Section: Community Medicine

Original Research Article

SOCIO-DEMOGRAPHIC, BEHAVIORAL, AND CLINICAL PROFILE OF HYPERTENSIVE ADULTS IN AN URBAN FIELD PRACTICE AREA OF THIRUVANANTHAPURAM, KERALA: A COMMUNITY-BASED CROSS-SECTIONAL STUDY

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Received *: 06/12/2025*
Received in revised form *: 20/01/2026*
Accepted *: 07/02/2026*

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DOI: 10.70034/ijmedph.2026.1.200

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (1); 1141-1147

ABSTRACT

Background: Hypertension represents a major public health burden globally and in India, with significant disparities in control and awareness, particularly in low- and middle-income countries. Community-based profiling of hypertensive patients is essential for tailoring management strategies and optimizing resource utilization in primary healthcare settings. **Objective:** To describe the socio-demographic, behavioral, and clinical profile of adult hypertensive patients in an urban field practice area of a government medical college in Thiruvananthapuram, Kerala.

Materials and Methods: A community-based cross-sectional study was conducted among 360 hypertensive adults aged ≥18 years with diagnosed hypertension for ≥1 year, residing in the Pangappara Medical College Health Unit area, Thiruvananthapuram. Participants were selected using cluster sampling from ten sub-centre areas. Data on socio-demographic characteristics, health behaviors, and clinical parameters were collected through structured interviews. Blood pressure was measured using a standardized Omron digital sphygmomanometer. Descriptive statistics and chi-square tests were used for analysis.

Results: The mean age was 60.3±10.95 years; 55.6% were female. Education was primary or below in 46.7%, and 61.7% belonged to above-poverty-line households. Physically sedentary behavior was reported by 31.9%, while 79.2% were non-smokers and 73.3% were non-alcohol users. Clinically, 42.2% were obese and 24.7% overweight. The average disease duration was 5.9±5.3 years; 51.9% had hypertension for 5–10 years. Comorbidities were prevalent: diabetes mellitus in 48.6%, dyslipidemia in 34.7%, and thyroid disorders in 10.3%. Most participants (87.2%) were on antihypertensive medications; 59.2% practiced salt restriction and 51.1% reduced oil intake. Public healthcare services were utilized by 62.8%.

Conclusions: The study population consisted predominantly of older females with high prevalence of overweight/obesity and metabolic comorbidities. Despite favorable non-communicable disease behaviors in certain domains (low smoking/alcohol use), the population carries substantial cardiovascular risk. High utilization of public health services presents an opportunity for integrating structured lifestyle counseling, regular metabolic screening, and digital health interventions through existing primary healthcare networks.

Keywords: Hypertension, Clinical profile, Comorbidities, Epidemiology, Community-based study, Public health services.

INTRODUCTION

Hypertension remains a critical public health challenge worldwide, constituting the leading modifiable risk factor for cardiovascular disease and premature mortality. The burden is particularly acute in low- and middle-income countries (LMICs), including India, where rising prevalence, suboptimal awareness, and poor control rates persist despite advances in pharmacotherapy and prevention strategies.[1-3] In India, recent estimates suggest hypertension prevalence ranges from 20–40% in urban populations, with significant variation by region and socioeconomic status.[4]

The complex interplay of socio-demographic, behavioral, and clinical factors influencing hypertension prevalence and management requires systematic community-based profiling to inform targeted interventions. Socio-demographic determinants—including age, gender, education, and income—significantly influence hypertension risk across populations.[5,6] In a Nepal-based study, educational attainment and income emerged as key predictors, whereas family type showed no significant association.[7] Similarly, marital status has been identified as a predictor, with divorced, separated, or widowed individuals exhibiting higher hypertension prevalence.[8]

Behavioral factors such as physical inactivity, tobacco use, and excessive alcohol consumption compound cardiovascular risk among hypertensive populations.[9] Concurrently, the high prevalence of comorbid conditions—particularly diabetes mellitus and dyslipidemia—substantially increases cardiovascular morbidity and mortality risk, necessitating integrated management approaches.[10,11]

In India, Kerala represents a unique epidemiological transition state with relatively high healthcare literacy, extensive primary healthcare infrastructure, and documented NCD burden. Yet, detailed clinical and behavioral profiling of community-dwelling hypertensives within government field practice areas remains limited. Such profiling is essential for optimizing resource allocation, designing tailored interventions, and leveraging existing public health platforms for improved cardiovascular outcomes.

