Original Article

Factors Influencing Lifestyle Modification among Persons with Hypertension in Punakha, Bhutan

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Abstract

OBJECTIVES: To describe lifestyle modification among persons with hypertension (HT), and examine whether hypertension knowledge, perceived self-efficacy and perceived social support can predict lifestyle modification among persons with HT in Punakha, Bhutan.

MATERIAL AND METHODS: Simple random sampling technique was used to recruit 108 persons with HT visiting the non-communicable disease (NCD) unit of Punakha District Hospital, Bhutan. Data on demographic characteristics and health information were collected using Demographic Questionnaires. Standard instruments such as Hypertension Self-care Profile Behaviour Scale (HBP SCP), Hypertension Knowledge-Level Scale (HK-LS), Hypertension Self-Efficacy Scale and Multi-dimensional Scale of Perceived Social Support (MSPSS), each bearing reliability coefficient of 0.83, 0.82, 0.81 and 0.85 respectively, were used to measure the research variables. Data was analysed using descriptive statistics and standard multiple regression.

RESULT: The findings showed that lifestyle modification was high among the participants (M = 53.9 ± 7.7). Standard multiple regression revealed hypertension knowledge ($\beta = 0.19$, $p = 0.04$) and perceived self-efficacy ($\beta = 0.36$, $p < 0.001$) as the significant predictors of lifestyle modification. Perceived social support did not predict lifestyle modification. All predictors together explained 21.05% of variance in lifestyle modification ($R^2 = 21.05\%$, $F_{(4, 103)} = 10.51$, $p < 0.001$) among the participants.

CONCLUSION: The lifestyle modification of persons with HT can be enhanced by designing an intervention directed toward strengthening hypertension knowledge and perceived self-efficacy. While providing the interventional program, healthcare professionals should involve both individual and family to motivate them to promote lifestyle modification.

Keywords: lifestyle modification, hypertension knowledge, self-efficacy, social support, Bhutan

Hypertension (HT) is a serious public health issue devastating millions of lives across the world. It is defined as the persistent elevation of seated blood pressure (BP) of ≥ 140/90 mmHg measured on two or more separate occasions.[1] Worldwide prevalence of HT is soaring; the number of cases rose from 594 million in 1975 to 1.13 billion in 2015, the majority of which are from low and middle income countries.[2] Globally, uncontrolled systolic blood pressure (SBP) alone is responsible for 10.4 million deaths and 218 million disability adjusted life years.[3] Ischemic heart diseases and stroke, which are the most common complications of HT, accounted for combined death tolls of 15.2 million in 2016.[4]

Such dramatic rise in HT-related morbidity and mortality are mainly due to unhealthy lifestyle practices, including unhealthy diet, physical inactivity, heavy alcohol consumption, smoking, non-adherence to prescribed medication and psychological stress among hypertensive population.[1,5,6] For instance, HT is highly prevalent among heavy alcohol drinkers (54.4%) and those who consume more than 5 grams of salt per day (40.7%).[6] It is evident that BP control with antihypertensive medication is inadequate among those with weight gain (OR= 2.18; 0.95CI: 1.52-3.11; p <0.001), physical inactivity (OR=1.19; 0.95CI: 1.17-3.38, p = 0.01), and high intake of salt (OR= 1.46, 0.95CI: 1.02-2.07, p = 0.03).[7] Study also reveals that smoking increases SBP by 4 mmHg and diastolic blood pressure (DBP) by 3 mmHg.[8] In addition, 91.8% of those who were non-adherent to prescribed medication was associated with uncontrolled BP[9] while 38.2% of those with psychological stress were reported to have raised BP.[5]

