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Factors associated with self-care behaviours among people with hypertension residing in Kathmandu: a cross-sectional study

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ABSTRACT

Objective To determine the prevalence and associated factors of self-care behaviours among people with hypertension in the Kathmandu district of Nepal.

Design Cross-sectional study.

Setting Municipalities of Kathmandu district, Nepal.

Participants We enrolled 375 adults aged ≥18 years with a minimum 1-year duration of hypertension using multistage sampling.

Outcome measures We used the Hypertension Self-care Activity Level Effects to assess self-care behaviours and collected data through face-to-face interviews. We conducted univariate and multivariable logistic regression analyses to determine the factors associated with self-care behaviours. The results were summarised as crude and adjusted ORs (AORs) with 95% CIs.

Results The adherence to antihypertensive medication, Dietary Approach to Stop Hypertension (DASH) diet, physical activity, weight management, alcohol moderation, and non-smoking were 61.3%, 9.3%, 59.2%, 14.1%, 90.9%, and 72.8%, respectively. Secondary or higher education (AOR: 4.42, 95% CI: 1.11 to 17.62), Brahmin and Chhetri ethnic groups (AOR: 3.30, 95% CI: 1.26 to 8.59) and good to very good perceived health (AOR: 3.96, 95% CI: 1.60 to 9.79) were positively associated with DASH diet adherence. Males (AOR: 2.05, 95% CI: 1.19 to 3.55) had higher odds of physical activity. Brahmin and Chhetri ethnic groups (AOR: 3.44, 95% CI: 1.63 to 7.26) and secondary or higher education (AOR: 4.70, 95% CI: 1.62 to 13.63) were correlates of weight management. Secondary or higher education (AOR: 2.47, 95% CI: 1.16 to 5.29), body mass index ≥25 kg/m^2 (AOR: 1.83, 95% CI: 1.04 to 3.22) and income above the poverty line (AOR: 2.24, 95% CI: 1.08 to 4.63) were positively associated with non-smoking. Furthermore, Brahmin and Chhetri ethnic groups (AOR: 4.51, 95% CI: 1.64 to 12.40), males (AOR: 0.17, 95% CI: 0.06 to 0.50) and primary education (AOR: 0.26, 95% CI: 0.08 to 0.85) were associated with alcohol moderation.

Conclusion The adherence to the DASH diet and weight management was particularly low. Healthcare providers and policymakers should focus on improving self-care by designing simple and affordable interventions for all patients with hypertension.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This cross-sectional study assessed self-care behaviours of people with hypertension at the community level.
⇒ All self-care recommendations by the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure were assessed.
⇒ Hypertension self-care behaviours were self-reported and could have been over-reported by the participants.
⇒ Self-monitoring of blood pressure by patients with hypertension was not assessed.
⇒ A mixed-methods study is required to evaluate self-care behaviours of people with hypertension.

INTRODUCTION

Hypertension is the number one preventable risk factor for cardiovascular diseases (CVDs) and premature death globally.[1 2] According to the World Health Organization (WHO), approximately 1.3 billion adults (aged 30–79 years) worldwide have hypertension,[3] and low-and middle-income countries contribute to two-thirds of the global burden.[3 4] The estimates of the WHO (2015) showed the highest prevalence of hypertension in Africa (27.4%), followed by the Eastern Mediterranean (26.3%) and Southeast Asia (25.1%). In South Asia, Nepal ranked third in terms of the prevalence of hypertension (29.4%), after Afghanistan (30.6%) and Pakistan (30.5%).[4 5]

Hypertension can lead to several health problems: coronary heart disease, stroke, heart failure, peripheral vascular disease, renal impairment, retinal haemorrhage and visual impairment.[3 6] Worldwide, hypertension and its complications account for 7.5 million deaths (12.8% of total deaths), equivalent to 57 million disability-adjusted life years (DALYs), that is, 3.7% of total DALYs.[7] Addressing hypertension and its

consequences increases the health system's expenses and results in significant productivity losses due to disability and premature mortality[8]; however, its treatment can be cost-effective and impactful. It is estimated that a 10 mm Hg reduction of systolic blood pressure (SBP) can reduce the risk of major CVD events by 20%, coronary heart disease by 17%, stroke by 27%, heart failure by 28% and death from all causes by 13%.[9]

Engaging people with hypertension in their self-care is one effective way to avert premature deaths due to hypertension.[10] Blood pressure (BP) can be lowered by non-pharmacological measures such as weight reduction (SBP 5–20 mm Hg/10 kg), the Dietary Approach to Stop Hypertension (DASH) eating plan (SBP 8–14 mm Hg), dietary sodium reduction (SBP 2–8 mm Hg), physical activity (SBP 4–9 mm Hg) and alcohol moderation (BP 2–4 mm Hg).[11 12] A combination of self-care interventions for weight loss, physical activity, DASH diet and alcohol moderation can lower 14.2 mm Hg of SBP and 7.4 mm Hg of diastolic BP in patients with hypertension.[11]

The Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC-7) recommends six self-care behaviours for BP control: antihypertensive medication, physical activity, weight management, alcohol moderation, non-smoking and a diet similar to DASH.[12] The WHO recommends self-care interventions for universal health coverage[13]; therefore, there is a pressing need to emphasise self-care to meet the targets of Sustainable Development Goal-3.[14]

Despite the robust evidence of self-care behaviours in controlling high BP, adherence to self-care behaviours is generally poor.[15–20] Only 38% of treated patients with hypertension in Nepal have their BP under control, underscoring the need for effective strategies to improve the hypertension care cascade.[5] Previous studies in Nepal have mainly focused on medicine adherence,[21–23] but other components of self-care behaviours have been usually overlooked and require further investigation. To the best of our knowledge, most studies are hospital based,[24–26] and literature studies assessing self-care behaviours at the community level are lacking.[27] This impedes in the development of targeted strategies for controlling hypertension. Hence, this study intends to bridge the knowledge gap by generating vital evidence on self-care behaviours and their determinants. The study findings will apply to policymakers and medical practitioners for planning strategies and health promotional activities for people with hypertension.

MATERIALS AND METHODS

Study design

This cross-sectional study was conducted among residents with hypertension of the Kathmandu district from September 2019 to February 2020.

Study setting

General setting

Nepal is a landlocked country in Southeast Asia with an area of 147, 516 km^2.[28] It has seven administrative provinces, within which lie 77 districts.[28] The districts subdivide into rural and urban municipalities, and the municipalities into wards.[29] It has a total population of 29, 112, 480[30] with nearly one-fourth of the adult population suffering from hypertension.[31]

Specific setting

We purposively selected the Kathmandu district due to the high burden of hypertension and poor lifestyle management in urban populations.[32–34] It lies in the Bagmati province and is the most densely populated district, with 2,017,532 people[30] inhabiting an area of 395 km^2.[35] It consists of 10 municipalities and 1 metropolitan city.[35] The municipalities have an overall 32% hypertension prevalence.[34] Kageshwori-Manohara, one of the municipalities in Kathmandu, reported a threefold increase in hypertension prevalence in just 25 years.[36]

Study population

The study population included diagnosed residents with hypertension of the Kathmandu district. The inclusion criteria include (1) adults aged ≥18 years with a minimum of 1-year diagnosis of hypertension and (2) patients with a prescription of one or more antihypertensive drugs, as verified through their medical records. Hypertensive cases that were (1) pregnant, (2) mentally and critically ill, and (3) denying informed consent were excluded from the study.

Sample size

The sample size was calculated to be 375 using a single population proportion formula $[Z^2\ p\ (1-p)/e^2]$,[37] assuming 50% prevalence (p) of self-care behaviour, 15% relative precision (e=15% of p), 95% confidence level, design effect of 2 and 10% non-response rate.

Sampling technique

We applied multistage sampling to select the study subjects. In the first stage, we randomly selected three municipalities using the lottery method. The selected municipalities, Kageshwori-Manohara, Kirtipur and Budhanilkantha, have 9,[38] 10,[39] and 13[40] wards, respectively. In the second stage, we randomly chose two wards from each selected municipality using the lottery method. In aggregate, we selected six wards for data collection and allocated an equal sample size to each chosen ward.

In the third sampling stage, we selected patients with hypertension using the pen spin technique. For this, we spun the pen at the central location of the selected wards to determine the direction for data collection. Following the direction pointed by the pen, we collected data from the nearest household in the pointed direction. We first checked for the availability of residents with hypertension and only enrolled cases that met the inclusion criteria. In case of ineligibility, and on completion of data collection,

we approached the subsequent households closest to the starting household. The iteration was carried on until the desired sample size was met for the respective ward. If households had more than one hypertensive case, the respondents were chosen using the lottery method.

Data collection tools and techniques

The principal investigator and the co-investigators collected data by conducting face-to-face interviews, reviewing patients' medical records and performing anthropometric measurements using a structured questionnaire. The questionnaire consisted of three sections: (a) sociodemographic characteristics, (b) health-related characteristics and (c) self-care behaviours.

Sociodemographic characteristics

This section consisted of a questionnaire to assess participants' sociodemographic characteristics: age (in years), gender (male/female), marital status (currently married/never married/widowed/divorced or separated), ethnicity (Brahmin/Chhetri/Janajati/Madhesi/Dalit), family type (nuclear/joint), education (no formal education/primary/secondary/higher), work status (working/not working) and income (below poverty line/above poverty line). The marital status was reclassified as 'in union' if participants were currently married at the time of data collection and 'not in union' if participants were never married, widowed, divorced or separated. Participants living below $1.9 per day were considered to be living below the poverty line.[41]

Health-related characteristics

It consisted of a questionnaire to assess hypertension duration, comorbid illness, family history of hypertension, body mass index (BMI) and perceived health status of patients with hypertension. Along with the face-to-face interviews with patients with hypertension, we also reviewed patients' medical records (hypertension duration, comorbidities and medicine prescriptions) and carried out anthropometric (height and weight) measurements to assess patients' health-related characteristics. The patients' heights were measured using a portable stature scale and recorded in centimetres; weights were measured using a digital weighing scale and recorded in kilograms.

