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ORIGINAL RESEARCH

Knowledge, attitude, and practice regarding hypertension among patients at a tertiary care hospital in eastern Bhutan: A cross-sectional study

Sonam Yangzom[1*], **Sonam Wangzin Rabjay**[2], **Ugyen Chophel**[3], **Sonam Lhaden**[4], **Pema Yangki**[4], **Kuenga Lhamo**[4], **Pema Wangchuk**[4], **Poonam Rai**[4], **Thinley Dorji**[5]

[1] *Department of Internal Medicine, Eastern Regional Referral Hospital, Mongar, Bhutan*

[2] *Department of Emergency Medicine, Eastern Regional Referral Hospital, Mongar, Bhutan*

[3] *Wangdue District Hospital, Wangdue Phodrang, Bhutan*

[4] *Department of Nursing, Eastern Regional Referral Hospital, Mongar, Bhutan*

[5] *Department of Internal Medicine, Central Regional Referral Hospital, Gelephu, Bhutan*

*Correspondence: Sonam Yangzom

ABSTRACT

Introduction: Hypertension is a major contributor to cardiovascular morbidity and mortality worldwide, yet knowledge, awareness, and lifestyle practices remain suboptimal in many low- and middle-income countries. Evidence on hypertension-related knowledge, attitudes, and practices in Bhutan is limited. This study assessed these factors and their association with blood pressure control among hypertensive patients attending the Eastern Regional Referral Hospital in Mongar, Bhutan.

Methods: A cross-sectional study was conducted among 546 adult hypertensive patients attending the outpatient department from June to August 2022. Data were collected using validated questionnaires assessing sociodemographic and clinical characteristics, hypertension knowledge (HK-LS), and self-care practices (HB-SCP). Blood pressure was measured, and hypertension-mediated organ damage was assessed when feasible. Descriptive statistics and logistic regression analyses were performed.

Results: A total of 546 hypertensive patients were included (mean age 58.6 ± 13 years; 66.5% female). Over 70% had no formal education, and 75% reported comorbidities, most commonly diabetes mellitus. Hypertension-mediated retinopathy was observed in 12.3%, nephropathy in 13.9%, and left ventricular hypertrophy in 5.9%. Monotherapy was used in 54.9% of patients, with angiotensin receptor blockers (77.7%) and calcium channel blockers (33.2%) being the most prescribed. Overall, 77% had uncontrolled blood pressure (>130/80 mmHg). Knowledge regarding hypertension was suboptimal: <20% correctly identified normal or diagnostic blood pressure, and misconceptions about medication use and reversibility of complications were common. Although most participants reported favorable dietary practices and regular clinic attendance, 91% never monitored blood pressure at home, and more than half did not check nutritional labels for sodium or saturated fat content.

Conclusions: Substantial gaps in knowledge, self-monitoring, and lifestyle practices exist among hypertensive patients in eastern Bhutan, contributing to poor blood pressure control. Strengthening patient education, promoting home blood pressure monitoring, improving nutrition literacy, and ensuring guideline-based pharmacotherapy are essential to reduce long-term cardiovascular complications.

Keywords: Attitude; Bhutan; Hypertension; Knowledge; Noncommunicable Disease; Practice; Psychological

Introduction

Non-communicable diseases (NCDs) cause about 41 million deaths annually, with cardiovascular diseases (CVDs) as the leading cause . Hypertension is a major modifiable risk factor for CVD, chronic kidney disease (CKD), stroke, and premature death. It is defined as systolic blood pressure ≥140 mmHg and/or diastolic pressure ≥90 mmHg. Globally, over 1.28 billion adults are hypertensive, with nearly two-thirds residing in low- and middle-income countries (LMICs) where

detection and treatment rates remain suboptimal. Hypertension accounts for about 10% of healthcare spending . A global analysis reported a higher prevalence in LMICs (31.5%) than in high-income countries (28.5%) .

Across South Asia, hypertension has emerged as a major public health challenge. A meta-analysis of 33 studies conducted across SAARC countries found an average prevalence of 27%, with Nepal at 33.8%, Bangladesh (17.9%), India (31.45%), Maldives at 31.5%, and Bhutan (23.9%) . Urbanization, aging populations, and under-resourced health systems contribute to this trend. In a study from Nepal, about half of hypertensive patients exhibited a positive attitude and adequate self-care practices, with education and diet influencing attitudes. However, in rural South Asia, over half of treated patients have uncontrolled blood pressure, especially in Pakistan, with factors like low socioeconomic status, poor medication adherence, and kidney dysfunction contributing to poor control. In Chennai, India, nearly one-third of diagnosed individuals did not take daily antihypertensive medication, largely due to beliefs that medication was unnecessary once blood pressure normalized or that medications should be intermittently stopped. While such beliefs are not yet well-documented in Bhutan, similar cultural perceptions may exist, particularly in rural and underserved communities.