This study aimed to systematically characterize the socio-demographic, behavioral, and clinical profile of hypertensive adults in an urban government field practice area, with a view to informing evidence-based management strategies and public health interventions.

MATERIALS AND METHODS

Study Design and Setting

A community-based cross-sectional study was conducted in the Pangappara Medical College Health (MCH) Unit area under Government Medical College, Thiruvananthapuram, Kerala. The MCH unit comprises ten sub-centre areas serving an urban population of approximately 15,000–20,000 residents, with primary healthcare provided through a network of government facilities integrated with the medical college's teaching and service functions.

Study Population

The study population consisted of all adults aged ≥18 years with previously diagnosed hypertension (confirmed by either self-report supported by antihypertensive medication prescriptions or a documented diagnosis in medical records) of ≥1 year duration, residing in any of the ten sub-centre areas.

Inclusion criteria: (1) age ≥18 years; (2) diagnosed hypertension for ≥1 year; (3) permanent resident of the study area for ≥6 months; (4) willing to provide informed written consent.

Exclusion criteria: (1) refusal of informed consent; (2) bedridden or cognitively unable to participate; (3) active severe mental illness affecting ability to consent or respond reliably.

Sample Size

Using the formula $n = Z^2 \times p(1-p) / d^2$, where Z = 1.96 (95% confidence), assumed hypertension comorbidity prevalence p = 50% (diabetes or dyslipidemia), and precision e = 5%, the calculated sample size was 384. Adjusting for 10% non-response and a design effect of 1.2 (cluster sampling), the final target was 360 participants, which was achieved.

Sampling Strategy

Cluster sampling was employed, with each of the ten sub-centre areas as a cluster. From each cluster, approximately 36 hypertensive individuals were enrolled sequentially from the sub-centre disease surveillance registry and community lists maintained by Accredited Social Health Activists (ASHAs). All eligible hypertensives in the sampling frame were invited; non-responders were replaced by the next eligible individual in the list.

Data Collection

Data were collected through face-to-face structured interviews conducted at participants' homes or sub-centres by trained field workers. The structured questionnaire was pretested among 30 hypertensives outside the study area and refined for clarity and cultural appropriateness.

Variables Collected:

Socio-demographic: Age (years), gender, religion, marital status, education level, occupation, monthly household income, and socioeconomic status (APL/BPL based on Kerala government ration card classification).

Behavioral factors: Physical activity level (assessed as sedentary: <150 min/week of moderate-intensity activity; moderate: 150–299 min/week; vigorous: ≥300 min/week), tobacco use (smoking and chewing status), and alcohol consumption (current, former, never).

Clinical variables: Blood pressure (systolic and diastolic, measured twice using Omron digital sphygmomanometer HEM-8712C, with the average recorded), body mass index (BMI, calculated as weight in kg / height in m^2), duration of hypertension

(years), family history of hypertension, current antihypertensive medications (type and number), dietary modifications (salt/oil restriction), and presence of comorbidities (diabetes mellitus, dyslipidemia, peripheral vascular disease, thyroid disorder, heart disease, others).

Operational Definitions

Hypertension: Previously diagnosed and documented, with ≥1 year duration.

Obesity: BMI ≥25 kg/m² (using WHO Asia-Pacific criteria, appropriate for Indian populations).

Overweight: BMI 23.0–24.9 kg/m².

Normal weight: BMI 18.5–22.9 kg/m².

Underweight: BMI <18.5 kg/m².

Sedentary behavior: <150 minutes per week of moderate-intensity physical activity (WHO definition).

Heavy smoker: ≥10 cigarettes/day or equivalent.

Data Quality

Interviewers underwent standardized training on questionnaire administration, informed consent procedures, and measurement techniques. Blood pressure measurements were performed according to standardized guidelines (appropriate cuff size, seated position, 5-minute rest). All completed questionnaires were reviewed for completeness and consistency on the same day by supervisors.