The BMIs were calculated using the formula: weight (kg)/height (m^2), and categorised as normal weight (18.5≤BMI≤24.9), overweight (25≤BMI≤29.9) and obese (BMI ≥30) using the WHO BMI classification.[42] Patients' perceived health status was rated as 'very good', 'good', 'fair', 'poor' and 'very poor'. The responses were further dichotomised as very good or good versus fair to very poor.[43]

Self-care behaviours

This section consisted of 31 questions of Hypertension Self-care Activity Level Effects (H-SCALE) categorised into six subdomains: (1) medication adherence, (2) DASH diet adherence, (3) physical activity, (4) weight management, (5) non-smoking and (6) alcohol moderation.

Outcome measures

We assessed adherence to six self-care behaviours recommended by JNC-7: taking medication, following a diet consistent with the DASH nutritional recommendation, engaging in physical activity, avoiding tobacco smoke, maintaining weight and moderating alcohol consumption.

1. Adherence to medication: the medication adherence questionnaire consisted of three items, with each item a score of 0–7 summed up to give a total score ranging from 0 to 21. Respondents with a score of 21 were considered adherent. Such participants included those who took the recommended dosage of medication at the same time on all days of the week.[15]
2. Adherence to the DASH diet: the DASH Questionnaire (DASH-Q) consisted of 11 items. Each item score ranged from 0 to 7 and was summed up to give a total score ranging from 0 to 77. Participants who scored 52 or greater on the DASH-Q were considered adherent to a high-quality diet consistent with DASH nutritional requirements.[15]
3. Adherence to physical activity: the physical activity questionnaire consisted of two items with each item score of 0–7, giving a total score of 0–14. Participants who scored an 8 or better were considered adherent to physical activity levels consistent with the recommendation of 150 min/week of moderate-intensity physical activity.[15]
4. Adherence to weight management: a 5-point Likert scale consisting of 10 items assessed weight management. Responses for each item ranged from strongly disagree (1) to strongly agree (5), giving a total score of 10–50. Participants who agreed or strongly agreed with all 10 items assessing weight management practice (score ≥40 out of 50) were considered adherent to weight management practices.[15]
5. Adherence to non-smoking: a two-item questionnaire assessed smoking habits and exposure to environmental tobacco smoke of patients with hypertension. Respondents reporting 0-day smoking and 0-day exposure to cigarette smoke in an enclosed room or vehicle while someone was smoking in the past 7 days were considered to be adherent to non-smoking.[15]
6. Adherence to alcohol moderation: a three-item questionnaire assessed alcohol consumption.[15] The questionnaire required us to quantify the amount of alcohol consumption in standard drinks. So, we showed pictorial cards displaying glasses and bowls frequently used by Nepalese people to help the participants recall how much alcohol they regularly consumed. Adherence to moderate alcohol consumption was defined as ≤2 drinks/day (score of 14 or less over the 7-day response period) for men and ≤1 drink/day (score of 7 or less) for women.[15]

Validity and reliability of tools

The H-SCALE that we used to ascertain the self-care behaviours of participants with hypertension has been widely used after translation in several countries, including Nepal.[15 44 45] After obtaining permission to use H-SCALE from the developer (Jan Warren Findlow), we translated the questionnaire from English to the Nepali language, and a bilingual language expert back-translated it to English. The consultants and faculty from B.P. Koirala Institute of Health Sciences reviewed the tools to maintain content validity. A week before data collection, we pretested the questionnaire in 10% of the required sample size (37 patients with hypertension) in Madhyapur Thimi, Bhaktapur, Nepal. We checked the questionnaire for its clarity, coherence and relevancy, and simplified it based on the respondents' understanding.

The Nepalese version of H-SCALE that we used had acceptable reliability for all self-care domains: medication adherence (α=0.98), DASH diet adherence (α=0.63), physical activity (α=0.88), weight management (α=0.63), non-smoking (α=0.62) and alcohol moderation (0.82).

Data entry and analysis

We checked data collection forms for missing entries on the same day of data collection. If any corrections were required, we made subsequent visits or resolved the issues through phone calls. At the end of every week of data collection, we randomly checked at least 10% of the collected data for correctness. We entered the data in Microsoft Excel V.2019 and imported it into STATA V.13.0 for cleaning and statistical analysis.

The categorical variables were summarised using frequencies and percentages. Normally distributed numerical variables were summarised as means and SDs, whereas non-normally distributed numerical variables were presented as medians and IQRs. The self-care behaviours were summarised using proportions and 95% CIs. The univariate and multivariable logistic regression analyses were conducted to determine the association of sociodemographic and health-related characteristics with self-care behaviours. All explanatory variables were entered for multivariable logistic regression. The results of the logistic regression analysis were presented as crude ORs (CORs) and adjusted ORs (AORs) with 95% CIs. A p value less than 0.05 was considered statistically significant throughout the study.