In Bhutan, according to the STEPS survey report 2019, approximately 28% of Bhutanese adults have raised blood pressure, with a disproportionately high number, 65%, being unaware of their condition . Among those who are aware, 20% are not receiving treatment, underscoring a major gap in hypertension management. The prevalence of hypertension among individuals aged 15 to 69 years has declined from 35.7% in 2014 to 28% in 2019, suggesting that ongoing interventions may be yielding some positive outcomes. Another study reported a lower prevalence of 17.4%, and hypertension was significantly associated with increasing age, female sex, low levels of physical activity due to occupation, psychological stress, and comorbid diabetes. These findings highlight the need for targeted, cost-effective prevention and control strategies at both the community and primary healthcare levels, focusing on high-risk groups and modifiable risk factors.

In response to the rising burden of non-communicable diseases (NCDs) in low- and middle-income countries like Bhutan, the World Health Organization (WHO) introduced the Package of Essential Noncommunicable (PEN) Disease Interventions to strengthen primary healthcare through early detection, risk reduction, and patient-centered care. The PEN framework focuses on early detection, risk factor modification, and integrated patient-centered care. Since KAP strongly influences treatment adherence, lifestyle modification, and health-seeking behavior, understanding these factors is essential. Evidence from other South Asian countries shows that poor awareness and harmful beliefs hinder hypertension control , but similar data from Bhutan are scarce. Yet, there is limited evidence on whether hypertensive patients in Bhutan possess adequate awareness, favorable attitudes, or engage in appropriate self-care.

This study aimed to assess the knowledge, attitudes, and practices of hypertensive patients attending the outpatient department at Eastern Regional Referral Hospital (ERRH) in Mongar, Bhutan. It evaluated patients' understanding of hypertension, its risk factors, and potential complications, as well as their self-reported adherence to medication, dietary habits, physical activity, home blood pressure monitoring, and other self-care behaviors. The study also explored factors associated with knowledge levels and blood pressure control. The findings were intended to identify gaps in awareness and management, providing evidence to guide targeted patient education and behavior-change strategies.

Methods

Study design

This was a cross-sectional study conducted over three months from June to August 2022 at Eastern Regional Referral Hospital (ERRH), Mongar, Bhutan

Study Setting

This study was conducted in Bhutan, one of the member states of SAARC, with a population of approximately 735,553 as per the Population and Housing Census of Bhutan 2017. Bhutan delivers healthcare through a three-tiered health system. At the primary level are the primary health centers and the 10-bedded hospitals. The secondary level includes district

hospitals, while the tertiary level comprises the National Referral Hospital and the Regional Referral Hospitals. Administratively, the country is divided into 20 districts (dzongkhags).

This study was conducted over three months from June to August 2022 at Eastern Regional Referral Hospital (ERRH), Mongar, Bhutan. It is one of the three tertiary-level referral hospitals in Bhutan. According to the ERRH Annual Report 2023, the hospital has a capacity of 150 beds, with active inpatient (IPD) and outpatient (OPD) services. It caters to the healthcare needs of several eastern districts, offering specialized services across multiple departments

Study Population

This study specifically involved the Outpatient Department (OPD), where hypertensive patients visit for regular consultations and follow-up, as well as the General OPD entrance, where all patients, regardless of their purpose of visit, undergo routine blood pressure screening at the reception.

It included adult patients aged 18 years and above who were clinically diagnosed with hypertension for more than one year and were visiting the Medicine OPD at ERRH. Patients with a diagnosis of less than one year were excluded to allow assessment of long-term beliefs, practices, and potential complications associated with hypertension. Patients <18 years and those who were dependent on caregivers for medication, hygiene, and activities of daily living were also excluded to ensure reliability in self-reported practice data.

Sample size and sampling technique

A convenience sampling method was used to select participants for the study. From the daily OPD attendees, eligible participants were identified through daily BP screening registers and directed to the Medicine OPD for enrolment. Those who consented were interviewed using validated tools.

Data were collected between 12:00 PM and 3:00 PM, Monday to Friday, at the Medicine OPD of Eastern Regional Referral Hospital (ERRH), from consenting hypertensive patients identified during routine BP screening.

Study tool and data collection

Data were collected using structured, validated instruments through face-to-face interviews conducted by trained nurses from the Medicine Ward. A demographic and clinical questionnaire was used to collect participants' background information, including age, sex, education, occupation, duration of hypertension, comorbidities, and follow-up frequency. To assess knowledge and attitudes, the Hypertension Knowledge-Level Scale (HK-LS) was used . This scale consists of 22 original items across six domains (definition, lifestyle, medical treatment, drug compliance, diet, and complications), with an additional 7 context-specific items incorporated for relevance to the Bhutanese setting. Permission to use and modify the tool was obtained from the original authors, and it demonstrated strong psychometric properties (Cronbach's alpha = 0.82; KMO = 0.78). To evaluate self-care practices, the Hypertension Self-Care Profile Behavior Scale (HB-SCP) , was administered. This 20-item Likert-scale tool assesses key self-care activities such as medication adherence, diet, exercise, smoking, and stress control, and has shown high internal consistency (Cronbach's alpha = 0.83).

