IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS)
e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 21, Issue 4 Ser. I (July. – August. 2026), PP 87-93
www.Iosrjournals.org

Prevalence and Risk Factors of Hypertension among Adult Population, South India

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Abstract

Background: *Hypertension is a leading contributor to cardiovascular morbidity and mortality worldwide, with prevalence steadily rising in India. Awareness and control remain inadequate, particularly in semi-urban communities. This study assessed the prevalence of hypertension and identified associated demographic and clinical risk factors among adults in a selected community in Chennai.*

Methods: *A descriptive correlational design was adopted among 350 adults aged 30–59 years, selected through systematic random sampling. Data were collected using structured interviews and clinical assessments, including blood pressure measurement, BMI calculation, and lifestyle profiling. Hypertension was defined according to JNC-8 criteria. Statistical analyses were performed using Chi-square tests and correlation methods.*

Results: *The prevalence of hypertension was 19.42%, with 59% of cases previously diagnosed and 41% newly identified. Significant demographic risk factors included male gender (60.3%), age above 40 years (70.6%), and low educational status (55.9% illiterate). Clinical risk factors strongly associated with hypertension were obesity (BMI >30, 37%), non-vegetarian diet (75%), tobacco use (57%), smoking (69%), alcohol consumption (63%), sedentary lifestyle (62%), family history of hypertension (56%), comorbid diseases (57%), and perceived stress (43%).*

Conclusion: *Hypertension is highly prevalent among adults in this semi-urban community, particularly among males over 40 years with unhealthy lifestyle practices. The findings highlight the urgent need for community-based interventions emphasizing lifestyle modification, early screening, and public health education to reduce hypertension-related risks.*

Keywords: *Hypertension; Risk factors; Sedentary lifestyle; Tobacco use; Alcohol consumption; BMI; Adult population; Community health*

I. Introduction

Hypertension remains one of the most prevalent and preventable contributors to cardiovascular morbidity and mortality worldwide. In India, the burden of hypertension is escalating across both urban and rural populations, with recent studies indicating a sharp rise in prevalence among adults aged 30–59 years [1, 2]. Despite its growing impact, awareness, early detection, and control of hypertension remain suboptimal, particularly in semi-urban and rural communities. In selected community, lifestyle transitions, dietary shifts, and limited access to preventive care have compounded the risk of hypertension among adults [3].

Prior research has highlighted the influence of demographic and behavioural factors such as age, gender, education level, and physical inactivity on hypertension prevalence [4, 5]. Clinical risk factors including elevated body mass index (BMI), tobacco use, alcohol consumption, and family history of hypertension have also been strongly associated with increased blood pressure levels [6–8]. Sedentary lifestyles and poor dietary habits, especially high intake of non-vegetarian and processed foods, further exacerbate the risk, contributing to early onset and poor control of hypertension [9]. Moreover, perceived stress and comorbid conditions such as diabetes and cardiovascular disease have been shown to intensify hypertension-related complications [10].

Socioeconomic status, health literacy, and access to primary care services play a pivotal role in shaping hypertension outcomes. In communities with limited health infrastructure, early screening and lifestyle counselling are often neglected, leading to delayed diagnosis and unmanaged disease progression [11]. Conversely, targeted community-based interventions focusing on health education, physical activity promotion, and dietary modification have demonstrated success in reducing hypertension prevalence and improving quality of life [12].

Given the critical role of hypertension in shaping adult health outcomes and its modifiable nature, understanding its prevalence and associated risk factors is essential for effective intervention. In India's evolving

health landscape, village-level studies offer valuable insights into population-specific vulnerabilities. This study aims to assess the prevalence of hypertension and identify associated demographic and clinical risk factors among adults in selected community Chennai.

II. Materials and Methods

Study Design and Setting

A descriptive correlational study design was employed to assess the prevalence of hypertension and identify associated demographic and clinical risk factors among adults in selected community Chennai, Tamil Nadu. The study was conducted in a semi-urban community setting with a rising burden of non-communicable diseases.

Sample and Sampling Technique

The study population comprised 350 adults aged 30–59 years residing in the selected area at Chennai. Sample size was estimated based on the previous study findings on prevalence estimates of hypertension in Tamilnadu (30%), [13], using the formualae $4pq/d^2$ This required a minimum sample of 233 (95% CI), rounded up to 350 to account for potential non-response and better generalisation. Participants were selected using systematic random sampling from the village household registry.