Statistical Analysis

Data were entered into SPSS version 25.0 (IBM Corp., Armonk, NY, USA) and verified for accuracy. Descriptive statistics were calculated: continuous variables were summarized as mean±standard deviation (SD), and categorical variables as frequencies and percentages. Chi-square tests were used to assess associations between categorical variables (e.g., obesity by gender, comorbidities by age group) at $p<0.05$ significance level.

Ethical Considerations

The study was approved by the Institutional Ethics Committee of Government Medical College, Thiruvananthapuram (Approval number: IEC No.05/11/2014/MCT dated 22/08/2014). All participants provided informed written consent in Malayalam or English as preferred. Confidentiality was maintained throughout; data were anonymized and stored securely.

RESULTS

Socio-Demographic Characteristics

A total of 360 hypertensive adults were enrolled. Socio-demographic characteristics are presented in Table 1.

The mean age of participants was 60.3±10.95 years. Nearly half (49.2%) were aged >50 years, 37.8% were 30–50 years, and 13.1% were <30 years. Females comprised 55.6% of the sample. The majority were Hindu (64.4%), with Christians (18.9%) and Muslims (16.7%) comprising smaller proportions. Regarding marital status, 71.7% were married, 27.8% were widowed or separated, and only 0.6% were unmarried.

Educational attainment was low: 46.7% had primary education or below, 34.4% had secondary education, 8.6% had completed higher secondary, and only 10.3% held a degree or higher qualification. Most participants (78.9%) were employed, while 21.1% were unemployed. Socioeconomic status showed 61.7% from above-poverty-line (APL) households and 38.3% from below-poverty-line (BPL) households.

Table 1: Socio-Demographic Characteristics of Hypertensive Adults (N=360)

Variable	Category	No.	%
Age (years)	<30	47	13.1
	30–50	136	37.8
	>50	177	49.2
Gender	Male	160	44.4
	Female	200	55.6
Religion	Hindu	232	64.4
	Christian	68	18.9
	Muslim	60	16.7
Marital Status	Married	258	71.7
	Unmarried	2	0.6
	Widowed/Separated	100	27.8
Education	Primary or below	168	46.7
	Secondary	124	34.4
	Higher secondary	31	8.6
	Degree and above	37	10.3
Occupation	Employed	284	78.9
	Unemployed	76	21.1
Socioeconomic Status	APL*	222	61.7
	BPL**	138	38.3
Total		360	100.0

**APL: Above Poverty Line; **BPL: Below Poverty Line*

Behavioral Characteristics

Table 2 presents health-related behavioral characteristics.

Regarding physical activity, 56.9% reported moderate activity levels, while 31.9% led sedentary lifestyles and 11.2% engaged in heavy/vigorous

activity. Among smoking status, 79.2% were non-smokers, 10.0% were current smokers, and 10.8% had quit smoking. Tobacco chewing was less prevalent: 90.0% were non-chewers, 5.8% currently chewed, and 4.2% had discontinued. For alcohol use, 73.3% were non-users, 15.3% were current users, and 11.4% had stopped consuming alcohol.

Table 2: Health-Related Behaviors of Hypertensive Adults (N=360)

Variable	Category	No.	%
Physical Activity	Sedentary	115	31.9
	Moderate	205	56.9
	Vigorous	40	11.2
Smoking Status	Non-smoker	285	79.2
	Current smoker	36	10.0
	Stopped smoking	39	10.8
Tobacco Chewing	Non-chewer	324	90.0
	Current chewer	21	5.8
	Stopped chewing	15	4.2
Alcohol Use	Non-user	264	73.3
	Current user	55	15.3
	Stopped using	41	11.4
Total		360	100.0

Clinical Characteristics and Comorbidities

Table 3 presents clinical characteristics and comorbid conditions.

Body mass index distribution revealed that 42.2% were obese, 24.7% were overweight, 24.2% had normal BMI, and 8.9% were underweight. Thus, two-thirds of the population (66.9%) were above normal weight, indicating substantial overweight/obesity burden.

The duration of hypertension varied: 51.9% had been diagnosed for 5–10 years, 25.3% for ≥10 years, and 22.8% for <5 years, with a mean duration of 5.9±5.3 years. Approximately half (49.7%) reported a family history of hypertension, while 50.3% did not.

