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Behavior Modification and its Implications among Hypertensive Patients at a Tertiary Hospital in Nepal

Sabita Pandey Bashyal[1], Narbada Thapa[2]

[1]Ph.D. Scholar, Mewar University

[2] Professor, Research Supervisor

Abstract: ***Background: Hypertension is the major modifiable risk factor for the majority of cardiovascular, neurological, renal, and other health problems. Despite the availability of various medications to control high blood pressure, the desired result is not yet achieved. Previous studies have considered behavior modification as an effective modality to prevent and control hypertension along with medication. Regardless of the increasing trend of hypertension and associated risk behaviors in Nepal, there are limited studies in this area. Objective: This study aimed to assess behavior modification and its implications among hypertensive patients. Methods: A mixed-method, cross-sectional study was conducted among 400 hypertensive patients who were on follow up visits at the outpatient department of Sadih Gangala National Heart Center, Kathmandu, Nepal. Patients who were diagnosed as hypertensive before 6 months were selected by simple random sampling technique and interviewed. Data was collected by using a semi-structured questionnaire, and an interview guide from March to May 2019 and analyzed using descriptive and inferential statistics. Results: The mean age of the participants was 58.86 ±11.07 years and nearly half (47.8%) of them were in the age group of 60 and above. More than half, (58%) were male, 77.8% were overweight, about half of them had a significant family history of hypertension with first degree relatives. There was a significant difference in behavior modification with selected socio-demographic and hypertension-related variables. Similarly, control of high blood pressure and related complications had a significant difference with behavior modifications. Conclusion: Although, there was a significant difference in behavior modification and control of high blood pressure and complications, the proportion of behavior modification as recommended was still low. Therefore, mass awareness of the importance of behavior modification for the control of high blood pressure and hypertension-related complications is seen as an essential component in hypertension management.***

Keywords: Complications, Hypertension, Lifestyle modification, Tertiary Hospital

1. Background

Hypertension (HTN) is an emerging global public health problem and a major reason for morbidity, mortality, and disability all over the world. The global prevalence of hypertension is about 40.7% of the total population [1].According to World Health Organization (WHO), it is estimated that one among three adults, that is 67 million people have hypertension in America, and about half of them do not have their blood pressure (BP)within the goal. It is also projected that the proportion of people with uncontrolled hypertension is higher in underdeveloped and developing countries [2].

As in other parts of the world, non-communicable diseases are increasing as a major public health problem in Nepal in which hypertension and cardiovascular conditions are the main. Former Studies found the increasing prevalence of HTN and its associated risk factors in Nepal [3,4]. Hypertension is asymptomatic in early-stage and might develop complications without any specific cause. However, several risk factors can contribute to the development of hypertension and some are modifiable. Commonly identified and accepted risk factors are increasing age, sex, race, significant family history, consumption of alcohol, consumption of tobacco, obesity and sedentary lifestyle, salty and fatty diet, stress, and so on [4].If hypertension is not controlled properly it can cause various complications and health problems. Despite its continuing and non-curable nature, hypertension can be managed by effective treatment adherence which includes behavior modification (dietary modifications, moderation of alcohol consumption, smoking cessation, physical exercise, and weight maintenance) along with medications [5, 6, 7].

Hypertension treatment is multidimensional, however, most of the previous studies focused on the medication-taking behavior of patients [8]. The hypertension management guideline stated that lifestyle modifications play an equally important role in the management of hypertension as drug treatment [9, 10]. Therefore, health care providers, mainly nurses have a greater role to reinforce behavior modifications along with drug treatment. Behavior modifications can lead to manage goal BP and increase the actions of antihypertensive drugs, which contributes to a reduction in the drug dose and the prevention of complications development. Therefore, behavior modifications should be actively performed not only before but also after the start of antihypertensive drug therapy [11].

Despite the enormous health consequences of hypertension and the importance of behavior modification in reducing probable complications, these areas have been not explored adequately in Nepal. Thus, this study attempted to provide evidence-based information on current practice on behavior modification and its effects in the control of BP and the prevention of related complications among hypertensive patients [12] This study might offer imperative information to health care providers in planning the program to increase the adaptation of healthy lifestyle recommendations for better management of hypertension.

