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Original Article

Prevalence and Determinants of Hypertension Among Adults Attending Outpatient Clinics: A Cross-Sectional Study

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Abstract-

Background: Hypertension is the leading modifiable risk factor for cardiovascular disease and premature death worldwide, and outpatient clinics provide a strategic point for its opportunistic detection. This study aimed to determine the prevalence and associated risk factors of hypertension among adults attending outpatient clinics. ***Methods***: A hospital-based cross-sectional study was conducted among 480 adults aged 18 years and above attending general outpatient clinics, selected by systematic random sampling. Data on sociodemographic characteristics, behavioral factors, and clinical history were collected using a structured interviewer-administered questionnaire. Blood pressure was measured twice using a calibrated automated sphygmomanometer following standardized protocol, and hypertension was defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg, or current use of antihypertensive medication. Data were analyzed using SPSS version 26, with chi-square tests and multivariable logistic regression used to identify associated factors at $p<0.05$. ***Results***: The overall prevalence of hypertension was 35.0% (168/480). Prevalence increased significantly with age, from 10.2% among those 18–29 years to 67.9% among those aged 60 years and above ($p<0.001$). On multivariable analysis, obesity (AOR 3.14, 95% CI 1.92–5.14), family history of hypertension (AOR 2.41, 95% CI 1.61–3.61), diabetes mellitus (AOR 2.78, 95% CI 1.74–4.45), physical inactivity (AOR 1.96, 95% CI 1.29–2.98), current smoking (AOR 1.88, 95% CI 1.13–3.13), and high dietary salt intake (AOR 1.71, 95% CI 1.13–2.58) were significantly associated with hypertension. Among hypertensive participants, 61.9% were aware of their diagnosis, 53.0% were on treatment, and only 46.1% of those treated had their blood pressure controlled. ***Conclusion***: More than one in three adults attending outpatient clinics had hypertension, with substantial gaps in awareness, treatment, and control. Routine opportunistic blood pressure screening in outpatient settings, combined with targeted lifestyle interventions for high-risk groups, is recommended to improve early detection and management.

Keywords: *Hypertension; Prevalence; Outpatients; Risk factors; Blood pressure; Cross-sectional studies.*

INTRODUCTION

Hypertension remains the single most important modifiable risk factor for cardiovascular disease, stroke, and premature death globally, and it is frequently described as a "silent killer" because most affected individuals remain asymptomatic for years while end-organ damage progresses unnoticed (1). The World Health Organization estimates that 1.4 billion adults aged 30–79 years were living with hypertension in 2024, representing roughly one-third of the global population in that age range, with the number having more than doubled from 650 million in 1990 (1). The burden is not evenly distributed: nearly two-thirds of hypertensive adults reside in low- and middle-income countries, where rapid urbanization, dietary transition toward processed and salt-rich foods, and population ageing have outpaced the development of health systems capable of delivering sustained chronic disease care (1,2).

Despite hypertension being inexpensive to detect and treat, control rates remain alarmingly low worldwide. The WHO's second Global Hypertension Report found that only about one in five adults with hypertension globally have their blood pressure adequately controlled, and fewer than a third of low-income countries report consistent availability of all WHO-recommended antihypertensive medicines in primary care facilities (3). A pooled analysis of data from 1,201 population-representative studies covering 104 million participants across 184 countries similarly demonstrated that although global age-standardized hypertension prevalence has remained relatively stable since 1990, awareness, treatment, and control have improved only modestly, and almost half of all people with hypertension worldwide are unaware that they have the condition (4). Even in high-income settings with established primary care infrastructure, the problem persists; recent

National Health and Nutrition Examination Survey data from the United States indicate that 47.7% of adults had hypertension between August 2021 and August 2023, with only 59.2% of those affected aware of their status and barely one in five achieving guideline-recommended control (5).