Bhutan is also bearing the brunt of the enormous socio-economic burden imposed by non-communicable disease (NCD), which includes HT. Evidence reveals that NCD accounted for 69% of the total deaths in Bhutan.[10] Prevalence of hypertensive cases doubled from 16% in 2012[11] to 35.6 % in 2014[12] giving rise to a number of life-threatening health issues including stroke, myocardial infarction and chronic kidney diseases in the country.[13] It is also interesting to note that an increase in incidence of HT is associated with a corresponding rise in incidence of stroke in Bhutan.[13,14] Such dramatic rise in HT-associated burden in the country could be due to unhealthy lifestyle ushered in by its unique culture and tradition wherein intake of alcohol is considered a socially accepted norm;[15] consumption of a diet rich in carbohydrate, fat and salt is more common than ever before among the Bhutanese.[13] A previous study showed that 22% of the adult Bhutanese population were physically inactive, 42.4% were current alcohol drinkers, 6% of adults were obese, over 50% of population did not engage in vigorous physical activity, 9% of adult had raised blood sugar and 88.1% with high BP (≥140/90 mmHg) were not on antihypertensive medication.[12] Likewise, the prevalence of high salt intake, unhealthy diet and consumption of tobacco were 99%, 67% and 25% respectively among them.[16] Thus, to combat the growing burden of hypertension, it is imperative for people with hypertension to engage in lifestyle modification.

Lifestyle modification refers to the adoption of a healthy lifestyle such as a healthy diet, physical activity, weight reduction, moderation in alcohol consumption, cessation of smoking, adherence to prescribed medication and stress management.[1,17] Myriad literature demonstrates lifestyle modification as an effective strategy to control BP.[2,18-21] Nonetheless, compliance to lifestyle modification was found to be unsatisfactory across several countries with 15.6% to 27% of hypertensive population adherent to it.[22-24] According to individual and family self-management theory,[25] which was used as theoretical guide, the proximal outcome that corresponds to lifestyle modification in this study is primarily influenced by the self-management process factors. The factors embedded in self-management process such as knowledge, self-efficacy and social support which corresponds to hypertension knowledge, perceived self-efficacy and perceived social support in the current study are reported to predict lifestyle modification among persons with hypertension.[22,23,26]

Some of the literature indicates hypertension knowledge as the predictor of lifestyle modification.[26,27] It influences lifestyle modification by impacting behavior-specific self-efficacy, outcome expectancy and goal congruence.[25] A study has shown that those with high level of hypertension knowledge is positively associated with better compliance to lifestyle modification ($\beta = 0.21$; $p < 0.001$).[26] Akoko and colleagues[28] also described that those participants with high level of hypertension knowledge are 2.9 times likely to engage in lifestyle modification.

Similarly, perceived self-efficacy has been reported as a potent predictor of lifestyle modification. Self-efficacy refers to judgment of personal capability to organize and execute health promoting behavior such as lifestyle modification.[29] Higher perceived self-efficacy reduces or eliminates perceived barriers to action which in turn directly influences execution of healthful behavior or through increasing the commitment to a plan of action.[29] A study in Indonesia shows self-efficacy as the strongest predictor of lifestyle modification ($\beta = 0.32$, $p < 0.001$) among hypertensive population.[23] A similar study in Ethiopia demonstrates that those participants with good self-efficacy are 2.6 times more likely to adhere to low salt diet and 3.5 times more likely to engage in weight management compared to those with low self-efficacy.[30]

Perceived social support, which includes provision of emotional, instrumental or informational support from family and healthcare providers,[25] is reported to influence lifestyle modification by enhancing coping with stress. Evidence shows that those with high social support are 2.9 times more likely to engage in a healthy lifestyle compared to those without social support.[31] Further, perceived social support was reported as a significant predictor of self-management behavior ($\beta = 0.37$, $p < 0.001$).[32]

In a nutshell, lifestyle modification is the scientifically recommended management strategy to control BP besides medicine. Factors such as hypertension knowledge, perceived self-efficacy and perceived social support were shown to predict lifestyle modification among hypertensive populations across the world. However, studies which focus on the influence of the aforesaid predicting variables on lifestyle modification among persons with hypertension in Bhutan is limited. In addition, since the way of life in Bhutan is interwoven within its unique culture and tradition, findings from other countries may not be generalizable to its population. Therefore, it is essential to investigate and find out the factors predicting lifestyle modification among the persons with hypertension in Punakha, Bhutan.