2. Methods

A hospital-based mixed method, cross-sectional study was conducted among hypertensive patients who were in follow up visits at the outpatient department (OPD) of Sahid Gangalal National Heart Center (SGNHC), Kathmandu, Nepal. The inclusion criteria were a minimum age of20 years, diagnosis of hypertension before six months, attended counseling session, on follow up visit, can communicate in the Nepali language, and not seriously ill. A simple random sampling technique was used to select the desired sample on the ratio of 5-6 participants every day and was interviewed by using a semi-structured questionnaire and interview guide after taking informed written consent. An in-depth interview was also carried out with 32 participants concurrently for qualitative data. Data collection was carried out from March to May 2019. Collected data were analyzed using descriptive and inferential statistics in Statistical Package for the Social Sciences (SPSS) version 20. Ethical approval was taken from the institutional review committee of SGNHC for the study.

3. Results

Of the total 400 study participants, nearly half (48.3%) were in the age group of 60 years and above with the mean age of 58.86 ±11.07 years and more than half (58%) were male. Almost all (99.5%) were married, living with family in urban (68.5%) setting and majority, (80.2%) followed the Hindu religion. Only 19% had received university-level education. The highest portion of the participants, (38%) were homemakers and about 40% had middle-level family income. There was a significant difference between some of the behavior modification and socio-demographic variables. Consumption of tobacco had significant difference with age (p=0.002), gender (p=0.000), religion (p=0.000), education (p=0.000), occupation (p=0.001), income (p=000), and residence (p=0.000). Similarly, alcohol consumption had significance difference with gender (p=0.000), religion (p=0.000), education (p=0.000), occupation (p=0.000), income (p=001), residence (p=0.000) and family history of HTN (p=0.000). Behavior of salt intake had significant difference with age (p=0.000), education (p=0.017), religion (p=0.015), and occupation (p=0.034) similarly, fat intake was associated only with gender (p=0.012) and intake of fruits/vegetables with age (p=0.015), religion (p=0.000) and family history of HTN (p=0.001). Likewise, physical activities had significant difference with age (p=0.000), education (p=0.000), BMI (p=0.000), income (0.011), family history of HTN (p=0.037) and duration of HTN diagnosis (p=0.000). (Table 1, 2).

Table 1: Relationship of behavior modification with socio-demographic variables (n=400)

Variables		N (%)	p values					
			TC	AC	SC	FC	F/VC	PE
Age group (years)**	20 – 39	18(4.5)						
	40 – 59	189(47.2)	**0.002**	0.129	**0.000**	0.128	**0.015**	**0.000**
	≥60	193(48.3)						
	Mean ±SD=58.75±11.14							
Gender *	Male	233(58.3)	**0.000**	**0.000**	0.667	**0.012**	0.312	0.078
	Female	167(41.8)						
Ethnicity**	Brahmin/ Chetri	169(42.2)	0.705	0.989	0.919	0.623	0.726	0.653
	Newar	139(34.8)						
	Janajati	48(12.0)						
	Others	44(11.0)						
Religion *	Hindu	321(80.2)	**0.000**	0.000	**0.015**	0.535	**0.000**	0.185
	Non-Hindu	79(19.8)						
Education level **	Illiterate	25(6.3)						
	1-5 class	76(19.0)	**0.000**	**0.000**	**0.017**	0.339	0.392	**0.000**
	6-10 class	116(29.0)						
	11-12 class	107(26.8)						
	12+	76(19.0)						
Occupation **	Service	91(22.8)						
	Business	51(12.8)	**0.001**	**0.000**	**0.034**	0.437	0.232	0.267
	Agriculture	104(26.0)						
	Homemaker	154(38.5)						
Address *	Urban	274(68.5)	**0.000**	**0.000**	0.086	0.112	0.105	0.257
	Rural	126(31.5)						
Marital status *	Unmarried	2(0.5)						
	Married	398(99.5)	0.706	0.373	0.501	0.508	0.247	0.647
Monthly family income (thousands) **	10-20	29(7.3)						
	21-40	161(40.3)						
	41-60	161(40.3)	**0.000**	**0.001**	0.819	0.117	0.185	**0.011**
	>60	49(12.3)						