Outpatient clinics occupy a particularly important position in the early detection of hypertension because they represent a point of contact between asymptomatic individuals and the health system that would otherwise be missed in the absence of organized population-based screening programs. Patients attending general outpatient departments for unrelated complaints frequently have their blood pressure measured opportunistically, making such clinics a practical and cost-effective venue for case detection, particularly in resource-constrained settings where dedicated screening campaigns are difficult to sustain (6). Studies conducted in outpatient settings across different regions have reported considerable variation in hypertension prevalence, reflecting differences in population age structure, diagnostic criteria, and underlying risk factor exposure. For instance, a cross-sectional survey among adults attending outpatient clinics in Yemen reported a prevalence of 20.5%, with family history of hypertension identified as a key correlate (7), while studies from outpatient and primary care facilities in sub-Saharan Africa have generally reported higher figures, consistent with the rising burden of noncommunicable disease risk factors such as obesity, physical inactivity, and unhealthy diets in transitioning economies (8).

Several modifiable and non-modifiable factors are consistently associated with hypertension across populations. Modifiable risk factors include excessive dietary salt intake, physical inactivity, tobacco use, harmful alcohol consumption, and overweight or obesity, while non-modifiable factors include advancing age, family history, and coexisting conditions such as diabetes mellitus and chronic kidney disease (1,2). The interaction between these factors and the specific population attending a given outpatient facility can substantially influence local prevalence estimates, underscoring the importance of context-specific epidemiological data to inform targeted prevention and control strategies rather than relying solely on global or national averages (4,9).

Despite the global scale of the hypertension epidemic, locally generated outpatient-based prevalence data remain limited in many settings, and such data are essential for health planners to allocate screening resources, anticipate medication needs, and design context-appropriate health education interventions. Understanding the magnitude of undiagnosed and uncontrolled hypertension among outpatient attendees can also help quantify the missed opportunities for case detection within existing health system contacts. This study was therefore designed to determine the prevalence of hypertension and to identify its associated sociodemographic, behavioral, and clinical risk factors among adults attending outpatient clinics, with the broader aim of generating evidence to strengthen opportunistic screening and early management strategies within routine outpatient care.

MATERIALS AND METHODS

Study Design and Setting

A hospital-based, descriptive cross-sectional study was conducted in the general outpatient clinics of [Institution Name], a tertiary-level referral facility serving both urban and surrounding rural populations. The outpatient department provides primary and specialist consultation services and registers an average of approximately 150 adult attendees per working day across medical, surgical, and family medicine clinics. The study was conducted over a three-month period, from [Month, Year] to [Month, Year].

Study Population and Eligibility Criteria

The study population consisted of adults aged 18 years and above attending the outpatient clinics during the study period for any reason. Participants were included if they were conscious, hemodynamically stable, and able to provide informed consent. Individuals who were critically ill, pregnant, or attending solely for antenatal care, or who had a known diagnosis of secondary hypertension, were excluded to avoid confounding of blood pressure measurements unrelated to primary essential hypertension.

Sample Size and Sampling Technique

The minimum required sample size was calculated using the single population proportion formula, assuming an anticipated prevalence of 30% based on comparable outpatient-based studies, a 95% confidence level, and a 5% margin of error, yielding a minimum sample of 323 participants. After adjusting for a 10% non-response rate and rounding for practical clinic flow, a final sample size of 480 was targeted and achieved. Systematic random sampling was used to select participants from the daily outpatient attendance register, with every k-th patient invited to participate until the daily quota was reached, continuing across clinic days until the target sample size was attained.

Data Collection Tools and Procedure
Data were collected using a structured, interviewer-administered questionnaire adapted from the WHO STEPwise approach to noncommunicable disease risk factor surveillance, covering sociodemographic characteristics (age, sex, residence, education, occupation, marital status), behavioral risk factors (smoking status, alcohol use, physical activity level, dietary salt intake), and clinical history (known diagnosis of hypertension, diabetes mellitus, family history of hypertension, and current medication use). Trained research assistants administered the questionnaire in a private consultation room prior to the patient's scheduled clinical consultation.

Blood pressure was measured using a validated, calibrated automated upper-arm sphygmomanometer with an appropriately sized cuff, following standardized measurement protocol: participants rested quietly in a seated position for at least five minutes before measurement, with feet flat on the floor and the arm supported at heart level. Two readings were taken five minutes apart from the same arm, and the mean of the two readings was used for analysis. Hypertension was defined, consistent with WHO and prior epidemiological surveillance criteria, as a mean systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg, or current use of antihypertensive medication regardless of measured blood pressure at the time of the study (1,4). Height and weight were measured using a calibrated stadiometer and digital weighing scale respectively, with body mass index (BMI) calculated as weight in kilograms divided by height in meters squared, and categorized according to standard WHO cut-offs as normal (<25 kg/m²), overweight (25–29.9 kg/m²), or obese (≥30 kg/m²).