Materials and Methods

A predictive correlational research design was used to investigate the influence of hypertension knowledge, perceived self-efficacy and perceived social support on lifestyle modification among persons with hypertension. The target population in this study was individuals diagnosed with essential hypertension who visited a Non-Communicable Disease (NCD) clinic of Punakha District Hospital during March to April 2020. Recruitment of the sample was based on the following inclusion criteria:

1. Aged ≥ 18 to ≤ 60 years
2. Have been diagnosed with hypertension ≥ 6 months
3. Taking at least one anti-hypertensive medication
4. Able to read and write in English
5. No history of stroke, and no history of psychiatric illness

Tabachnick and Fidell's formula[33] was used to calculate sample size in this study. The formula is given by n ≥ 104+m (where n is the required sample size and m is the number of independent variables). Since there are three independent variables in the current study, the sample size required was at least 107. A total of 108 samples were recruited for the study.

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Eligible participants for the study were recruited using a simple random sampling technique. On each day of data collection, the researcher wrote odd (1) and even (2) number on two separate slip of papers. One slip of the paper was randomly drawn from the box. If an odd number was selected, potential participants for the day were those bearing an odd registration number. Similar process was followed for recruitment of those participants bearing an even registration number, if the number drawn from the box was even. This method means that every participant has an equal opportunity to be selected for the study.

The study was conducted at NCD clinic of Punakha District Hospital of Bhutan. Managed collaboratively by a doctor, a nurse, a nutritionist and other paramedical staff, the clinic is actively involved in the implementation of WHO package of essential NCD (WHO PEN) program.[34] The clinic provides patient-centered essential healthcare services such as diagnosis and treatment, follow-up care and counseling on lifestyle modification for persons with NCD based on standard guidelines developed by WHO. On average, the NCD clinic records more than 200 cases of HT per month.

Instrument

Data were collected using self-administered research questionnaires. Demographic Questionnaires were used to gather demographic and health information of the participants.

Hypertension Self-Care Profile Behaviour Scale (HBP SCP)[17] was used to measure lifestyle modification among the participants. The scale consisted of 20 items hypertension self-care behaviour such as taking medication, physical activity, low sodium and low-fat diet, restricting alcohol consumption, non-smoking, weight control, and stress reduction. Two items were reversed coded. Scoring on each item was based on four points interval scale, 1= never (do not practice it), 2 = rarely (seldom practice it), 3 = sometimes (occasionally practice it), and 4 =always (all the time). The total score of the scale range from 20 to 80 with higher score indicating high level of hypertension self-care behavior which reflects high lifestyle modification.[17]

Hypertension Knowledge-Level Scale (HK-LS)[35] was used to measure the level of hypertension knowledge among the participants. The scale consisted of 22 items requiring standard response as "Correct, Incorrect or Don't Know". Correct response was given 1 point each while the incorrect statement or don't know was given zero. Possible scores for the scale range from 0-22 with higher score indicating better hypertension knowledge.[35]

Hypertension Self-efficacy Scale[36] was used to measure perceived self-efficacy of the participants. It consisted of five items and each item begins with the phrase "How confident are you that you can…?" Response ranges from 1 (not confident at all) to 10 (totally confident). Possible scores for the scale range from 5-50 with higher score indicating high level of self-efficacy. A mean score of 9 or greater (≥ 9) was classified as having good self-efficacy while the mean score lower than 9 was considered as poor self-efficacy.[36]

Multi-dimensional Scale of Perceived Social Support (MSPSS) was used to measure perceived instrumental, informational and emotional social support from family, significant others and friends.[37] The scale is 12 items self-reported questionnaire rated on a seven-point Likert scale. The total score ranges from 12 to 84 while the mean score of the scale ranges from 1 to 7. Based on the mean score, the magnitude of social support was categorized as low 1-2.9, moderate 3-5 and high 5.1-7.[37]

All standard research instruments had well-established psychometric properties. Reliability of standard research instruments for the current study was pilot-tested with 30 persons with hypertension who filfulled the same inclusion criteria of the main study. The result generated a reliability coefficient of 0.83, 0.82, 0.81 and 0.85 respectively for HBP SCP, HK-LS, Hypertension Self-Efficacy Scale and MSPSS.