Comorbidities were highly prevalent: 48.6% had diabetes mellitus, 34.7% had dyslipidemia, 10.3% had thyroid disorders, 8.9% had peripheral occlusive vascular disease, 6.9% had heart disease, and 6.7% had obesity (as a distinct comorbidity). Only 1.7% reported other comorbidities.

Management practices: Among participants, 87.2% were on antihypertensive medications. Dietary modifications were common: 59.2% reported restricting salt intake and 51.1% had reduced oil consumption. Regarding healthcare utilization, 62.8% of participants relied on government (public) healthcare services for hypertension management, while 37.2% utilized private healthcare or a combination of both.

Table 3: Clinical Profile and Comorbidities of Hypertensive Adults (N=360)

Variable	Category	No.	%
BMI (kg/m²)	Underweight (<18.5)	32	8.9
	Normal (18.5–22.9)	87	24.2
	Overweight (23.0–24.9)	89	24.7
	Obese (≥25)	152	42.2
Duration of HTN (years)	<5	82	22.8
	5–10	187	51.9
	≥10	91	25.3
Family History of HTN	Present	179	49.7
	Absent	181	50.3
Diabetes Mellitus	Yes	175	48.6
Dyslipidemia	Yes	125	34.7
Thyroid Disorder	Yes	37	10.3
Peripheral Vascular Disease	Yes	32	8.9
Heart Disease	Yes	25	6.9
Obesity (as comorbidity)	Yes	24	6.7
Other Comorbidities	Yes	6	1.7
Antihypertensive Medications	On medication	314	87.2
	Not on medication	46	12.8
Dietary Modification (Salt restriction)	Yes	213	59.2
Dietary Modification (Oil reduction)	Yes	184	51.1
Healthcare Utilization	Government	226	62.8
	Private/Mixed	134	37.2
Total		360	100.0

Obesity coded separately as comorbidity; overlaps with BMI-based obesity classification but includes clinically diagnosed cases.

DISCUSSION

This community-based cross-sectional study characterized the socio-demographic, behavioral, and clinical profile of 360 hypertensive adults from an urban government field practice area in Thiruvananthapuram. The findings reveal a population with substantial cardiovascular risk despite some favorable behavioral attributes and high engagement with public healthcare services.

Socio-Demographic Profile and Risk Stratification

The predominance of older adults (mean age 60.3 years; 49.2% >50 years) reflects the well-documented association between age and hypertension prevalence.[12] This age pattern is consistent with studies from Kerala and South India, where advancing age substantially increases hypertension and cardiovascular disease risk.[13]

The female predominance (55.6%) aligns with demographic patterns in urban Kerala, where women comprise a higher proportion of healthcare-seeking populations and may also reflect higher life expectancy.[14]

The low educational attainment (81.1% with education ≤secondary level) is notable and consistent with the predominantly older demographic. Prior research has established that lower educational levels correlate with reduced health literacy, poorer medication adherence, and suboptimal disease management.[15] Despite this, the high proportion of employed individuals (78.9%) and above-poverty-line households (61.7%) suggests moderate socioeconomic stability, potentially facilitating healthcare access and medication affordability—though the 38.3% BPL proportion warrants targeted support to prevent treatment discontinuation.

Behavioral Risk Profile

While the prevalence of non-smoking (79.2%) and non-alcohol use (73.3%) represents favorable public health achievements in this cohort, the 31.9% physical inactivity rate is concerning. This sedentary behavior, combined with the high obesity prevalence (42.2%) and overweight burden (24.7%), indicates substantial modifiable cardiovascular risk. The inactivity rate exceeds national estimates and those reported in comparable South Indian studies, suggesting that this urban field practice area population may benefit from targeted lifestyle intervention programs.[16]

Notably, 59.2% reported salt restriction and 51.1% reduced oil intake, indicating that dietary awareness and modification efforts are underway. However, these practices may not fully counterbalance the metabolic risk imposed by obesity and physical inactivity, underscoring the need for comprehensive lifestyle counseling within the primary healthcare setting.