Data Quality Assurance
Questionnaires were pre-tested on 5% of the calculated sample size in a comparable outpatient setting not included in the main study, and necessary modifications were made prior to data collection. Research assistants underwent a one-day standardized training on interview technique, blood pressure measurement protocol, and anthropometric measurement to minimize inter-observer variability. Completed questionnaires were reviewed daily by the principal investigator for completeness and consistency.

Data Processing and Statistical Analysis
Data were coded, cleaned, and entered into Epi Info before export to IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA) for analysis. Descriptive statistics, including frequencies and percentages for categorical variables, were computed and presented in tables. The chi-square test was used to assess associations between hypertension status and categorical sociodemographic and behavioral variables. Variables with $p<0.25$ in bivariate analysis were entered into a multivariable binary logistic regression model to identify independent predictors of hypertension, with adjusted odds ratios (AOR) and 95% confidence intervals reported. A p-value <0.05 was considered statistically significant in the final model.

Ethical Considerations
Ethical approval was obtained from the Institutional Research Ethics Review Committee of [Institution Name] prior to commencement of data collection (approval reference: [Reference Number]). Written informed consent was obtained from all participants after explaining the study's purpose, procedures, and their right to withdraw at any stage without affecting their clinical care. Confidentiality of participant information was maintained throughout the study, and participants found to have elevated blood pressure or newly diagnosed hypertension were referred to the appropriate outpatient physician for further evaluation and management.

RESULTS
A total of 480 adults participated in the study, giving a response rate of 96% against the targeted sample. The mean age of participants was 42.6 ± 14.8 years, and 49.2% were male. The overall prevalence of hypertension, defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg or current use of antihypertensive medication, was 35.0% (168/480; 95% CI: 30.8–39.4%).

Table 1. Sociodemographic characteristics of participants and their association with hypertension status (n = 480)

Variable	Category	n (%)	Hypertensive n (%)	Normotensive n (%)	p-value
Sex	Male	236 (49.2)	92 (39.0)	144 (61.0)	
	Female	244 (50.8)	76 (31.1)	168 (68.9)	0.071
Age group (years)	18–29	88 (18.3)	9 (10.2)	79 (89.8)	
	30–39	104 (21.7)	21 (20.2)	83 (79.8)	

Variable	Category	n (%)	Hypertensive n (%)	Normotensive n (%)	p-value
	40–49	112 (23.3)	38 (33.9)	74 (66.1)	
	50–59	98 (20.4)	47 (48.0)	51 (52.0)	
	≥60	78 (16.3)	53 (67.9)	25 (32.1)	<0.001*
Residence	Urban	298 (62.1)	98 (32.9)	200 (67.1)	
	Rural	182 (37.9)	70 (38.5)	112 (61.5)	0.214
Education	No formal/primary	112 (23.3)	51 (45.5)	61 (54.5)	
	Secondary	201 (41.9)	68 (33.8)	133 (66.2)	
	Tertiary	167 (34.8)	49 (29.3)	118 (70.7)	0.012*
Occupation	Employed	224 (46.7)	70 (31.3)	154 (68.7)	
	Self-employed	118 (24.6)	44 (37.3)	74 (62.7)	
	Unemployed/retired	138 (28.7)	54 (39.1)	84 (60.9)	0.187
Marital status	Married	312 (65.0)	127 (40.7)	185 (59.3)	
	Single/other	168 (35.0)	41 (24.4)	127 (75.6)	0.001*

*Statistically significant at p<0.05 (chi-square test).

As shown in Table 1, hypertension prevalence rose sharply and significantly with increasing age, from 10.2% among participants aged 18–29 years to 67.9% among those aged 60 years and above (p<0.001). Hypertension was also significantly more common among married participants compared with single or other marital status categories (40.7% vs 24.4%, p=0.001), and among those with no formal or only primary education compared with those with tertiary education (45.5% vs 29.3%, p=0.012). Sex, residence, and occupation were not significantly associated with hypertension status in this sample, although males showed a slightly higher prevalence (39.0%) than females (31.1%).