***ANOVA test, *chi-square test, significant level- ≤5, CI-95%, **bold**-significant values TC-tobacco consumption, AC-alcohol consumption, SC-salt consumption, FC-fat consumption, F/VC-fruits and vegetable consumption, PE-physical exercise*

Table 2: Relationship of behavior modification with BMI and HTN related variables (n=400)

Behaviors		N (%)	p values					
			TC	AC	SC	FC	F/VC	PE
BMI**	Normal	72(18.0)						
	Overweight	312(78.0)	0.252	0.143	0.300	0.696	0.128	**0.000**
	Obese	16(4.0)						
	Mean ±SD 26.97±1.93							
Stage of HTN*	I	240(60)	**0.000**	**0.041**	**0.000**	0.825	0.540	**0.000**
	II	160(40)						
Family history of HBP*	No	202(50.5)	**0.000**	**0.002**	0.877	0.151	**0.001**	**0.037**
	Yes	198(49.5)						
Duration of HTN (years)**	<5	136(34)						
	5-10	173(43.2)	0.099	**0.000**	**0.018**	0.528	0.593	**0.000**
	10-15	58(14.5)						
	>15	33(8.2)						

***ANOVA test, *chi-square test, significant level- ≤5, CI-95%, **bold**-significant values*

There was a significant difference in the modification of behaviors after the diagnosis of hypertension. Consumer of tobacco was decreased from 41% to 22%, alcohol from 50% to 31%, and consumption of low fat diet was increased from 12.3% to 72%, low salt 39.5% to 88.5% and fruits/green vegetables 29% to 50.2% with p-value 0.000 for all except intake of fruits/vegetables (p=0.188). Similarly, participants who performed adequate physical exercise regularly was increased from 34.5% to 66% with a p-value of 0.000. (Table 3).

Table 3: Behavior modification before and after HTN diagnosis (n=400)

Behaviors	Before Diagnosis		After Diagnosis		p-value
	Yes N (%)	No N (%)	Yes N (%)	No N (%)	
Consumption of tobacco	164 (41.0)	236 (59.0)	88 (22.0)	312 (78.0)	0.000*
Consumption of alcohol	198 (49.5)	202(50.5)	124 (31.0)	276 (69.0)	0.000*
Intake of fruits/ vegetables	116 (29.0)	284 (71.0)	201 (50.2)	199(49.8)	0.188
Intake of low fat diet	49(12.3)	351(87.7)	288(72.0)	112(28.0)	0.000*
Intake of low salt diets	162 (39.5)	238 (59.5)	354 (88.5)	46 (11.5)	0.000*
Physical activities	139(34.8)	261(65.2)	272(66.0)	128(34.0)	0.000*

*McNemar test, significant level- ≤5, CI-95%, * significant values*

There was a significant difference in BP control and HTN related complications with behavior modification among hypertensive patients. BP control had a statistically significant difference with consumption of tobacco (p=0.000), alcohol (p=0.004), salt (p= 0.000), and performance of regular physical exercise (p=0.000), whereas, intake of fat and fruits/vegetables had insignificant (p=0.821 and 0.488 respectively)with BP control. A similar result was found in HTN complications, where the behavior of consumption of tobacco, alcohol, salt, and performance of physical exercise had a significant difference (p=0.000, 0.000, 0.001 and 0.000 respectively)with HTN complications. (Table 4, 5).