Interviews were conducted in a private space to ensure confidentiality, and each participant was marked in their health booklet to prevent duplicate enrollment during follow-up visits.

At the reception of the hospital, all known hypertensive patients on medication were highlighted. Duplicate entries were avoided by verifying Citizen ID numbers and prior visit dates in health booklets. Identified hypertensive patients were then directed to the Medicine OPD for participation in the study.

Data analysis and statistics

Collected data was analyzed using STATA version 14.1. Data were represented as frequencies and proportions of the nominal variables and as means (±SD) for the continuous variables.

For the assessment of knowledge, each question had three possible responses: “Correct,” “Incorrect,” and “Don’t know.” For analysis purposes, the “Incorrect” and “Don’t know” responses were combined and presented together as “Incorrect.” This approach allowed for a clearer comparison between respondents who had accurate knowledge and those who lacked correct understanding or were uncertain about the answers. The total knowledge score was generated as a sum. Those with a knowledge score ≥70% were consitered having ‘good knowledge’, ≥50 to <70% were considered to have ‘satisfactory knowledge’, and those with a score of <50% were considered to have ‘poor knowledge’.

Blood pressure control was categorized using a cut-off of 130/80 mmHg, with values below this threshold considered as good control and those equal to or above as poor control. Factors associated with a good level of knowledge and control of hypertension were assessed using logistic regression. Those factors with $p < 0.100$ on the unadjusted analysis were taken for the adjusted analysis. Factors with $p < 0.05$ were considered significant.

The presence of missing data for specific variables has been indicated using superscripts in the respective tables.

Ethics consideration

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethics approval for the study was obtained from the Research Ethics Board of Health, Ministry of Health, Bhutan (Ref.no. IRB/Approval/PN21-042/2021-22/519, dated 10th February 2022). Additionally, administrative clearance was obtained from the Ministry of Health, Royal Government of Bhutan, and the hospital administrators. Written informed consent was obtained from all participants before enrollment. Participants were informed about the study objectives, procedures, potential risks, and benefits, and their right to withdraw at any time. All data were anonymized to protect confidentiality.

Results

Sociodemography

A total of 546 hypertensive patients were included in the study, with a mean age of 58.6 ± 13.0 years (range: 20 – 94 years). Of the participants, 363 (66.5%) were female. Hypertensive organ damage was observed in the form of retinopathy 67 (12.3%), nephropathy 76 (13.9%), left ventricular hypertrophy 32 (5.9%), cerebrovascular accidents 27 (4.9%), and cardiovascular disease 43 (7.9%). However, assessment for target organ damage was not performed in most of the patients; 180 (33.0%) were not evaluated for hypertensive retinopathy, 63 (11.5%) for nephropathy, and 171 (31.3%) for LVH.

Monotherapy was used in 298 patients (54.9%). Angiotensin receptor blockers were the most commonly prescribed agents (421, 77.7%), followed by calcium channel blockers (180, 33.2%). Overall, 77.02% of patients had uncontrolled BP during that visit. The detailed sociodemographic and clinical characteristics are presented in Table 1.

Table 1. Sociodemographic characteristics of the study participants (n=546) assessed for KAP on hypertension in Mongar, Bhutan, 2022

Characteristics	Frequency (n)	Percentage(%)
Age (Years)		
<39	31	5.68
40 – 59	246	45.05
>60	269	49.27
Gender		
Female	363	66.48
Male	183	33.52
Level of Education		
No education	404	73.99
Non-Formal Education or Primary Education	87	15.93
Secondary education	39	7.14

Characteristics	Frequency (n)	Percentage(%)
Graduate level or higher	16	2.93
Occupation		
Unemployed	428	78.39
Employed	57	10.44
Retired	33	6.04
Monks	27	4.95
Student	1	0.18
Duration of Hypertension (years)a		
Up to 3	192	35.36
4 to 6	165	30.39
7 to 9	44	8.1
>10	142	26.15
Comorbidities (any)(n=413)	413	75.64
Diabetes	143	26.19
Chronic kidney disease	23	4.21
Dyslipidemia	36	6.59
Others	148	27.11
Hypertensive Organ Damage		
Hypertensive retinopathy		
Absent	299	54.76
Present	67	12.27
Not evaluated	180	32.97
Nephropathy		
Absent	407	74.54
Present	76	13.92
Not evaluated	63	11.54
Left ventricular Hypertrophy		
Absent	343	62.82
Present	32	5.86
Not evaluated	171	31.32
Cerebrovascular Accident		
Absent	519	95.05
Present	27	4.95
Cardiovascular disease		
Absent	503	92.12
Present	43	7.88
Antihypertensive medicine		
ACEib	15	2.77
ARBc	421	77.68
CCBc	180	33.21