Clinical Burden and Comorbidity Profile

The metabolic comorbidity burden is striking: nearly half (48.6%) have diabetes mellitus and more than one-third (34.7%) have dyslipidemia. This prevalence substantially exceeds national average estimates and reflects a population with markedly elevated cardiovascular and microvascular risk.[17] The coexistence of hypertension, diabetes, and dyslipidemia ("cardiometabolic triad") is well-established as a major driver of premature cardiovascular events and mortality. The additional prevalence of thyroid disorders (10.3%), which may independently contribute to cardiovascular risk and medication interactions, further compounds the clinical complexity.

A systematic Kerala-based study by Menon et al. similarly documented high prevalence of obesity and diabetes among hypertensives in community settings.[18] Our findings reinforce this pattern and suggest that community-based hypertensives in urban Kerala represent a high-risk, clinically complex population requiring intensive cardiovascular risk factor management.

Disease Duration and Management

The average disease duration of 5.9±5.3 years, with 51.9% having hypertension for 5–10 years, suggests a relatively established disease cohort. The high medication adherence rate (87.2% on antihypertensive therapy) is encouraging and likely reflects access to public healthcare. However, the absence of detailed data on blood pressure control rates, medication adherence (via validated scales), and intensity of pharmacotherapy limits our ability to assess whether treatment adequacy is being achieved.

Healthcare System Utilization: A Public Health Asset

A key and notable finding is the high reliance on government (public) healthcare services (62.8%), which contrasts with higher rates of private sector utilization in many urban Indian settings. This suggests strong community confidence in and accessibility of public health infrastructure in this MCH unit area. This pattern is an important asset for **Kerala's public health system and provides a strategic platform for:**

1. Integrated NCD clinic models: Structured hypertension and diabetes co-management clinics with trained teams (ANM, health worker) can standardize care and improve outcomes.
2. Structured lifestyle programs: Group-based counseling and physical activity programs facilitated through sub-centres.
3. Digital health extensions: Mobile-based BP monitoring, medication reminders, and periodic feedback—leveraging this literate, healthcare-engaged population.
4. Regular metabolic screening: Routine diabetes and dyslipidemia screening can ensure timely detection and intervention.

Limitations

This study has several limitations. First, as a cross-sectional design, it establishes associations and descriptions but not causation. Second, behavioral data (physical activity, diet, alcohol) rely on self-report and are subject to social desirability bias. Third, the study does not include recently diagnosed

hypertensives (inclusion criterion: ≥1 year duration), potentially excluding a younger, less comorbid population and limiting generalizability. Fourth, blood pressure control status was not assessed in detail; single BP measurements do not define control. Fifth, no validated scales for medication adherence or health literacy were employed. Finally, the study population is confined to one urban field practice area in Thiruvananthapuram and may not be generalizable to rural or other geographic settings in Kerala or India.

Strengths include the community-based design within an established government health system, a reasonable sample size, structured data collection, and a focus on a clinically and epidemiologically important population within a setting representative of urban India.

CONCLUSION

This study presents a comprehensive clinical and behavioral profile of hypertensive adults in an urban government field practice area in Kerala. The population is characterized by advanced age, female predominance, moderate socioeconomic status, and—most critically—a substantial burden of overweight/obesity (66.9%), metabolic comorbidities (48.6% with diabetes, 34.7% with dyslipidemia), and sedentary lifestyles (31.9%). Despite these risks, favorable non-communicable disease behaviors (low smoking/alcohol use) and high reliance on public healthcare services (62.8%) represent important strengths.

These findings underscore the urgent need for integrated, evidence-based cardiovascular risk reduction strategies that combine:

1. Structured lifestyle interventions: Capacity building of sub-centres and ANMs for systematic counseling on diet, physical activity, and weight management.
2. Metabolic screening protocols: Regular assessment of glucose and lipid profiles with timely therapeutic intensification.
3. Digital health facilitation: Leveraging mobile platforms for BP monitoring, medication reminders, and behavior change support.
4. Healthcare worker empowerment: Training and resource allocation to enable primary-care-led hypertension and diabetes co-management.

By capitalizing on existing public sector engagement and healthcare infrastructure, this population can benefit substantially from evidence-based, scalable interventions that address both pharmacological and behavioral domains of cardiovascular risk. Future research should evaluate the effectiveness of such integrated interventions in this setting.

Funding: No specific grant was received for this study.

Conflict of Interest: The authors declare no conflict of interest.

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