Ethical consideration

The permission to conduct the study was granted by the Institutional Review Board of Burapha University, Thailand (certificate number 005/2020) and the Research Ethic Board of Health, Ministry of Health, Bhutan (Ref. No. REBH/Approval/2020/024). Permission to conduct the study was also accorded by the clinical agency. Recruitment of participants was carried out purely based on volunteerism. Only those participants who were willing and consented to take part in the study were recruited. All data obtained from the study were kept strictly confidential.

Statistical Analysis

The data were coded and entered into Statistical Software Package (Minitab 17) for analysis. Statistical significance was set at alpha level of 0.05. Descriptive statistics including frequency, percentage, mean (M) and standard division (SD) were used to describe demographic characteristics, independent and dependent variables. The data were tested to examine fulfilment of assumptions required for running standard multiple regression test such as normality of data, presence for homoscedasticity and linearity, outliers, autocorrelation, and absence of multicollinearity. Standard multiple regression applying enter method was used to examine predictors of lifestyle modification which included hypertension knowledge, perceived self-efficacy and perceived social support.

Results

Demographic characteristics

The result showed that more than half of the participants were male, comprising 58.3%. Age of the participants ranged from 28-60 years with a mean age of 49.3. Most of the participants were married (86.1%) and more than half (55.6%) were employed. The majority (37.1%) of participants earned a monthly family income of Nu. 10,000-Nu. 20,000 ($130-

$260) with 79.6% of the participants disclosing it as adequate. While 45% of the participants acquired information on hypertension from health professionals, only 26.8% had attended a hypertension awareness program. Only a small minority of 2.8% were current smokers while 23% were past smokers. Less than a quarter of the participants (22.2%) currently drink alcohol while 29.6% drank in the past (Table 1).

Table 1: Frequency, percentage, mean, and standard division of demographic characteristics of the participants (n = 108)

Characteristics	n (%)
Age (years)	
20-30	2 (1.9)
31-40	20 (18.5)
41-50	35 (32.4)
51-60	51 (47.2)
Mean ± SD; min-max	49.3 ± 8.4 ; 28 - 60
Gender	
Male	63 (58.3)
Female	45(41.7)
Education	
Primary School	36 (33.3)
Secondary School	23 (21.3)
High school	26 (24.1)
Diploma	7 (6.5)
Bachelor or higher	16 (14.8)
Marital status	
Married	93 (86.1)
Unmarried	3 (2.8)
Divorced/separated/widowed	12 (11.1)
Employment status	
Employed	60 (55.6)
Unemployed	38 (35.2)
Retired	10 (9.2)
Family income per month in Nu (Nu.76 = 1 USD)	
< 10,000	14 (12.9)
10,000 -20,000	40 (37.1)
>20,000 - 30,000	18 (16.7)
>30,000 - 40,000	20 (18.5)
> 40,000	16 (14.8)
Income adequacy	
Adequate	86 (79.6)
Inadequate	22 (20.4)
Source of information on hypertension *(n = 200)	
Health professionals	90 (45.0)
Television	58 (29.0)
Printed documents	15 (7.5)
Newspaper	12 (6.0)
Radio	11 (5.5)
Others (social media and internet)	14 (7.0)
History of attending hypertension awareness program	
Yes	29 (26.8)
No	79 (73.2)
Smoke cigarette	
Yes	3 (2.8)
No	105 (97.2)
Smoked cigarette in the past	
Yes	25 (23.0)
No	83 (77.0)
Drink alcohol	
Yes	24 (22.2)
No	84 (77.8)
Drank alcohol in the past	
Yes	32 (29.6)
No	76 (70.4)

* can answer more than 1 item

Health information of the participants

The result showed that 28.7% of the participants had comorbidities with diabetes ranked top at 19.4%. Of the total participants, 10.7% had normal BP <120/80 mmHg, 14.9% had elevated BP, 33.1% had HT Stage 1, and 41.3% had HT Stage 2.[18] This staging of HT indicates that 85.1% of the participants are at the higher risk for cardiovascular disease, end-stage renal disease, subclinical atherosclerosis and all-cause death.[18] Overall, 59.3% of the participants had their BP controlled, while 40.7% had uncontrolled BP.[1] The mean body mass index was 27.1 (SD = 4) with 53.7% overweight (25-29.9) and 18.5% obese (≥ 30).[12] There were 59.3% of the participants diagnosed with HT within 1-5 years. 61.1% were on lone antihypertensive medications, while 38.9% were on more than one antihypertensive medication. Not as many participants took traditional medicines to manage BP, with only 6.5% reported to have resorted to such practice (Table 2).