Inclusion criteria specified that participants must be permanent residents of the village, aged between 30 and 59 years, and willing to participate in the study. Individuals were excluded if they had any cognitive impairment or serious illness that could interfere with participation or clinical assessment.

Data Collection Procedure and Instruments

Data were collected through structured interviews and clinical assessments conducted by trained nursing personnel. The interview schedule included a Demographic Profile Proforma capturing age, gender, education, marital status, and religion. Clinical variables were assessed using a standardized checklist that included BMI, tobacco use, smoking, alcohol consumption, dietary habits, physical activity, family history of hypertension, associated diseases, and perceived stress.

Blood pressure was measured using a calibrated digital sphygmomanometer following WHO guidelines [15]. BMI was calculated using height and weight measurements. Lifestyle variables were categorized based on frequency and intensity of behaviours. Perceived stress was assessed using a validated 4-point Likert scale adapted for community use.

Hypertension was defined according to JNC-8 criteria: systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg, or current use of antihypertensive medication [16]. Participants were classified as hypertensive (cases) or normotensive (controls) based on these criteria.

All tools underwent expert validation and pilot testing. Modifications were incorporated based on feedback from public health and nursing research experts. Data collection was conducted over a 30-days period in Nov 2024, with each interview and assessment taking approximately 30–40 minutes per participant.

Ethical Consideration

Ethical clearance was obtained from the Institutional Ethics Committee (IEC) of Apollo College of Nursing, Chennai, India (IEC No ACONC/IEC/2023/020 dated 31/10/23). Written informed consent was obtained from all participants prior to data collection. Confidentiality was maintained by anonymizing data using coded identifiers and storing all records in password-protected digital files accessible only to the research team.

Data Analysis

Data were analysed using IBM SPSS version 22. Descriptive statistics including frequency, percentage, mean, and standard deviation were used to summarize demographic and clinical characteristics. Chi-square tests were used to examine associations between hypertension status and categorical variables such as age, gender, education, BMI, lifestyle habits, and perceived stress. Correlation analysis was performed to assess relationships between continuous variables and hypertension scores. Statistical significance was set at $p<0.05$. Out of the total 350 participants, 68 were identified with the condition, yielding a prevalence rate of **19.42%**. Among them people with Hypertension were viewed as cases and who were free of hypertension were viewed as controls. This indicates that nearly one in five individuals in the study population were affected, highlighting a noteworthy proportion that warrants attention in both analysis and interpretation.

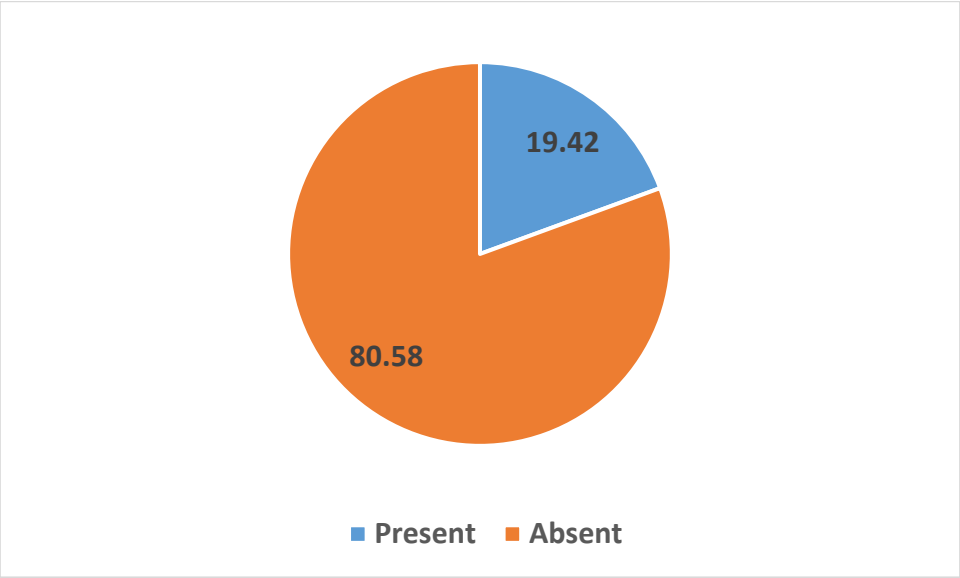

Fig 1: Prevalence of Hypertension among Adult Population

Out of the total 350 participants, 68 were identified with the condition, yielding a prevalence rate of **19.42%**.