Table 4: Effects of behavior modification on BP control (n=400)

Behaviors		BP control		Total	p-value
		No	Yes		
Consumption of tobacco	Non- user	91	145	236	
	Not changed	22	13	35	0.000*
	Reduced	29	22	51	
	Stopped	18	60	78	
Consumption of alcohol	Non- user	87	115	202	
	Not changed	53	71	124	0.001*
	Stopped	20	54	74	
Intake of low salt diet	Always user	75	162	237	
	Not changed	37	9	46	0.000*
	Reduced	48	69	117	
Intake of a low-fat diet	Always user	22	28	50	
	Not changed	44	67	111	0.821
	Reduced	94	145	239	
Intake of fruits/vegetables	Adequate	77	124	201	0.488
	Inadequate	83	116	199	
Physical exercise	No exercise	48	26	74	
	Inadequate	109	170	280	0.000*
	Adequate	3	44	47	

*Chi-square test, significant level- ≤5, CI-95%, *significant value*

Table 5: Effects of behavior modification on HTN complications (n=400)

Behaviors		*Complications*		*Total*	*p-value*
		No	Yes		
Consumption of tobacco	Non-user	139	97	236	
	Not changed	8	43	51	**0.000***
	Reduced	0	35	35	
	Stopped	53	25	78	
Consumption of alcohol	Non- user	27	97	124	
	Not changed	123	79	202	**0.000***
	Stopped	50	24	74	
Intake of low salt diet	Always user	11	35	46	
	Not changed	62	55	117	**0.001***
	Reduced	127	110	237	
Intake of a low-fat diet	Always user	57	54	111	
	Not changed	120	119	239	0.810
	Reduced	23	27	50	
Intake of fruits/vegetables	Adequate	105	96	201	0.368
	Inadequate	95	104	199	
Physical exercise	No exercise	16	58	74	
	Inadequate	145	134	279	**0.000***
	Adequate	39	8	47	

*Chi-square test, significant level- ≤5, CI-95%, * significant values*

During an in-depth interview, one of the participants expressed his compliance with behavior modification and family support as *"Ever since I suffered from this disease, my wife gave me separate vegetables and meat (gave me with less salt and add salt to others). My daughter reminds me of medications daily and she took my BP regularly. I used to walk usually during the morning and evening although it is quite difficult because of my knee pain." [IDI, 72 Y/M, HTN for 14 yrs]*.

Another participant expressed her experience regarding behavior modification as recommended in the following way: *"I don't have sound sleep and had nightmares whole night sometimes (Rat chralangai hunto); I went to the hospital for a check-up. The doctor told my BP was high (could not tell how much) so I had these problems. He told me to take medicines, stop smoking (before I smoked), control salt, fat, and do exercise. I did as he told and after some time I can sleep better at night and my BP was good since then." (56Y/F, HTN for 3 years).* Other participants expressed his perception of HTN and behavior modification as "*I don't think high BP is a big problem me for behavior modifications and visit after three months but I didn't care, still, I have no problem with my BP but I felt some chest pain and came to here in hospital". (44 Y/M, HTN for 2 years).*

4. Discussion

Four hundred diagnosed cases of hypertension, who were attending follow up visits in OPD of a tertiary hospital were selected for this study to assess the behavior modification and its implications. The mean age of the participants was 58.75±11.14 years with the highest proportion (48.3%) at the age group of >60 years followed by 40-59 years (47.3%). It might be because the age >40 years is considered as a substantial risk factor for HTN [12].The result of this study was in line with the results of a study conducted in Nepal [13] which stated that the mean age was 51.26 years among hypertensive patients. Likewise, a study conducted in Malaysia [14] reported that the mean age of patients with HTN was 57.84 years.

The percentage of males was more, (58.3%) than the females in this study which is in line with previous studies conducted in Nepal, reported 57% of hypertensive patients were males and 49.4% were females [15]. Similarly, studies conducted in Pakistan and Taiwan also stated that 63.6% and 60.3% of the hypertensive patients were males in their studies. It is considered that HTN is more prevalent among males but after the age of fifty, there is also increasing the trends among females. Almost, all patients (99.5%) were married which was similar to several previous studies [13, 17].The majority of them, (80%) were from the Hindu religion because Hinduism isa more prominent religion in Nepal. This result was also similar to other previous studies done in Nepal which reported more than 80% were Hindu by religion [13. 16].