Characteristics	Frequency (n)	Percentage(%)
Thiazidea	141	25.97
Beta blockersa	50	9.21
MRAa	14	2.58
Othersa	148	27.11
Number of anti-hypertensive medications		
One	298	54.88
Two	202	37.20
Three	36	6.63
Four	6	1.10
Five	1	0.18
Mostly followed up centerd		
Regional referral	424	80
District hospital	19	3.58
PHC	87	16.42
Blood pressure control *		
Uncontrolled BP	419	77.02
Controlled BP	125	22.98

a Missing = 3; b Missing=5; c Missing=4; d Missing=16 *Control cutoff= SBP≤ 130 DBP≤80 mmhg ACEi = Angiotensin-converting enzyme inhibitors; ARBS=Angiotensin receptor blockers; CCBs=Calcium channel blockers; MRAs=Mineralocorticoid receptor antagonists

In the unadjusted analysis, age, sex, education level, occupation, duration of hypertension, and most comorbid conditions were not associated with good blood pressure control. Participants with a history of stroke were associated with good blood pressure control, while those with cardiovascular disease also showed higher odds, this association was not statistically significant. Detailed factor analysis is presented in Table 2.

Table 2. Factors associated with blood pressure control among patients with hypertension at the Eastern Regional Referral Hospital, Mongar, Bhutan, 2022

Characteristics	Total	Unadjusted analysis			Adjusted analysis		
		OR	95% CI	P value	Adjusted OR	95% CI	P value
Age (years)							
<39	31	Ref					
40 – 59	246	0.72	0.30 – 1.70	0.453			
≥60	269	0.98	0.42 – 2.29	0.958			
Sex							
Female	363	Ref					
Male	183	0.79	0.51 – 1.23	0.298			
Education							
No education	404	Ref					
Non-Formal Education or Primary education	87	0.96	0.55 – 1.68	0.882			
Secondary education	39	1.50	0.73 – 3.08	0.267			
Tertiary education	16	0.48	0.11 – 2.16	0.341			
Occupation							
Unemployed or dependent	428	Ref					

Characteristics	Total	Unadjusted analysis			Adjusted analysis		
Employed	47	1.01	0.52 – 1.94	0.988			
Retired	33	1.28	0.57 – 2.84	0.550			
Monks	27	1.02	0.40 – 2.61	0.966			
Student	1	-	-	-			
Duration of hypertension (years)							
Up to 3	192	Ref					
4 – 6	165	1.13	0.68 – 1.88	0.627			
7 – 9	44	1.83	0.87 – 3.78	0.102			
≥10	142	1.31	0.78 – 2.20	0.312			
Diabetes mellitus	143	1.34	0.86 – 2.08	0.194			
Chronic kidney disease	23	1.49	0.60 – 3.71	0.388			
Dyslipidemia	36	1.37	0.64 – 2.94	0.418			
Stroke	27	2.43	1.10 – 5.38	0.029	2.23	1.00 – 5.01	0.050
Left ventricular diastolic dysfunction	32	1.61	0.74 – 3.47	0.266			
Cardiovascular disease	43	1.90	0.98 – 3.69	0.056	1.76	0.90 – 3.44	0.101
Number of anti-hypertensive medications							
One	298	Ref					
Two	202	0.81	0.53 – 1.25	0.339			
Three	36	0.74	0.31 – 1.76	0.497			
Four	6	1.53	0.28 – 8.55	0.625			
Five	1	-					
Level of care of hospital							
Primary Health Centre	87	Ref					
District Hospital	19	0.98	0.25 – 3.81	0.097			
Referral Hospital	424	1.71	0.92 – 3.15	0.088			

Knowledge and attitude

Most participants demonstrated a lack of knowledge about hypertension. While 484 (88.64%) correctly stated that antihypertensive medications should be taken lifelong, 330 (60.44%) believed that these medications can cure hypertension, and 491 (89.93%) incorrectly thought they should be taken only when feeling ill. Most answered correctly while testing for knowledge regarding medication adherence and lifestyle modification. However, 371 (67.95%) correctly identified that hypertension complications are mostly irreversible. Detailed responses to the knowledge and attitude questions are shown in Table 3.