Patient and public involvement

Participants were not involved in the design, conduct, reporting and dissemination plans of our research.

RESULTS

Sociodemographic characteristics

A total of 375 adults with hypertension participated in this study, of which more than half (56.3%) were females. The age of the participants ranged from 19 to 87 years, with the mean age of 57.7 (SD: 13.4) years. About half of the total participants belonged to the Janajati ethnic group (52.5%), followed by Brahmin (22.6%) and Chhetri (21.1%). The majority of participants were currently married (82.1%) and lived in a nuclear family (54.7%). About 45.9% of patients with hypertension had no formal schooling. The median daily per capita income was $3.1 (IQR: $2.4–$4.4), and about 11.5% were living below the poverty line (table 1).

Table 1 Sociodemographic characteristics of patients with hypertension (n=375)

Characteristics	n (%) or mean (SD) or median (IQR)
Age in years, mean (SD)	57.7 (13.4)
Gender	
Male	164 (43.7)
Female	211 (56.3)
Ethnicity	
Brahmin	85 (22.6)
Chhetri	79 (21.1)
Janajati	197 (52.5)
Madhesi	4 (1.1)
Dalit	10 (2.7)
Marital status	
Currently married	308 (82.1)
Never married	5 (1.4)
Widowed	59 (15.7)
Divorced/separated	3 (0.8)
Family type	
Nuclear	205 (54.7)
Joint	170 (45.3)
Education	
No formal education	172 (45.9)
Primary	71 (18.9)
Secondary	63 (16.8)
Higher	69 (18.4)
Work status	
Working	153 (40.8)
Not working	222 (59.2)
Income	
Below poverty line	43 (11.5)
Above poverty line	332 (88.5)
Daily per capita income ($/person/day), median (IQR)	3.1 (2.4–4.4)

%, percent; IQR, interquartile range; n, frequency; SD, standard deviation.

Health-related characteristics

The median duration of hypertension illness was 5 years (IQR: 2–10). About 39.2% of participants had a family history of hypertension, and 44% had other comorbidities

Table 2 Health-related characteristics of patients with hypertension (n=375)

Characteristics	n (%) or median (IQR)
Hypertension duration in years, median (IQR)	5 (2–10)
Family history of hypertension	
Yes	147 (39.2)
No	228 (60.8)
Comorbidity	
Yes	165 (44.0)
No	210 (56.0)
Body mass index	
<18.5 kg/m^2	4 (1.1)
18.5–24.9 kg/m^2	95 (25.3)
25–29.9 kg/m^2	185 (49.3)
≥30 kg/m^2	91 (24.3)
Perceived health	
Very poor	8 (2.1)
Poor	43 (11.5)
Fair	246 (65.6)
Good	76 (20.3)
Very good	2 (0.5)

%, percent; IQR, interquartile range; n, frequency.

like diabetes, dyslipidaemia, ischaemic heart disease and kidney disease. Only 20.8% of the participants reported good to very good health conditions. Based on the WHO BMI classification, about 49.3% and 24.3% of the study participants were overweight and obese, respectively (table 2).

Prevalence of self-care behaviours

Figure 1 illustrates the prevalence of self-care behaviours among patients with hypertension. The prevalence of DASH diet adherence (9.3%, 95% CI: 6.6% to 12.7%) was the lowest among all subdomains. About 61.3% (95% CI: 56.2% to 66.3%) were adherent to antihypertensive medication, 59.2% (95% CI: 54.0% to 64.2%) followed physical activity recommendations, 72.8% (95% CI: 68.0% to 77.2%) avoided smoking and 14.1% (95% CI: 10.8% to 18.1%) practised weight management. Alcohol moderation (90.9%, 95% CI: 87.6% to 93.6%) was the most prevalent self-care behaviour among patients with hypertension.

Factors associated with self-care behaviours

Table 3 shows the results of the univariate logistic regression analysis. Age, gender, marital status, education, ethnicity, family type, work status, income, hypertension duration, family history of hypertension and perceived health were significantly associated with the self-care behaviours of people with hypertension.