Tab 1: Frequency and Percentage Distribution of Demographic Variables (N=350)

Variables	Category	Cases (n = 68)		Controls (n = 282)	
		f	%	f	%
Age	30–39	20	29	190	67
	40–49	26	38	80	28
	50–59	22	33	12	5
Education	Illiterate	14	21	121	43
	Primary	30	44	78	28
	Secondary	15	22	55	20
	Higher Secondary	6	9	20	7
	Degree & Above	3	4	8	2
Marital Status	Married	58	85	230	82
	Unmarried	10	15	51	18
	Widow	0	0	1	0
	Divorcee/Separated	0	0	0	0
Religion	Hindu	46	68	192	68
	Christian	21	31	84	30
	Muslim	1	1	5	2
	Others	0	0	1	0

Table 1 depicts that among cases (n=68) and controls (n=282), age distribution was similar, with most participants aged 40–49 years (cases: 38.2%, controls: 38.7%). Educational levels were generally low; primary education was most common (cases: 44.1%, controls: 42.9%), while higher secondary and degree qualifications were rare. Most participants were married (cases: 85.3%, controls: 81.6%), and majority of them were Hindus (cases: 68%, controls: 68%).

Tab 2 : Frequency and Percentage Distribution of Clinical Variables (N=350)

Clinical Variables	Category	Cases (n = 68)		Controls (n = 282)	
		f	%	f	%
BMI	<25	17	25	98	35
	25–29	25	37	120	42
	30–34	26	38	47	17
	35–39	0	0	17	6
Family History of Hypertension	Present	38	56	52	18
	Absent	30	44	230	82
Duration of Illness	< 2 Years	15	22	–	–
	2–5 Years	25	36.7	–	–
	> 5 Years	28	41.17	–	–

Table 2 highlights distinct differences between cases and controls. Among cases, a substantial proportion had BMI 30–34 (38.2%), recent tobacco chewing habits (43%), and reported smoking (69%) and alcohol

consumption (63%). Over half had a family history of hypertension (56%) and associated comorbidities (57%). Sedentary lifestyle was common (62%), with 81% diagnosed with hypertension and 75% following non-vegetarian diets.

In contrast, controls predominantly had BMI 25–29 (42%), engaged in physical activity (56%), and lacked perceived stress (51%). Most had no comorbidities (82%), were vegetarian (82%), and reported no tobacco use (81%), smoking (94%), or alcohol consumption (82%). Family history of hypertension was absent in 82% of controls. Among cases

Tab 3: Association between Demographic Variables and Hypertension among Cases and Controls

N=350

Variables	Category	Cases (n = 68)		Controls (n = 282)		χ^2 Value
		f	%	f	%	
Gender	Male	41	60	136	48	3.9*
	Female	27	40	146	52	
Age	30–39 yrs	20	29	190	67	32.8***
	> 40 yrs	48	71	92	34	
Educational Status	Illiterate	14	21	121	43	11.53***
	Literate	54	79	161	57	

*p<0.05 ***p<0.001

Table 3 presents the association between selected demographic variables and hypertension status among 350 participants. Gender was significantly associated with hypertension (χ^2=3.9, p<0.05), with a higher proportion of males among cases (60.3%) compared to controls (48.2%). Age showed a strong association (χ^2=32.8, p<0.001); 70.6% of cases were aged >40 years, whereas only 32.4% of controls fell in this age group. Educational status was also significantly associated (χ^2=11.53, p<0.001), with illiteracy more prevalent among cases (55.9%) than controls (32.4%). The demographic variables such as gender (male), (p<0.05), age above 40yrs and literates (p<0.001) were found to be the risk factors of hypertension.

Tab 4: Association between Clinical Variables and Hypertension among Cases and Controls.