Table 3. Knowledge and attitude on hypertension among patients visiting Eastern Regional Referral Hospital, Mongar, Bhutan, 2022

Knowledge and attitude on hypertension	Correct (%)	Incorrect (%)
K1. Normal blood pressure is <120/80 mmHg.	16.12	83.88
K2. High Hypertension is BP > 140/90 mmHg.	9.71	90.30
K3. Blood Pressure medicines can cure hypertension.	60.44	39.56
K4. Individuals with increased blood pressure must take their medication only when they feel ill.	10.07	89.93
K5. Individuals with increased blood pressure must take their medication throughout their life.	88.64	11.36
K6. Individuals with increased blood pressure must take their medication in a manner that makes them feel good.	50.00	50.00

Knowledge and attitude on hypertension	Correct (%)	Incorrect (%)
K7. If the medication for increased blood pressure can control blood pressure, there is no need to change lifestyles.	17.1	82.91
K8. Increased blood pressure is the result of aging, so treatment is unnecessary.	8.06	91.95
K9. If individuals with increased blood pressure change their lifestyles, there is no need for treatment.	20.33	79.67
K10. Individuals with increased blood pressure can eat salty foods as long as they take their drugs regularly.	9.16	90.84
K11. Once Blood Pressure is normal after medicine, I can stop the medicine	17.95	82.05
K12. Long term medicines are more harmful than high Blood Pressure.	20.51	79.49
K13. Physical exercise can bring down Blood Pressure.	77.66	22.35
K14. Indoor work and daily activities are considered as effective physical exercise.	35.9	64.11
K15. Lifestyle modification is only when Blood Pressure is high.	34.25	65.75
K16. Individuals with increased blood pressure can drink alcoholic beverages.	3.11	96.89
K17. Individuals with increased blood pressure must not smoke.	74.36	25.64
K18. Individuals with increased blood pressure must eat fruits and vegetables frequently.	79.67	20.33
K19. For individuals with increased blood pressure, the best cooking method is frying.	2.38	97.62
K20. For individuals with increased blood pressure, the best cooking method is boiling or grilling.	96.15	3.85
K21. Main dietary control for Hypertension is reducing salt.	94.69	5.32
K22. The best type of meat for individuals with increased blood pressure is white meat.	48.9	51.10
K23. The best type of meat for individuals with increased blood pressure is red meat.	15.38	84.61
K24. Increased blood pressure can cause premature death if left untreated.	92.67	7.33
K25. Increased blood pressure can cause heart diseases, such as a heart attack if left untreated.	76.56	23.45
K26. Increased blood pressure can cause strokes if left untreated.	88.46	11.54
K27. Increased blood pressure can cause kidney failure if left untreated.	82.42	17.58
K28. Increased blood pressure can cause visual disturbances if left untreated	83.7	16.30
K29. The complications once developed are mostly reversible.	32.05	67.95

Overall, 37.2% of participants had good knowledge (score >70%), 52.75% had satisfactory knowledge (score ≥50 – <70%), and 10.07% had poor knowledge (score <50%). Having a secondary education and coexisting dyslipidemia were associated with a good level of knowledge. Although older age, male sex, and being employed or retired showed higher odds in the unadjusted analysis, these associations were not statistically significant after adjustment. Details of factors associated with a good level of knowledge are shown in Table 4.

Practice

The majority of the participants reported engaging in regular physical activity, limiting salt and fat intake, using healthier cooking methods, and demonstrated good medication adherence and healthcare engagement. All the participants denied smoking 546 (100%). However, 499 (91.39%) reported not monitoring their blood pressure at home, and more than half of the participants never read the nutritional facts label on the packaging. Detailed responses to practice-related questions are shown in Figure 1.

Table 4. Factors associated with good level of knowledge on hypertension among patients at the Eastern Regional Referral Hospital, Mongar, Bhutan, 2022

Characteristics	Total	Unadjusted analysis			Adjusted analysis		
		OR	95% CI	P value	Adjusted OR	95% CI	P value
Age (years)							
<39	31	Ref			Ref		
40 – 59	246	0.50	0.24 – 1.07	0.075	0.62	0.28 – 1.38	0.241

Characteristics	Total	Unadjusted analysis			Adjusted analysis		
≥60	269	0.33	0.15 – 0.70	0.004	0.46	0.20 – 1.06	0.069
Sex							
Female	363	Ref			Ref		
Male	183	1.68	1.17 – 2.42	0.005	1.36	0.85 – 2.17	0.196
Education							
No education	404	Ref			Ref		
Non-Formal Education or Primary education	87	2.21	1.38 – 3.53	0.001	1.57	0.92 – 2.67	0.099
Secondary education	39	4.52	2.25 – 9.08	<0.001	2.76	1.22 – 6.22	0.014
Tertiary education	16	3.76	1.34 – 10.58	0.012	1.63	0.51 – 5.27	0.411
Occupation							
Unemployed or dependent	428	Ref			Ref		
Employed	47	3.34	1.89 – 5.91	<0.001	1.63	0.79 – 3.37	0.183
Retired	33	2.52	1.23 – 5.15	0.011	1.49	0.70 – 4.06	0.243
Monks	27	1.44	0.65 – 3.20	0.464	0.86	0.35 – 2.12	0.746
Student	1	-	-	-	-		
Duration of hypertension (years)							
Up to 3	192	Ref					
4 – 6	165	1.26	0.73 – 1.73	0.589			
7 – 9	44	0.76	0.38 – 1.56	0.460			
≥10	142	1.26	0.81 – 1.97	0.312			
Diabetes mellitus	143	0.81	0.54 – 1.21	0.298			
Chronic kidney disease	23	0.34	0.11 – 1.02	0.055	0.32	0.10 – 1.02	0.053
Dyslipidemia	36	2.53	1.27 – 5.01	0.008	2.54	1.24 – 5.20	0.011
Stroke	27	1.37	0.63 – 3.00	0.425			
Left ventricular diastolic dysfunction	32	0.75	0.35 – 1.64	0.477			
Cardiovascular disease	43	0.56	0.27 – 1.13	0.105			
Number of anti-hypertensive medications							
One	298	Ref					
Two	202	1.04	0.72 – 1.50	0.844			
Three	36	0.74	0.35 – 1.56	0.432			
Four	6	1.68	0.33 – 8.49	0.527			
Five	1	-	-	-			
Level of care of hospital							
Primary Health Centre	87	Ref					
District Hospital	19	1.11	0.40 – 3.11	0.845			
Referral Hospital	424	1.16	0.72 – 1.89	0.540			