Table 4 shows the results of the multivariable logistic regression analysis. The odds of DASH diet adherence were higher for participants with secondary or higher education (AOR: 4.42, 95% CI: 1.11 to 17.62), good to very good perceived health (AOR: 3.96, 95% CI 1.60 to 9.79), and Brahmin and Chhetri ethnic groups (AOR: 3.30, 95% CI: 1.26 to 8.59). The males had higher odds of physical activity (AOR: 2.05, 95% CI: 1.19 to 3.55). The odds of weight management were higher among

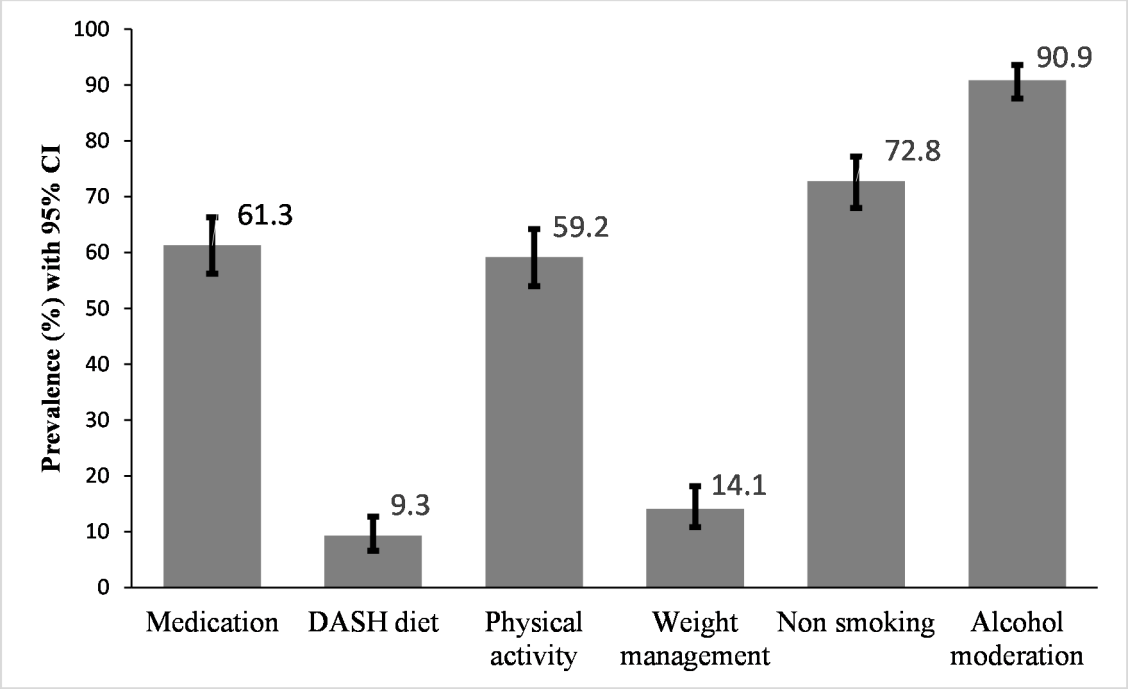

Figure 1 Prevalence of self-care behaviours among patients with hypertension; the error bars represent the 95% CI for percentages (n=375). DASH, Dietary Approach to Stop Hypertension.

Table 3 Unadjusted associations of sociodemographic and health-related characteristics with self-care behaviours (n=375)

	Medication adherence COR (95% CI)	DASH diet adherence COR (95% CI)	Physical activity COR (95% CI)	Weight management COR (95% CI)	Non-smoking COR (95% CI)	Alcohol moderation COR (95% CI)
Age (in years)	1.00 (0.99 to 1.02)	1.02 (0.99 to 1.05)	1.00 (0.98 to 1.01)	1.01 (0.98 to 1.02)	1.01 (0.99 to 1.03)	1.04 (1.01 to 1.07)*
Gender						
Female	1	1	1	1	1	1
Male	0.89 (0.59 to 1.35)	5.00 (2.21 to 11.33)*	2.17 (1.42 to 3.34)	2.64 (1.45 to 4.84)*	1.15 (0.73 to 1.83)	0.21 (0.09 to 0.48)*
Marital status*						
In union	1	1	1	1	1	1
Not in union	0.99 (0.58 to 1.71)	0.12 (0.02 to 0.91)*	0.95 (0.56 to 1.63)	0.08 (0.01 to 0.55)*	0.85 (0.48 to 1.52)	1.7 (0.58 to 5.00)
Ethnicity						
Others	1	1	1	1	1	1
Brahmin/Chhetri	1.17 (0.77 to 1.78)	5.00 (2.21 to 11.33)*	1.57 (1.03 to 2.39)*	4.91 (2.53 to 9.56)*	1.62 (1.10 to 2.60)*	4.03 (1.63 to 9.98)*
Education						
No education	1	1	1	1	1	1
Primary	0.53 (0.30 to 0.92)*	1.22 (0.22 to 6.80)	1.95 (1.10 to 3.48)*	2.58 (0.87 to 7.64)	0.79 (0.44 to 1.42)	0.16 (0.06 to 0.41)*
Secondary or higher	1.30 (0.81 to 2.10)	11.83 (4.04 to 34.61)*	2.07 (1.29 to 3.31)*	9.89 (4.25 to 22.98)*	2.28 (1.31 to 4.00)*	0.42 (0.16 to 1.01)
Work status						
Working	1	1	1	1	1	1
Not working	0.76 (0.50 to 1.16)	0.64 (0.30 to 1.35)	1.23 (0.80 to 1.87)	0.78 (0.43 to 1.43)	0.57 (0.36 to 0.89)*	0.39 (0.19 to 0.81)*
Income						
Below poverty	1	1	1	1	1	1
Above poverty	0.93 (0.48 to 1.40)	1.42 (0.42 to 4.86)	1.17 (0.62 to 2.22)	1.02 (0.41 to 2.54)	2.38 (1.24 to 4.55)*	2.69 (1.13 to 6.40)*
Family type						
Joint	1	1	1	1	1	1
Nuclear	0.97 (0.64 to 1.47)	1.45 (0.71 to 2.98)	1.34 (0.89 to 2.03)	1.31 (0.73 to 2.38)	0.84 (0.53 to 1.33)	0.63 (0.30 to 1.32)
HTN duration	0.99 (0.95 to 1.02)	1.06 (1.01 to 1.11)*	0.97 (0.94 to 1.00)	1.04 (0.99 to 1.08)	1.01 (0.97 to 1.04)	1.01 (0.96 to 1.07)
Comorbidity						
No	1	1	1	1	1	1
Yes	1.14 (0.75 to 1.73)	1.58 (0.75 to 3.17)	0.97 (0.04 to 1.47)	1.39 (0.77 to 2.48)	1.55 (0.97 to 2.48)	2.00 (0.93 to 4.31)
Family history						
No	1	1	1	1	1	1
Yes	1.26 (0.82 to 1.93)	2.24 (1.11 to 4.52)*	0.87 (0.57 to 1.33)	1.46 (0.82 to 2.67)	1.26 (0.78 to 2.02)	1.61 (0.75 to 3.48)
Perceived health						
Fair to very poor	1	1	1	1	1	1
Good to very good	1.01 (0.61 to 1.69)	4.94 (2.41 to 10.14)*	1.86 (1.09 to 3.19)*	2.76 (1.48 to 5.15)*	1.74 (0.94 to 3.22)	0.51 (0.24 to 1.10)
BMI (kg/m^2)						
<25	1	1	1	1	1	1
≥25	1.10 (0.69 to 1.77)	0.57 (0.28 to 1.19)	0.78 (0.48 to 1.25)	0.80 (0.42 to 1.52)	1.6 (0.98 to 2.63)	1.18 (0.54 to 2.56)

