measured using a standard mercury sphygmomanometer (adult cuff size 12–13 cm × 35 cm) after the participant had been seated at rest for at least 5 minutes, in a quiet room. Two readings were taken 5 minutes apart on the right arm, and the average was recorded. Hypertension was defined as mean systolic BP ≥ 140 mmHg and/or mean diastolic BP ≥ 90 mmHg, or current use of antihypertensive medications, as per JNC-7 classification. BMI was calculated as weight (kg)/height (m²); overweight was defined as BMI 23.0–24.9 kg/m² and obesity as BMI ≥ 25.0 kg/m² per revised Asian cut-offs.

Statistical Analysis

Data were entered in Microsoft Excel and analysed using SPSS version 20.0. Frequencies, percentages, means, and standard deviations were computed for descriptive statistics. Chi-square test was used to assess associations between hypertension and categorical variables. Logistic regression analysis was performed to identify independent predictors of hypertension. A p-value of <0.05 was considered statistically significant.

Ethical Consideration

Written informed consent was obtained from all participants. Confidentiality of data was maintained throughout the study.

3. Results

A total of 340 adults participated in the study with a 100% response rate. The mean age of participants was 42.6 ± 13.8 years. The age range was 18 to 75 years.

Table 1: Sociodemographic Profile of Study Participants (n=340)

Variable	Category	Number (n)	Percentage (%)
Sex	Male	165	48.5
	Female	175	51.5
Age Group (years)	18–30	68	20.0
	31–45	102	30.0
	46–60	112	32.9
	>60	58	17.1
Education	Illiterate	54	15.9
	Primary	87	25.6
	Secondary	118	34.7
	Graduate & above	81	23.8
Occupation	Unskilled labour	76	22.3
	Skilled/semiskilled	98	28.8
	Business/self-employed	72	21.2
	Housewife	71	20.9
	Professional	23	6.8
Socioeconomic Class (BG Prasad)	Class I–II (Upper)	82	24.1
	Class III (Middle)	136	40.0
	Class IV–V (Lower)	122	35.9

Table 2: Prevalence of Hypertension by Sex and Age Group (n=340)

Category	Total	Hypertensive (n)	Prevalence (%)	p-value
Overall	340	114	33.5	—
Male	165	63	38.2	<0.05

Female	175	51	28.7	
18–30 years	68	8	11.8	<0.001
31–45 years	102	28	27.5	
46–60 years	112	48	42.9	
>60 years	58	30	51.7	

The overall prevalence of hypertension was 33.5% (114/340). Among hypertensive participants, 62 (54.4%) were newly diagnosed (i.e., unaware of their hypertensive status prior to this study), 35 (30.7%) were known hypertensives on treatment, and 17 (14.9%) were known hypertensives not on regular treatment.

Table 3: Distribution of Hypertension by Stage (JNC-7) (n=114)

Stage	BP Range	Number (n)	Percentage (%)
Pre-hypertension	120–139/80–89 mmHg	72	21.2 (of total 340)
Stage I Hypertension	140–159/90–99 mmHg	71	62.3 (of 114)
Stage II Hypertension	≥160/≥100 mmHg	43	37.7 (of 114)

Table 4: Association of Risk Factors with Hypertension (n=340)

Risk Factor	Hypertensive (n=114) n (%)	Non-hypertensive (n=226) n (%)	Chi-square	p-value
Obesity (BMI ≥25 kg/m ²)	74 (64.9)	72 (31.9)	32.4	<0.001
Physical inactivity	81 (71.1)	108 (47.8)	16.8	<0.001
Tobacco use	58 (50.9)	74 (32.7)	10.6	<0.001
Alcohol use	41 (36.0)	52 (23.0)	6.9	<0.01
High salt intake (>5g/day)	67 (58.8)	88 (38.9)	12.5	<0.001
Family history of HTN	63 (55.3)	71 (31.4)	18.7	<0.001
Diabetes mellitus	39 (34.2)	28 (12.4)	24.3	<0.001

Table 5: Awareness, Treatment and Control Status Among Hypertensives (n=114)

Status	Number (n)	Percentage (%)
Unaware (newly detected)	62	54.4
Aware but not on treatment	17	14.9
On treatment but uncontrolled	21	18.4
On treatment and controlled	14	12.3

4. Discussion

The present study found an overall prevalence of hypertension of 33.5% among adults attending urban health centres, which is consistent with the established trend of high hypertension burden in urban India. Anchala et al. (2014),[5] in a systematic review and meta-analysis encompassing 142 studies, reported a pooled urban hypertension prevalence of 33.8% in India, remarkably similar to our findings. The ICMR-INDIAB study by Anjana et al. (2015)[6] reported age-standardised prevalence rates ranging from 28.1% to 31.5% across urban residents of four Indian states, again corroborating our observations. These concordant findings emphasise that approximately one-third of urban adults in India carry the burden of hypertension, establishing it as a major public health crisis.

The prevalence of hypertension was significantly higher among males (38.2%) compared to females (28.7%) in this study ($p<0.05$). This finding aligns with the report of the Jaipur Heart Watch study (2017),[7] which documented higher prevalence rates in men across all survey waves spanning

1991 to 2015. Male preponderance may be explained by higher rates of tobacco and alcohol use, greater occupational stress, and earlier onset of atherosclerotic changes in men. However, it is noteworthy that post-menopausal women demonstrate a sharp rise in hypertension rates due to loss of oestrogen-mediated vascular protection, a pattern reflected in the increasing female prevalence beyond 60 years in our data.