Discussion

This study evaluated the sociodemographic characteristics, clinical profiles, and knowledge, attitude, and practice regarding hypertension among 546 hypertensive patients. The mean age of participants was 58 years, with a predominance of females, consistent with a study from Bhutan, where females constituted 62.3%. In contrast to previous studies from

Nepal, the Bhutan STEPS survey, and most global studies, which reported a higher prevalence of hypertension among men, highlighting potential gender differences in healthcare-seeking behavior and diagnosis. Nearly three-quarters of participants had no formal education. They were unemployed, mirroring patterns observed across low- and middle-income countries (LMICs), where lower socioeconomic status is strongly associated with hypertension and poorer disease outcomes. Limited education and employment may restrict access to health information, self-care resources, and sustained lifestyle modification, contributing to suboptimal blood pressure control.

More than half of the participants had comorbidities, with diabetes mellitus being the most common. This finding is consistent with previous studies showing a strong association between diabetes and hypertension. Individuals with diabetes in Bhutan have been reported to be nearly 3.5 times more likely to develop hypertension, and over half of the diabetic population has coexisting hypertension . Furthermore, genetic and Mendelian randomization studies provide evidence of a unidirectional causal relationship in which type 2 diabetes increases the risk of hypertension, partly mediated through elevations in systolic blood pressure . . The high coexistence is likely due to shared risk factors such as sedentary lifestyle, obesity, smoking, alcohol use, and common metabolic pathways .

Hypertension-mediated organ damage (HMOD) was frequently observed, particularly involving the kidneys, eyes, and heart. Hypertensive retinopathy and nephropathy were present in approximately 13% of evaluated patients, while LVH was detected in 5.9%. However, a substantial proportion of participants were not assessed for all complications, which may have led to underestimation. Cerebrovascular accidents and established cardiovascular disease were less frequently observed. These findings are broadly comparable with previous studies reporting HMOD in nearly one-third of hypertensive patients, particularly among those with newly diagnosed or long-standing uncontrolled hypertension . One study reported HMOD prevalence of 20% in isolated systolic hypertension, 30.8% in preexisting hypertension, and 33.3% in newly diagnosed cases, with LVH being the most common manifestation [22]. The lower prevalence of LVH in our cohort may reflect differences in diagnostic modalities, under-evaluation, or shorter disease duration in some participants. Collectively, these findings reinforce the importance of early diagnosis and effective blood pressure control to prevent target organ damage.

Angiotensin receptor blockers (ARBs) were the most frequently prescribed antihypertensive agents in this study, with the majority of patients managed on monotherapy. This prescribing pattern differs from the Bhutan national hypertension guideline, which until recently recommended thiazide diuretics, particularly hydrochlorothiazide, as first-line therapy, with ARBs such as losartan reserved as second-line treatment. However, this study was conducted before the guideline update, which may explain the discrepancy between observed prescribing practices and current recommendations. The preference for ARBs in clinical practice likely reflects their favorable tolerability and safety profile, as well as their additional renal and cardiovascular protective benefits, particularly for patients with diabetes mellitus or chronic kidney disease . Nonetheless, the predominance of monotherapy alongside a high proportion of uncontrolled blood pressure suggests possible therapeutic inertia or delayed treatment intensification, highlighting the need for closer adherence to guideline-directed stepwise escalation and earlier initiation of combination therapy when blood pressure targets are not achieved.

Overall, 77% of patients had uncontrolled blood pressure based on the target of <130/80 mmHg, indicating poor hypertension control despite healthcare engagement. Similar findings have been reported in other low- and middle-income countries, where treatment rates remain high, but control rates are suboptimal . Sociodemographic factors and most comorbidities were not significantly associated with blood pressure control, suggesting that poor control was widespread across subgroups, in contrast to studies reporting age- and sex-related differences . Participants with a history of stroke or cardiovascular disease showed higher odds of achieving control, although not statistically significant, possibly reflecting increased risk perception and closer clinical follow-up.