Table 2: Frequency, percentage, mean and standard division of health information of the participants (n = 108)

Health information	n (%)
Comorbidities	
No	77 (71.3)
Yes	31 (28.7)
Diabetes	21 (19.4)
Heart disease	8 (7.4)
Others (gastritis & sinusitis)	2 (1.9)
Blood pressure (BP); mmHg	
Normal (SBP < 120 & DBP < 80)	13 (10.7)
Elevated (SBP > 120-129 & DBP < 80)	18 (14.9)
Hypertension stage 1 (SBP: 130-139 or DBP 80-89)	40 (33.1)
Hypertension stage 2 (SBP ≥ 140 or DBP ≥ 90)	50 (41.3)
Controlled BP (< 140/90)	64 (59.3)
Uncontrolled BP (≥ 140/90)	44 (40.7)
Body mass index (BMI)	
< 18.5	2 (1.9)
18.5 to 24.9	28 (15.9)
25 to 29.9	58 (53.7)
≥ 30	20 (18.5)
Mean ± SD; min-max	27.1 ± 4 ; 16.7-38.2
Duration of hypertension (years)	
< 1	4 (3.7)
1-5	64 (59.3)
≥ 6	40 (37.0)
Mean ± SD; min-max	5.5 ± 4.9 ; 5 - 30
Number of antihypertensive medications	
1	66 (61.1)
≥ 2	42 (38.9)
Took traditional (herbal) medicine to control BP	
Yes	7 (6.5)
No	101 (93.5)

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Description of lifestyle modification

Table 3 illustrates lifestyle modifications reported by the participants. From the mean score of lifestyle modification [M = 53.9 (2.7), SD = 7.7], it is apparent that the participants occasionally practice lifestyle modification. Likewise, the mean score of lifestyle modification dimension revealed that the participants occasionally practice physical activity, healthy diet, weight reduction, moderation in alcohol consumption, stress management, and medication adherence (M = 2.6-2.9). Reassuringly, the mean score of smoking cessation (M = 3.3) was slightly higher than other dimensions of lifestyle modification.

Predicting factors of lifestyle modification

The results showed high hypertension knowledge (16.6 ± 2.7), poor perceived self-efficacy (7.4 ± 1.9) and high social support (5.2±1.1) among the participants (Table 4). Pearson's correlation test was performed to examine the relationship between lifestyle modification, hypertension knowledge, perceived self-efficacy and perceived social support. From the correlation matrix (Table 5), lifestyle modification was significantly correlated with hypertension knowledge (r = 0 .27, $p < 0.01$), perceived self-efficacy (r = 0.43, $p < 0.001$) and perceived social support (r = 0.26, $p < 0.01$).

To determine the predictors of lifestyle modification, standard multiple regression was performed. The result of standard multiple regression is presented in Table 6. The results showed that hypertension knowledge, perceived self-efficacy and perceived social support explained 21.05% of variance in lifestyle modification ($F3, 104 = 10.51$, $p < 0.001$). However, only hypertension knowledge ($\beta = 0.19$, $p = 0.04$) and perceived self-efficacy ($\beta = 0.36$, $p < 0.001$) significantly explained the variance in lifestyle modification. Of the two significant predictors, hypertension knowledge better explained the variance in lifestyle modification followed by perceived self-efficacy. Perceived social support did not significantly explain variance in lifestyle modification ($\beta = 0.11$, $p = 0.26$).