*Significant at p<0.05.
*Marital status: in union category includes currently married participants, whereas not in union category includes never married, widowed and separated participants.
†Others ethnic groups include Janajati, Madhesi and Dalit.
BMI, body mass index; COR, crude OR; DASH, Dietary Approach to Stop Hypertension; HTN, hypertension.

Brahmin and Chhetri ethnic groups (AOR: 3.44, 95% CI: 1.63 to 7.26) and participants with secondary or higher education (AOR: 4.70, 95% CI: 1.62 to 13.63).

Secondary or higher education (AOR: 2.47, 95% CI: 1.16 to 5.29), BMI ≥25 kg/m^2 (AOR: 1.83, 95% CI: 1.04 to 3.22) and income above the poverty line (AOR: 2.24, 95% CI: 1.08 to 4.63) were positively associated with non-smoking practices. The Brahmin and Chhetri ethnic groups (AOR: 4.51, 95% CI: 1.64 to 12.40) had higher odds of adherence to alcohol moderation; male respondents (AOR: 0.17, 95% CI: 0.06 to 0.50) and participants with primary education (AOR: 0.26, 95% CI: 0.08 to 0.85) had lower odds of adherence to alcohol moderation.

Table 4 Adjusted associations of sociodemographic and health-related characteristics with self-care behaviours (n=375)