Regarding the education status, about 94% were literate and 46% of them had received high school or above education was a contrast with the study done by Maharjan which reported majority were uneducated [16].It might be because of the variation in the study setting. The current study was done in a central hospital among hypertensive patients who were in follow up visits at the hospital, whereas, in another study the study setting was a peri-urban area. Educated people might be more aware in comparison to uneducated regarding the importance of regular follow-ups as recommended and possibly were more likely to come for follow-up visits. Regarding the occupation, the highest percentage, (38.5%) did not have specific income-generating occupations and engaged in household works. It might be because the highest proportion of participants were from the age group of more than 60 years so they were already retired from the job or not working in the agriculture field and the majority of women may engage in household works. These findings were compared with the findings from previous HTN related studies [13, 15].

Regarding BMI of the participants, the mean BMI was 26.97±1.93kg/m^2 in the current study which was in line with the study done in Nepal [15] and Iran [17] reported the mean BMI of the hypertensive participants was 26.60 ± 4.4 and 27.6±1.37 respectively. It is evident that the HTN is more prevalent among overweighed people and considered a risk factor of HTN. Similarly, 78% of the participants were overweight it might be due to the majority of urban residents tendto be overweight than the rural areas. This is comparable with the study conducted by Manandhar and Kojuin semi-urban areas of Nepal reported 54.4% of the hypertensive patients were overweight. Similarly,another study conducted in Nepal to assess cardiovascular risk factors also reported that 67.7% had overweight whose BMI was ≥25kg/m [2.20].

Facts arepointing out that family history is a significant risk factor for HTN. As reported by Zhang, the person who has first-degree relatives with hypertension had double the risks for developing hypertension than the person without any family history of HTN [21].In the current study, about 50% of hypertensive patients had a significant family history of HTN was comparable with other former Nepalese studies [19, 22] which stated 51.17% and 40% of the hypertensive participants had a significant family history of HTN. Similarly, a study conducted in India and China reported that 64% and 74.7% of hypertensive participants had a family history of HTN [21, 23]. In this study, the mean duration of HTN diagnosis was 7. 86 years was comparable with the study that reported the mean length of time since the diagnosis of hypertension was 8.59 years and 8.25 years respectively [1,14]. Similarly, in the current study, 34% had <5 years and 8.2% had >15 years duration of HTN diagnosis which is comparable with a similar study done in Turkey and Pakistan which stated that 32.4% had <5years of HTN duration[24] and about 10% of the hypertensive patients had >15yrs duration of HTN diagnosis [16].

It is believed that several factors are associated with human behaviors which also affect the change/modification of usual behavior as recommended. In the current study, age, education, occupation, family income, family history of HTN, and duration of HTN diagnosis had a significant difference with consumption of tobacco (p=0.002), salt (p=0.000), fruits/vegetables (p=0.015) and physical exercise (p=0.000).These findings were comparable with other former studies [24, 25] which reported age, education, monthly income, duration of HTN diagnosis had significant

difference with lifestyle behaviors among hypertensive patients. It might be due tothe effects of common variables for the change in lifestyle behaviors.

There was a significant difference in behavior modification before and after HTN diagnosis among hypertensive patients which was supported by former studies done in Nepal [13, 26]. It might be because of increased knowledge about the effects of behavior modification on their condition after counseling by the health personals. The current study revealed that there was a significant difference between behavior modification and control of HBP and HTN related complications among participants. Consumption of tobacco (p=0.000), alcohol (p=0.004), salt (p=0.000), and regular physical exercise (p=0.000) had a significant difference in BP control and HTN related complications and consumption of fats, fruits and vegetables were insignificant. These findings were comparable with several earlier studies [24, 27, 28]. Behavior modification and its adherence showed the positive results in minimizing the threat of adverse consequences of uncontrolled HTN and improved quality of life among hypertensive patients. Good behavior adherence decreases the risk of repeated hospital admission in patients and reduced overall health care expenditures [29].

5. Conclusion

There was a significant difference in behavior modification after HTN diagnosis which showed significant relation in BP control and prevention of HTN related complications but the proportion of behavior modification was still low. Therefore, mass public awareness atthe community level and effective counseling for the hypertensive individual is important.

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