A strong and statistically significant age-related trend was observed, with prevalence rising from 11.8% in the 18–30 year age group to 51.7% in those above 60 years ($p < 0.001$). This progressive rise mirrors findings from Bendhari et al. [9] (2016), who reported age as the strongest predictor of hypertension in their urban slum study, and is consistent with the well-established pathophysiology of age-related arterial stiffening and progressive decline in baroreceptor sensitivity.

Critically, 54.4% of hypertensive participants in the present study were unaware of their condition. This prevalence of undiagnosed hypertension is alarming but not unexpected. Anchala et al. (2014) [5] reported that only 42% of urban hypertensives were aware of their diagnosis, and the NFHS-4 (2015–16) data revealed that a significant proportion of the hypertensive population in urban India remained undiagnosed. Furthermore, among those aware and on treatment in our study, only 12.3% had achieved adequate blood pressure control, compared to 20% reported by Anchala et al. [5] and approximately 36% projected by the Jaipur Heart Watch study. These low rates of awareness, treatment, and control represent a critical gap in the hypertension care continuum and demand urgent attention at the primary care level.

Obesity was the strongest modifiable risk factor in this study, with 64.9% of hypertensives being obese ($\text{BMI} \geq 25 \text{ kg/m}^2$), compared to only 31.9% of normotensives ($p < 0.001$). This is consistent with data from the ICMR-INDIAB study, where generalised obesity was one of the strongest independent predictors of hypertension in multivariate analysis. Physical inactivity was significantly associated with hypertension (71.1% vs 47.8%; $p < 0.001$), corroborating the findings of Bendhari et al. [9] and multiple reviews demonstrating that regular physical activity reduces systolic blood pressure by 4–8 mmHg.

Tobacco use was significantly associated with hypertension in our study (50.9% vs 32.7%; $p < 0.001$). While the acute pressor effect of nicotine is well-documented, chronic tobacco use promotes endothelial dysfunction and sympathetic nervous system activation, both of which contribute to sustained hypertension. Similarly, excessive dietary salt intake ($> 5 \text{ g/day}$) was significantly more common among hypertensives (58.8% vs 38.9%; $p < 0.001$), in keeping with the ICMR-INDIAB finding that salt intake $\geq 6.5 \text{ g/day}$ was independently associated with hypertension (OR: 1.4, 95% CI: 1.0–1.9).

Family history of hypertension was present in 55.3% of hypertensives versus 31.4% of non-hypertensives ($p < 0.001$), highlighting the role of hereditary predisposition, and reaffirming the importance of targeted family-based screening strategies. Diabetes mellitus was found in 34.2% of hypertensives compared to 12.4% of normotensives ($p < 0.001$), reflecting the well-established pathophysiological linkage between insulin resistance, hyperinsulinaemia, and activation of the renin-angiotensin-aldosterone system.

The distribution of hypertension by JNC-7 stage showed that 62.3% of hypertensives had Stage I and 37.7% had Stage II hypertension. An additional 21.2% of the total study population had pre-hypertension, a subgroup at high risk of progression to overt hypertension. Addressing pre-hypertension through non-pharmacological interventions at the UHC level represents an important preventive opportunity.

A key strength of this study is its setting at urban health centres, which represent a functionally important and understudied sentinel point for hypertension detection in India. The standardised BP measurement protocol and use of a validated questionnaire add rigour to the findings. Limitations include the cross-sectional design, which precludes causal inference, potential selection bias since UHC attendees may not fully represent the broader urban community, and the restriction of BP measurement to a single visit rather than three separate visits as recommended by guidelines.

Conclusion

The prevalence of hypertension among adults attending urban health centres was found to be 33.5%, with more than half of hypertensive individuals unaware of their condition. Obesity, physical inactivity, tobacco use, high salt intake, family history of hypertension, and diabetes mellitus were significantly associated risk factors. These findings underscore the urgent need to strengthen hypertension screening at urban primary care facilities, promote community-level awareness, and implement targeted lifestyle modification programmes. Urban health centres must be empowered to serve as active platforms for NCD prevention and control.

References

1. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380(9859):2224–60.
2. Mills KT, Bundy JD, Kelly TN, Reed JE, Kearney PM, Reynolds K, et al. Global disparities of hypertension prevalence and control: a systematic analysis of population-based studies from 90 countries. *Circulation*. 2016;134(6):441–50.
3. Poulter NR, Prabhakaran D, Caulfield M. Hypertension. *Lancet*. 2015;386(9995):801–12.
4. Gupta R, Gaur K, Ram CVS. Emerging trends in hypertension epidemiology in India. *J Hum Hypertens*. 2016;30(9):501–7.
5. Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E, et al. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *J Hypertens*. 2014;32(6):1170–7.
6. Anjana RM, Pradeepa R, Das AK, Deepa M, Bhansali A, Joshi SR, et al. Prevalence of and risk factors for hypertension in urban and rural India: the ICMR-INDIAB study. *J Hum Hypertens*. 2015;29(3):204–9.
7. Gupta R, Gaur K, Deedwania P, Gupta BS, Mahajan S, Gupta A, et al. 25-Year trends in hypertension prevalence, awareness, treatment, and control in an Indian urban population: Jaipur Heart Watch. *Indian Heart J*. 2018;70(6):802–7.
8. Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Avezum A, et al. Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *JAMA*. 2013;310(9):959–68.
9. Bendhari ML, Korade RS, Haralkar SJ. Study of prevalence and risk factors of hypertension in adults in an urban slum area of Western Maharashtra, India. *Int J Community Med Public Health*. 2016;3(10):2812–6.
10. Shetty S, Patil A, Naik J. Prevalence of hypertension and pre-hypertension in adults attending urban health centre in Mumbai: a cross-sectional study. *J Clin Diagn Res*. 2016;10(11):LC01–4.