(N=350)

Clinical Variables	Category	Cases (n = 68)		Controls (n = 282)		χ^2 Value
		f	%	f	%	
BMI	Up to 30	43	63	218	77	10.57***
	Above 30	25	37	64	23	
Food Habit	Non-veg	51	75	51	18	8.58***
	Veg	17	25	231	82	
History of Tobacco	Yes	39	57	56	20	6.18**
	No	29	43	226	80	
History of Smoking	Yes	47	69	70	25	7.64***
	No	21	31	212	75	
History of Alcohol	Yes	43	63	51	18	5.63*
	No	25	37	231	82	
Physical Activity	Sedentary	42	62	60	21	10.4***
	Moderate	26	38	222	79	
Family History	Yes	38	56	52	18	4.21*
	No	30	44	230	82	
Associated Diseases	Yes	39	57	62	22	6.38**
	No	29	43	220	78	
Perceived Stress	Yes	39	57	144	51	4.36*
	No	29	43	138	49	

***p<0.05 **p<0.01 ***p<0.001**

Table 4 demonstrates significant associations between hypertension and multiple clinical variables. Obesity (BMI >30) was more prevalent among cases (37%) than controls (23%) (χ^2=10.57, p<0.001). Non-vegetarian diet was significantly associated with hypertension (cases: 75%, controls: 18%; χ^2=8.58, p<0.001), as were tobacco use (χ^2=6.18, p<0.01), smoking (χ^2=7.64, p<0.001), and alcohol consumption (χ^2=5.63, p<0.05).

Sedentary physical activity was more common among cases (62%) than controls (21%) (χ^2=10.4, p<0.001). Family history of hypertension (χ^2=4.21, p<0.05), presence of associated diseases (χ^2=6.38, p<0.01), and perceived stress (χ^2=4.36, p<0.05) were also significantly linked to hypertension status.

The clinical variables such as habit of alcohol intake, family history (p<0.05), habit of tobacco chewing, associated diseases (p<0.01), BMI >30, habit of taking non vegetarian diet, habit of smoking, sedentary physical activity and perceived stress (p<0.001) were found to be the risk factors of hypertension.

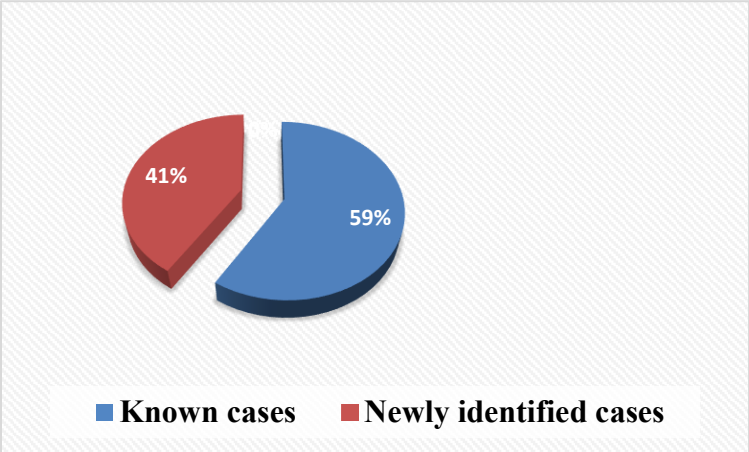

Fig 2: Percentage Distribution of Known and Newly identified Cases of Hypertension

Fig 2 indicates that 59% of participants were already known cases of hypertension, while 41% were newly identified during the study and were referred to medical facility for the treatment.

III. Discussion

The present study revealed a hypertension prevalence of 19.42% among adults aged 30–59 years in a semi-urban community of Chennai. This is comparable to national estimates reported in NFHS-5, which highlighted a rising burden of hypertension across urban and semi-urban populations in India (16). Importantly, 41% of cases were newly identified, underscoring the persistent challenge of underdiagnosis and the need for routine community-level screening.

Consistent with prior evidence, male gender and age above 40 years were significantly associated with hypertension. Mohanty and Chauhan reported gender disparities in hypertension prevalence, with men showing higher susceptibility due to occupational stress and lifestyle behaviours (17). Similarly, Kanchana, Vijayalakshmi, and Merlin highlighted in their descriptive study of heart failure patients in Chennai that comorbid hypertension was particularly burdensome among older adults (18). Our findings reinforce these demographic vulnerabilities, suggesting that interventions must be gender- and age-sensitive.