Characteristics	Medicine adherence AOR (95% CI)	DASH diet adherence AOR (95% CI)	Physical activity AOR (95% CI)	Weight management AOR (95% CI)	Non-smoking AOR (95% CI)	Alcohol moderation AOR (95% CI)
Age (in years)	1.02 (0.99 to 1.04)	1.02 (0.96 to 1.08)	1.01 (0.99 to 1.04)	0.99 (0.95 to 1.03)	1.01 (0.98 to 1.04)	1.03 (0.99 to 1.08)
Gender						
Female	1	1	1	1	1	1
Male	0.78 (0.45 to 1.33)	2.94 (0.95 to 9.11)	2.05 (1.19 to 3.55)*	1.53 (0.66 to 3.54)	1.02 (0.56 to 1.87)	0.17 (0.06 to 0.50)*
Marital status*						
In union	1	1	1	1	1	1
Not in union	1.01 (0.55 to 1.84)	0.21 (0.02 to 1.84)	1.37 (0.75 to 2.51)	0.13 (0.02 to 1.01)	0.90 (0.46 to 1.73)	1.04 (0.29 to 3.71)
Ethnicity						
Others†	1	1	1	1	1	1
Brahmin/Chhetri	0.93 (0.58 to 1.48)	3.30 (1.26 to 8.59)*	1.43 (0.89 to 2.29)	3.44 (1.63 to 7.26)*	1.13 (0.67 to 1.93)	4.51 (1.64 to 12.40)*
Education						
No education	1	1	1	1	1	1
Primary	0.57 (0.30 to 1.09)	0.64 (0.10 to 4.20)	1.38 (0.71 to 2.67)	1.79 (0.53 to 6.08)	1.02 (0.51 to 2.04)	0.26 (0.08 to 0.85)*
Secondary or higher	1.61 (0.84 to 3.10)	4.42 (1.11 to 17.62)*	1.27 (0.66 to 2.43)	4.70 (1.62 to 13.63)*	2.47 (1.16 to 5.29)*	0.75 (0.22 to 2.58)
Employment status						
Unemployed	1	1	1	1	1	1
Employed	0.86 (0.53 to 1.42)	0.44 (0.14 to 1.37)	1.02 (0.62 to 1.69)	0.64 (0.28 to 1.44)	0.63 (0.36 to 1.09)	1.16 (0.45 to 3.00)
Income						
Below poverty	1	1	1	1	1	1
Above poverty	0.73 (0.35 to 1.48)	0.67 (0.16 to 2.88)	1.17 (0.57 to 2.40)	0.75 (0.26 to 2.19)	2.24 (1.08 to 4.63)*	2.02 (0.70 to 5.51)
Family type						
Joint	1	1	1	1	1	1
Nuclear	1.14 (0.70 to 1.85)	1.50 (0.57 to 3.96)	1.30 (0.80 to 2.12)	1.03 (0.49 to 2.17)	0.82 (0.47 to 1.42)	1.08 (0.42 to 2.74)
HTN duration	0.96 (0.93 to 1.00)	1.03 (0.97 to 1.11)	0.97 (0.93 to 1.00)	1.05 (0.99 to 1.11)	0.99 (0.95 to 1.03)	0.95 (0.89 to 1.02)
Comorbidity						
No	1	1	1	1	1	1
Yes	1.15 (0.72 to 1.85)	0.98 (0.37 to 2.59)	0.88 (0.55 to 1.42)	1.33 (0.62 to 2.83)	1.37 (0.81 to 2.34)	2.05 (0.76 to 5.48)
Family history						
No	1	1	1	1	1	1
Yes	1.12 (0.71 to 1.79)	1.06 (0.45 to 2.48)	0.77 (0.48 to 1.23)	0.88 (0.44 to 1.76)	0.96 (0.57 to 1.62)	1.39 (0.55 to 3.47)
Perceived health						
Fair to very poor	1	1	1	1	1	1
Good to very good	0.96 (0.55 to 1.68)	3.96 (1.60 to 9.79)*	1.81 (1.00 to 3.27)	1.71 (0.83 to 3.54)	1.46 (0.74 to 2.86)	0.40 (0.16 to 1.05)
BMI (kg/m^2)						
<25	1	1	1	1	1	1
≥25	1.02 (0.61 to 1.71)	0.58 (0.22 to 1.49)	0.92 (0.54 to 1.56)	0.80 (0.37 to 1.75)	1.83 (1.04 to 3.22)*	0.75 (0.29 to 1.96)

*Significant at p<0.05.
*Marital status: in union category includes currently married participants, whereas not in union category includes never married, widowed and separated participants.
†Others ethnic groups include Janajati, Madhesi and Dalit.
AOR, adjusted OR; BMI, body mass index; DASH, Dietary Approach to Stop Hypertension; HTN, hypertension.

DISCUSSION

In this community-based cross-sectional study, we assessed all self-care behaviours, recommended by the JNC-7, and further identified their correlates. The prevalence of self-care behaviours was generally poor among residents with hypertension of Kathmandu, particularly with DASH diet adherence and weight management practices. Moreover, gender, education, ethnicity, income, perceived health and BMI were significantly associated with self-care behaviours.

Nearly two-thirds (61.3%) of our respondents adhered to antihypertensive medication, similar to studies in Ethiopia (65.0%),[17] North Carolina (58.6%)[44] and China (61.3%).[46] On the contrary, studies in a tertiary care centre in western Nepal (82.4%)[25] and Pakistan (83.3%)[47] reported a higher level of medication adherence. Yet,

our prevalence is higher than that of studies in India (41.9%),[18] Iran (36.1%)[16] and Myanmar (24.1%).[48] It could be due to differences in the study setting, participant selection criteria and sociodemographic characteristics of hypertensive cases.

The adherence to the DASH-Q subscale was the lowest (9.3%) among all self-care domains, and it aligns with the study findings in Myanmar (2.7%)[48] and North Carolina (18.0%).[15] The STEPS Survey of Nepal (2019) also reported insufficient consumption of fruits and vegetables (<5 servings in a day) in 96.7% of the adult population.[31] Hence, the Nepalese population should be encouraged to increase the portions of fruits and vegetables in the staple diet. Our study demonstrated higher odds of DASH diet adherence in Brahmin and Chhetri ethnic groups, possibly due to better food choices and access to high-quality food in these ethnic groups. The participants with secondary or higher levels of education had increased odds of DASH diet adherence; therefore, health service providers should teach patients about the composition of the DASH diet. Additionally, good to very good perceived health was positively associated with DASH diet adherence. So, health service providers should boost self-confidence of patients with hypertension by regularly counselling them that hypertension is treatable and controlling it can further minimise the risk of other diseases such as heart and kidney diseases.