Table 3: Range, mean, standard division and level of lifestyle modification among the participants (n = 108)

Lifestyle modification	Range		Mean	SD
	Possible score	Actual score		
Lifestyle modification (Overall)	20 - 80	33 - 71	53.90	7.7
Healthy diet	10 - 40	14 - 39	26.55 (2.7)*	0.05
Physical activity	1 - 4	1 - 4	2.7	0.99
Weight reduction	1 - 4	1 - 4	2.6	0.90
Moderation in alcohol consumption	1 - 4	1 - 4	2.9	1.26
Cessation of smoking	1 - 4	1 - 4	3.3	1.19
Stress management	2 - 8	2 - 8	5.32 (2.7)*	1.45
Medication adherence	4 - 16	5- 1 6	10.60 (2.7)*	2.04

*mean score calculated from a score range from 1-4

Table 4: Range, mean, standard division and level of hypertension knowledge, perceived self-efficacy and perceived social support (n = 108)

Variables	Range		Mean	SD
	Possible score	Actual score		
Hypertension knowledge	0 - 22	10 - 22	16.6 ± 2.7	High
Perceived self-efficacy	5 - 50	21 - 50	7.4 ± 1.9	Poor
Perceived social support	12 - 84	30 - 84	5.2 ± 1.1	High

Table 5: Correlation matrix among the variables (n = 108)

	Hypertension knowledge	Perceived self-efficacy	Perceived social support	Lifestyle modification
Hypertension knowledge	1			
Perceived self-efficacy	0.20*	1		
Perceived social support	0.11	0.36***	1	
Lifestyle modification	0.27**	0.43***	0.26**	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Predicting factors of lifestyle modification among the participants (n = 108)

Predicting variables	B	SE	B	t	p
Hypertension knowledge	0.54	0.25	0.19	2.11	0.04
Perceived self-efficacy	0.40	0.10	0.36	3.85	< 0.001
Perceived social support	0.06	0.10	0.11	1.14	0.26
Constant = 27.14, $p < 0.001$, R2 = 23.27%, R2(adj) = 21.05%; $F_{3, 104} = 10.51$					

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Discussion

The findings of the study revealed that lifestyle modification among persons with HT in Bhutan was predicted by hypertension knowledge (β = 0.19, p = 0.04) and perceived self-efficacy (β = 0.36, p < 0.001), which is in line with the objective of the study. However, perceived social support (β = 0.11, p = 0.26) was not the significant predictor of lifestyle modification in this study, which is in contrast to the research hypothesis. All the predictors explained 21.05% of variance in lifestyle modification. The reasons for this result can be enumerated in terms of national health policy and demographic characteristics of the participants.

Hypertension knowledge significantly predicted lifestyle modification among people with hypertension in Bhutan, which is consistent with the hypothesis of the study. According to the individual and family self-management theory management theory, knowledge which corresponds to hypertension knowledge influences lifestyle modification by modulating behaviour-specific self-efficacy, outcome expectancy and goal congruence.[25] The theory also postulated that knowledge influences engagement in self-regulation behavior such as goal setting, self-monitoring and reflective thinking, decision-making and self-evaluation, which ultimately impacts the individual's engagement in lifestyle modification. Possession of good hypertension knowledge is reported to positively influence patients' perception of management of hypertension while lack of knowledge can negatively alter their perception of illness,[28] which results in poor lifestyle modification.

Hypertension knowledge, which significantly predicted lifestyle modification in the current study, can be explained by the fact that the Ministry of Health, Royal Government of Bhutan, has accorded extra-ordinary priority to confront the growing burden of hypertension and other NCDs. One such initiative was the reformation and amendment of national health policy which mandates people-centred approach in management of NCD,[34] thus strengthening physical and social environment to engage in lifestyle modification.[25] This program ensures that the patients are knowledgeable on various aspects of disease such as causes, risk factors and management approaches. As patients gain a deeper understanding about the disease and its management, they are more likely to engage in lifestyle modification.[28]

The finding of our study is in congruence with those of the previous studies. A study demonstrated that hypertension knowledge predicted 8.1% of variance in practice of lifestyle modification among the cohort of hypertensive patients (β = 0.28, p < 0.01).[32] Similarly, a study in Cameroon reported that those participants with a high level of HT knowledge are 2.9 times likely to comply with lifestyle modification practice compared to those with low hypertension knowledge.[28]