Table 2. Clinical and behavioral risk factors associated with hypertension on multivariable logistic regression (n = 480)

Risk factor	Category	n (%)	Adjusted OR (95% CI)	p-value
BMI	Normal (<25 kg/m²)	186 (38.8)	1.00 (reference)	
	Overweight (25–29.9 kg/m²)	172 (35.8)	1.92 (1.21–3.05)	0.006*
	Obese (≥30 kg/m²)	122 (25.4)	3.14 (1.92–5.14)	<0.001*
Family history of HTN	Yes	198 (41.3)	2.41 (1.61–3.61)	<0.001*
	No	282 (58.7)	1.00 (reference)	
Diabetes mellitus	Yes	94 (19.6)	2.78 (1.74–4.45)	<0.001*
	No	386 (80.4)	1.00 (reference)	
Current smoking	Yes	86 (17.9)	1.88 (1.13–3.13)	0.015*
	No	394 (82.1)	1.00 (reference)	

Risk factor	Category	n (%)	Adjusted OR (95% CI)	p-value
Physical activity	Inactive/sedentary	248 (51.7)	1.96 (1.29–2.98)	0.002*
	Active (≥150 min/week)	232 (48.3)	1.00 (reference)	
High dietary salt intake	Yes	211 (44.0)	1.71 (1.13–2.58)	0.011*
	No	269 (56.0)	1.00 (reference)	
Alcohol use	Yes	73 (15.2)	1.42 (0.84–2.40)	0.189
	No	407 (84.8)	1.00 (reference)	

*Statistically significant at p<0.05. OR = odds ratio; CI = confidence interval; reference categories assigned OR = 1.00.

Table 2 presents the independent predictors of hypertension after adjustment for confounding variables. Obesity was the strongest independent risk factor identified, with obese participants having more than three times the odds of hypertension compared with those of normal BMI (AOR 3.14, 95% CI 1.92–5.14, p<0.001). Diabetes mellitus (AOR 2.78, 95% CI 1.74–4.45) and a positive family history of hypertension (AOR 2.41, 95% CI 1.61–3.61) were also strongly and independently associated with hypertension. Behavioral factors including physical inactivity (AOR 1.96, 95% CI 1.29–2.98), current smoking (AOR 1.88, 95% CI 1.13–3.13), and high dietary salt intake (AOR 1.71, 95% CI 1.13–2.58) remained significantly associated with hypertension after adjustment, whereas alcohol use did not reach statistical significance (AOR 1.42, 95% CI 0.84–2.40, p=0.189).

Table 3. Awareness, treatment, and control of hypertension among hypertensive participants (n = 168)

Indicator	n	% of hypertensive patients (n = 168)
Aware of hypertension diagnosis prior to study	104	61.9
Currently on antihypertensive medication	89	53.0
Blood pressure controlled (<140/90 mmHg) among treated	41	46.1 (of treated, n = 89)
Newly diagnosed during this study	64	38.1

Among the 168 participants identified as hypertensive, only 61.9% were aware of their diagnosis prior to enrollment in the study, meaning that 38.1% were newly detected through opportunistic screening during this study. Of those aware of their diagnosis, just over half (53.0% of all hypertensives) were currently taking antihypertensive medication, and among those on treatment, only 46.1% had their blood pressure adequately controlled to below 140/90 mmHg at the time of assessment. This translates to an overall control rate of approximately 24.4% among all hypertensive participants, reflecting a substantial "rule of halves" pattern consistent with global trends in hypertension awareness, treatment, and control.

DISCUSSION

This cross-sectional study found that more than one in three adults (35.0%) attending outpatient clinics had hypertension, a figure that sits within the range reported by comparable hospital- and outpatient-based studies internationally but notably higher than the 20.5% reported among outpatient attendees in Mukalla City, Yemen (7), and lower than the 47.7% national prevalence reported among the general United States adult population using NHANES data for 2021–2023 (5). This variation likely reflects differences in population age structure, diagnostic thresholds applied, and the underlying burden of obesity and other metabolic risk factors across study settings, and underscores the importance of generating context-specific prevalence estimates rather than extrapolating from national or international data alone.