Knowledge regarding hypertension was suboptimal, with fewer than 20% of participants correctly identifying normal or diagnostic blood pressure levels. Misconceptions regarding medication discontinuation, symptom-based treatment, and reversibility of complications were common. Although awareness of lifestyle measures such as salt reduction, healthy cooking methods, physical activity, and the risks of untreated hypertension was relatively high, concerns about long-term medication use and perceived harm persisted. This pattern of fragmented knowledge mirrors findings from South Asia and

other LMICs, where lifestyle awareness often coexists with poor understanding of disease chronicity and pharmacological management . For instance, a study from Chennai, India, reported that nearly one-third of diagnosed individuals did not take antihypertensive medication daily due to beliefs that treatment was unnecessary once blood pressure normalized or could be used intermittently . While such beliefs were less prominent in our cohort, similar gaps persist nationally in Bhutan. The STEPS Survey 2019 reported that 28% of adults have raised blood pressure, yet 65% remain unaware of their condition, and 20% of those diagnosed are not receiving treatment . Among treated individuals, over half cited perceiving medication as unnecessary or believing blood pressure was controlled, while fear of side effects or lifelong dependence was also reported, particularly among middle-aged adults and women [11].

Overall, self-reported hypertension-related practices were generally favorable, particularly in dietary modification, medication adherence, and healthcare engagement. Most participants reported reducing salt and fat intake, using healthier cooking methods, and attending regular clinical follow-up. Complete abstinence from smoking was reported by all participants, likely reflecting strong cultural and regulatory norms rather than hypertension education alone. Similar levels of adequate self-care practices have been reported in other low- and middle-income countries . Important gaps were noted in self-monitoring and informed dietary choices. More than 91% of participants reported never checking their blood pressure at home, consistent with evidence from South Asia, where limited access to devices, cost, and inadequate counseling hinder home monitoring . In addition, over half of the participants did not read nutritional labels for sodium and saturated fat on packaged foods, which may reflect limited educational background and health literacy. Despite good clinic attendance and reported medication adherence, poor self-monitoring and limited use of nutrition labels may delay recognition of uncontrolled blood pressure and reduce the effectiveness of long-term hypertension management.

Limitations

This study provides valuable insights into hypertension-related KAP in the study setting, but has limitations. Referral hospital-based recruitment may limit generalizability, incomplete assessment of complications may underestimate HMOD prevalence, and self-reported practices may be influenced by social desirability bias. Nevertheless, the findings highlight critical gaps in knowledge, self-monitoring, and sustained lifestyle practices. Targeted, patient-centered interventions focusing on foundational hypertension education, home blood pressure monitoring, treatment intensification, and practical nutrition literacy, including interpretation of food labels, are essential to improve blood pressure control and prevent long-term complications.

Conclusion

This study highlights substantial gaps in knowledge, attitudes, and self-care practices among hypertensive patients attending the outpatient department at Eastern Regional Referral Hospital, Mongar, Bhutan. Despite regular engagement with healthcare services and reported adherence to medications, a large proportion of patients had uncontrolled blood pressure, indicating possible therapeutic inertia, suboptimal treatment intensification, and inadequate lifestyle modification. Many patients lacked accurate knowledge of blood pressure targets, the chronic nature of hypertension, and strategies to prevent complications.

These findings underscore the need for patient-centered interventions that integrate structured hypertension education, culturally appropriate lifestyle counseling, promotion of home blood pressure monitoring, and improved provider adherence to guideline-directed therapy. Strengthening continuity of care, routine assessment of target organ damage, and incorporation of multidisciplinary approaches at the primary care level may further enhance blood pressure control and reduce long-term cardiovascular morbidity in Bhutan.

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Data availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Patient and public involvement

Patients and the public were not involved in the design, conduct, reporting, or dissemination plans of this research.

Authors contributions

Conceptualization and Study design: SY, SWR, TD; Data collection- SL, PY, KL, PW, PR, SY; Data curation and management: UC, SWR, TD; Formal analysis/ Statistical analysis: UC, SWR, TD; Writing- Original Draft: SWR, SY; Writing- Reviewing & Editing: SWR, UC, SY, TD; Supervision: SY, TD. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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References