Consistent with our research hypothesis, perceived self-efficacy is another factor that significantly predicted lifestyle modification in the current study. Theoretically, it is hypothesized that behavior-specific self-efficacy primarily influence the proximal outcome i.e. lifestyle modification.[25] The studies also indicate that perceived self-efficacy motivates the patients directly by levelling the expectations for behaviour changes[22] and indirectly by eliminating perceived barriers to action and/or increasing their commitment to the plan of action.[29] If hypertensive patients are assured that hypertension is controllable and that their capability to carry out lifestyle modification is sufficient, their likelihood of engaging in lifestyle modification will increase.[23]

Findings from other studies also support those of the present study where self-efficacy is reported as the strongest predictor of lifestyle modification (β = 0.32, p <0.001).[23] A similar study also reported that those participants with high level of self-efficacy were 2.6 times more likely (AOR: 2.58, 0.95CI: 1.41-4.73) to engage in weight management behavior than those with low self-efficacy.[30] Likewise, a compliance to lifestyle modification is four times higher among those with high self-efficacy than those with low self-efficacy.[22]

Similarly, perceived social support is one of the factors reported as the potent predictor of lifestyle modification in the previous studies. Perceived social support includes instrumental, informational and emotional support received from family, friends and significant others.[25] According to Ryan and Sawin[25] social facilitation such as perceived social support can direct, encourage and support individual and family's engagement in self-management behavior.

Perceived social support was high among the participants in this study. However, it did not significantly predict lifestyle modification among the participants. This finding is in contrast with our research hypothesis and previous literatures. A study showed that perceived social support predicted 15.10% of variance in self-management behavior among the cohort of hypertensive patients (β = 0.36, p <0.001).[32] A similar study conducted in Ethiopia also reported a remarkable association between perceived social support and adherence to low salt diet (AOR: 2.81,0.95CI: 1.20-6.53).[30] In addition, individuals with good social support are more likely to adopt lifestyle modification (AOR: 2.20, 0.95CI:1.27-3.82, p < 0.01) compared to their counterparts.[31]

The possible explanation for perceived social support not predicting lifestyle modification can be attributed to the deeply rooted Buddhist belief which defines the way of life in Bhutan. Buddhism strongly embraces love, compassion, care and social cohesion among people. The prevalence of joint family units also ensures a high level of social support among the Bhutanese population. Therefore, in the Bhutanese context social support should be considered a naturally occurring phenomenon emanating from its intricately woven pattern of spiritualism, culture and tradition. Thus, social support as a ritualistic norm failed to predict lifestyle modification among persons with hypertension in Bhutan.

Conclusion

Lifestyle modification among persons with HT in Bhutan was predicted by hypertension knowledge and perception self-efficacy. The interventional program should be strategically targeted to enhance hypertension knowledge and perceived self-efficacy among persons with hypertension in Punakha, Bhutan.

Implication for nursing practice

Findings of the current study might be useful in the following areas:

1. **Nursing practice:** Clinical nurses could develop appropriate nursing intervention to foster lifestyle modification among hypertensive patients in Bhutan by targeting on hypertension knowledge and perceived self-efficacy to control BP and to prevent untoward complications.
2. **Nursing education:** Nurse educators could apply the findings as evidence to enhance nursing students' knowledge on lifestyle modification approach for managing hypertension.
3. **Health policy:** There should be a provision in health policy that mandates individual patients to be adequately counselled on fundamental aspects of lifestyle modification and their significance in the promotion of health in Bhutan. The health system should also promote home visit by healthcare professionals to encourage and motivate both individual and family to engage in lifestyle modification.

Recommendations for future research

Since the study was conducted in a single setting it must be acknowledged that the findings may not represent all the characteristics of Bhutanese patients with hypertension. For the purpose of generalization of results among the Bhutanese hypertensive population, we recommend replicating the study in multiple settings. Future studies should explore appropriate interventional programs to test whether promotion of hypertension knowledge and perceived self-efficacy can foster lifestyle modification among persons with hypertension in Bhutan.

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