Educational status emerged as another determinant, with illiteracy strongly linked to hypertension. Kulothungan et al. demonstrated that low literacy impedes awareness and control of hypertension, thereby exacerbating disease progression (19). In addition, Kanchana et al. showed that structured nursing pathways significantly improved patient satisfaction in heart failure care, indirectly emphasizing the importance of health literacy and system-level interventions (20).

Clinical risk factors identified in this study—obesity, non-vegetarian diet, tobacco use, smoking, alcohol consumption, sedentary lifestyle, family history, comorbid diseases, and perceived stress—mirror findings from earlier Indian studies. Tripathy et al. reported similar associations in rural North India (21). Patel et al. confirmed that dietary patterns, particularly high intake of non-vegetarian and processed foods, significantly elevate hypertension risk (22).

The role of psychosocial stress was notable, with 57% of hypertensive cases reporting perceived stress. Rao et al. and Das & Sahoo both highlighted stress as a critical but often overlooked contributor to hypertension in Indian populations (23,24).

The association of family history and comorbid conditions with hypertension in this study is consistent with Sharma et al., who demonstrated that genetic predisposition significantly increases hypertension risk (25). Moreover, the coexistence of diabetes and cardiovascular disease among cases reflects the clustering of non-communicable diseases, as noted by Joshi & Saboo (26).

Finally, Kanchana et al. confirmed that integrated clinical care programs improved nurse competency and patient outcomes, reinforcing the value of structured, community-based interventions for chronic disease management (27). Kanchana et al. also emphasized the importance of preventive behavior of stroke among hypertensive patients, as stroke is one of the major complications of hypertension (28). Assessment of depression

Taken together, the evidence suggests that hypertension in semi-urban India is driven by a complex interplay of demographic, behavioural, and clinical factors. The high proportion of undiagnosed cases, coupled with strong associations with modifiable lifestyle behaviours, underscores the urgent need for community-based interventions. These should include routine screening, dietary counselling, physical activity promotion, tobacco and alcohol cessation programs, and stress management strategies. Patients also must be screened for depression

regularly with periodical intervention as depression is common comorbid illness with any chronic illness (29). Integrating such strategies and interventions into existing primary care and nursing pathways could substantially reduce the burden of hypertension and improve overall cardiovascular outcomes.

Study Limitations

This study's design and sampling approach present notable limitations. The use of systematic random sampling within a single semi-urban village restricts the generalizability of findings to broader rural or urban populations. As a cross-sectional correlational study, the research identifies associations but cannot establish causality between hypertension and the examined risk factors. The reliance on self-reported lifestyle data introduces the possibility of recall and social desirability bias, which may affect the accuracy of behavioural assessments.

Furthermore, the study did not fully account for confounding variables such as income level, occupational stress, and healthcare access, which could influence both hypertension prevalence and lifestyle choices. Future research should incorporate longitudinal designs and multivariate analyses to better understand the interplay of these factors and strengthen the evidence base for targeted interventions.

IV. Conclusion

Hypertension is a significant public health concern among adults in selected community particularly among males over 40 years with unhealthy lifestyle practices. The study identified strong associations with obesity, substance use, sedentary behaviour, and dietary habits, emphasizing the need for immediate, community-based interventions focused on lifestyle modification, early screening, and public health education.

Declarations

Ethics Approval and Consent to Participate

This study was conducted in accordance with ethical standards and received approval from the Institutional Ethics Committee (IEC) of Apollo College of Nursing, Chennai, India (Approval No: ACONC/IEC/2024/018 dated 15/6/24). Written informed consent was obtained from all participants prior to data collection. Confidentiality and data protection were ensured through coded identifiers and secure, password-protected digital storage, with only aggregate data reported.

Availability of Data and Materials

The datasets generated and analysed during the current study are not publicly available due to privacy and confidentiality concerns but are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare no competing interests.

Funding Source

Nil

Authors' Contributions

All the authors contributed equally to the conception and design of the study, data collection, statistical analysis, interpretation of findings, manuscript drafting, and final approval for publication.

Acknowledgments

The authors extend their sincere gratitude to the residents of selected community, Chennai for their participation,

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