1. World Health Organization. Noncommunicable diseases [Internet]. 2024 [cited 2025 Jul 14]. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
2. Aminpour M, Aryankhesal A, Hashjin AA, Pourasghari H. Implementation of the Package of Essential Non-Communicable (PEN) Disease Interventions in Low-Resource Settings: A Systematic Review. Iran J Public Health [Internet]. 2024 [cited 2025 Jul 14];53(10):2226–38. Available from: https://creativecommons.org/licenses/by-nc/4.0/
3. World Health Organization. Hypertension [Internet]. 2023 [cited 2025 Apr 24]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension
4. McCarthy CP, Bruno RM, Brouwers S, Canavan MD, Ceconi C, Christodorescu RM, et al. 2024 ESC Guidelines for the management of elevated blood pressure and hypertension. Vol. 45, European Heart Journal. Oxford University Press; 2024. p. 3912–4018.
5. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. Vol. 16, Nature Reviews Nephrology. Nature Research; 2020. p. 223–37.
6. 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 Aug 9;134(6):441–50.
7. Neupane D, McLachlan CS, Sharma R, Gyawali B, Khanal V, Mishra SR, et al. Prevalence of hypertension in member countries of South Asian Association for Regional Cooperation (SAARC): Systematic review and meta-analysis. Medicine (United States). 2014;93(13).
8. Shrestha J, Marasine NR, Lamichhane R, Marasini NR, Sankhi S. Attitude and self-care practice on hypertension among antihypertensive medication users in a tertiary care hospital Nepal. SAGE Open Med [Internet]. 2021 Aug 2 [cited 2025 Jul 15];Volume 9;1-9. Available from: https://doi.org/10.1177/20503121211040707
9. Jafar TH, Gandhi M, Jehan I, Naheed A, Asita De Silva H, Shahab H, et al. Determinants of Uncontrolled Hypertension in Rural Communities in South Asia—Bangladesh, Pakistan, and Sri Lanka. Am J Hypertens. 2018;31(11):1205.
10. Sudharsanan N, Ali MK, McConnell M. Hypertension knowledge and treatment initiation, adherence, and discontinuation among adults in Chennai, India: A cross-sectional study. BMJ Open. 2021 Jan 20;11(1).
11. Noncommunicable Disease Risk Factors: Bhutan STEPS Survey Report, 2019 [Internet]. 2020 [cited 2025 Jul 15]. Available from: www.health.gov.bt
12. Wangdi K, Jamtsho T. Prevalence and predisposing factors for self-reported hypertension in Bhutanese adults. Nepal J Epidemiol [Internet]. 2020 [cited 2025 Jul 15];10(1):830–40. Available from: www.nepjol.info/index.php/NJE
13. Population and housing census of Bhutan. National Statistics Bureau of Bhutan; 2017.
14. Thinley S, Tshering P, Wangmo K, Wangchuk N, Dorji T, Tobgay T, et al. The Kingdom of Bhutan Health System Review. Health Syst Transit. 2017;VoL 7 No.2.
15. Eastern Regional Referral Hospital. Eastern Regional Referral Hospital Annual Report 2023 [Internet]. Mongar: Eastern Regional Referral Hospital; 2024. Available from: http://www.mrrh.gov.bt
16. Erkoc SB, Isikli B, Metintas S, Kalyoncu C. Hypertension knowledge-level scale (HK-LS): A study on development, validity and reliability. Int J Environ Res Public Health. 2012;9(3):1018–29.

17. Han HR, Lee H, Commodore-Mensah Y, Kim M. Development and validation of the hypertension self-care profile: A practical tool to measure hypertension self-care. Journal of Cardiovascular Nursing. 2014;29(3).

18. Giri BR, Sharma KP, Chapagai RN, Palzom D. Diabetes and hypertension in urban bhutanese men and women. Indian Journal of Community Medicine. 2013 Jul 1;38(3):138–43.

19. Sun D, Zhou T, Heianza Y, Li X, Fan M, Fonseca VA, et al. Type 2 Diabetes and Hypertension. Circ Res. 2019 Mar 15;124(6):930–7.

20. Nelaj E, Gjata M, Kecaj I, Gjermeni I, Tase M. HIGH BLOOD PRESSURE IN THE NEWLY DIAGNOSED TYPE 2 DIABETES PATIENTS. J Hypertens. 2023 Jun;41(Suppl 3):e172.

21. Jia G, Sowers JR. Hypertension in Diabetes: An Update of Basic Mechanisms and Clinical Disease. Vol. 78, Hypertension. Lippincott Williams and Wilkins; 2021. p. 1197–205.

22. Jaryal A, Kumar B, Gaur N, Sharma K, Vikrant S, Kumar N. Prevalence of hypertension-mediated target organ damage in hypertensive patients in an outpatient setting – An observational study. Int J Noncommun Dis. 2016;10(1):12–6.

23. Williams B, Mancia G, Spiering W, Rosei EA, Azizi M, Burnier M, et al. 2018 ESC/ESH Guidelines for themanagement of arterial hypertension. Vol. 39, European Heart Journal. Oxford University Press; 2018. p. 3021–104.

24. Chia YC, Buranakitjaroen P, Chen CH, Divinagracia R, Hoshide S, Park S, et al. Current status of home blood pressure monitoring in Asia: Statement from the HOPE Asia Network. Vol. 19, Journal of Clinical Hypertension. Blackwell Publishing Inc.; 2017. p. 1192–201.