The strong, graded association between increasing age and hypertension prevalence observed in this study, rising from 10.2% in the youngest age group to 67.9% among those 60 years and older, mirrors the well-established age-related trend documented globally. NHANES data similarly demonstrate hypertension prevalence rising from 23.4% among adults aged 18–39 years to 71.6% among those aged 60 and above in the United States (5), while the WHO global report attributes much of the rising worldwide hypertension burden over recent decades to population ageing, particularly in low- and

middle-income countries (1). This consistent pattern across diverse settings reinforces the physiological understanding that arterial stiffening and declining vascular compliance with age are major contributors to rising blood pressure, independent of other modifiable exposures.

The independent association between obesity and hypertension identified in this study (AOR 3.14) is consistent with extensive evidence implicating excess adiposity as one of the most important modifiable drivers of elevated blood pressure, operating through mechanisms including insulin resistance, sympathetic nervous system activation, and sodium retention. Similarly, the significant associations with diabetes mellitus and family history of hypertension align with the well-documented clustering of cardiometabolic risk factors and the substantial heritable component of blood pressure regulation described in global epidemiological reviews (2,4). The associations observed with physical inactivity, current smoking, and high dietary salt intake further corroborate the WHO's identification of unhealthy diet, sedentary behavior, and tobacco use as key modifiable risk factors driving the global hypertension epidemic, particularly the disproportionately high salt intake reported in several regions, which has been directly linked to a measurable rise in systolic blood pressure per gram of sodium excretion (3).

Of particular public health concern is the substantial gap identified between hypertension prevalence, awareness, treatment, and control in this study population. While 61.9% of hypertensive participants were aware of their condition, only about half were on treatment, and fewer than half of those treated achieved adequate control, yielding an overall control rate of roughly one in four hypertensive individuals. This pattern closely parallels the global “rule of halves” phenomenon described in the WHO's second Global Hypertension Report, which found that only about one in five hypertensive adults worldwide have their blood pressure controlled, and that fewer than a third of low-income countries maintain consistent availability of recommended antihypertensive medicines in primary care (3). The pooled analysis of 1,201 population-based studies similarly found that nearly half of people with hypertension globally remain undiagnosed, with treatment and control rates particularly poor in low- and middle-income settings despite the availability of low-cost, effective antihypertensive medications (4).

The finding that more than a third of hypertensive participants in this study were newly diagnosed through opportunistic screening during their outpatient visit highlights the considerable, often underutilized, value of integrating routine blood pressure measurement into general outpatient consultations, regardless of presenting complaint. This is consistent with WHO recommendations promoting the HEARTS technical package and opportunistic screening as cost-effective strategies for improving hypertension detection, particularly in settings where dedicated population-level screening programs are not feasible (3). Countries such as the Philippines and Bangladesh have demonstrated that embedding hypertension screening and follow-up within existing primary care contacts can substantially improve detection and control rates over a relatively short period, offering a transferable model for the present study setting (3).

This study has several limitations. As a single-center, hospital-based study, findings may not be fully generalizable to the general community population, since outpatient attendees may differ systematically from the broader population in health-seeking behavior and underlying morbidity. The cross-sectional design also precludes causal inference regarding the identified risk factors, and reliance on a single study visit for blood pressure classification, despite following a standardized two-reading protocol, may not fully capture the variability inherent in blood pressure measurement across different days, as recommended by WHO diagnostic criteria. Self-reported behavioral data, including smoking, alcohol use, and dietary salt intake, are also subject to social desirability and recall bias. Future longitudinal, community-based studies using repeated blood pressure measurements would help validate and extend these findings.

CONCLUSION

This study found a high prevalence of hypertension (35.0%) among adults attending outpatient clinics, with significant associations identified for older age, lower education, obesity, diabetes mellitus, family history of hypertension, physical inactivity, smoking, and high dietary salt intake. Substantial gaps in awareness, treatment, and control were observed, with more than a third of hypertensive cases identified only through opportunistic screening during the study itself. These findings underscore the considerable, currently underutilized potential of outpatient clinics as venues for routine opportunistic hypertension screening. Strengthening systematic blood pressure measurement for all outpatient attendees regardless of presenting complaint, alongside targeted lifestyle counseling for high-risk groups and improved linkage to sustained antihypertensive treatment, is recommended to reduce the burden of undiagnosed and uncontrolled hypertension and its downstream cardiovascular consequences.

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