More than half (59.2%) of our respondents followed physical activity recommendations. The prevalence was higher than the studies in Ethiopia (43.0%),[17] Pakistan (24.8%),[47] Iran (28.3%),[16] Myanmar (24.9%)[48] and India (17.8%),[18] but similar to a study in China (51.9%)[46] and tertiary care centre in central Nepal (44.8%).[24] Compared with females, males had higher odds of physical activity, congruent with a study in Ethiopia[49 50] and Pakistan.[47] It is because our measurement tool largely took account of outdoor activities, and the female respondents, who were mostly homemakers, could barely spare time for outdoor physical activities due to their overwhelming household responsibilities.

Only 14.1% of our participants adhered to weight management practices, which concurs with the study in Myanmar (9.5%).[48] Previous studies in Pakistan (54.8%),[47] Iran (38.5%),[16] North Carolina (39.0%)[15] and central Nepal (50.9%)[24] have reported higher prevalence of weight management. Thus, our findings reflect poor weight management efforts and unhealthy dietary practices among residents with hypertension, warranting public health interventions. We observed a positive association between higher education and weight management practices, similar to the study in Pakistan.[47] Hence, efforts should be made to raise the awareness of people with hypertension through regular health education sessions. Our findings also indicated higher odds of weight management among the Brahmin and Chhetri ethnic groups, possibly due to their socioeconomic status, dietary habits and availability of necessary resources.

Nearly three-fourths (72.8%) of respondents reported no tobacco smoking, consistent with the findings in India (70.2%)[18] and western Nepal (75.0%).[25] Previous studies in Ethiopia (92.0%),[17] North Carolina (82.o%)[15] and Pakistan (83.3%)[47] have reported lower adherence to non-smoking. Our study showed a positive association between higher education and non-smoking; therefore, health service providers should specifically target people with no or primary education while providing counselling sessions. BMI was positively associated with smoking abstinence, possibly due to the effect of nicotine—a chemical substance in tobacco. Nicotine is known to reduce body weight by increasing metabolic rate, decreasing metabolic efficiency and reducing appetite among light smokers.[51] Hence, longitudinal studies are warranted to establish the direction of causality. People living above the poverty line had increased odds of smoking cessation; therefore, income-generating activities might benefit those living in absolute poverty in their efforts to quit smoking.[52]

In the present study, the prevalence of alcohol moderation was the highest (90.9%) among all self-care domains, consistent with the studies in North Carolina (89.0%)[15] and central Nepal (85.8%).[24] Previous studies in Pakistan (100.0%)[47] and Iran (100.0%)[16] have reported absolute abstinence due to their religious prohibition. Our study showed a negative association between the male gender and alcohol moderation, congruent to a study in Ethiopia.[50] It is because our societal norms regard drinking as an immoral act for females.[53] Unlike males, they drink moderate amount of home-brewed liquor.[53 54] The Brahmins and Chhetris had higher odds of alcohol moderation, concurrent with other studies in Nepal.[53 55] It is traditional for Brahmins not to consume alcohol unlike Janajatis who drink alcohol during social functions and even offer alcohol to deities.[53] But this cultural distinction is progressively disappearing, and drinking is ubiquitous in all ethnic groups.[53 54] Surprisingly, we found an inverse association between primary education and alcohol moderation. It could be due to the selection of elderly patients without education as a comparison group, who avoided or limited alcohol intake to preserve their waning health.

Limitations of the study

Finally, our study is not free from limitations. We used a cross-sectional study design which precludes the ability to determine causal inferences. Hypertension self-care behaviours were self-reported and could have been over-reported by the participants due to social desirability. The participants were asked to report their adherence over the past 7–30 days, and this might have introduced recall bias in the study. We used the WHO international standards to classify BMI, so overweight and obesity prevalence might have been under-reported in our study. Other factors like hypertension knowledge, self-efficacy, social support and other psychosocial factors might also affect hypertension self-care behaviours and need further

exploration. Moreover, future research should also assess self-monitoring of BP in patients with hypertension.

Conclusion

Our findings indicated poor adherence to self-care behaviours, particularly to the DASH diet and weight management practices; therefore, healthcare providers should provide regular dietary counselling. It is also essential to emphasise hypertension self-care counselling in the national Package of Essential Non-Communicable (PEN) disease interventions. Participants' adherence to self-care behaviours varied with sociodemographic backgrounds; hence, policymakers and health service providers should focus on patients with low socioeconomic and educational backgrounds while designing health interventions. Further studies using triangulation methods are needed to elucidate poor adherence to self-care behaviours.

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