ORIGINAL RESEARCH

Perceived Illness and Treatment Adherence to Hypertension Among Patients Attending a Tertiary Hospital in Kathmandu, Nepal

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Introduction: Hypertension (HTN) is a silent killer, accountable for life-threatening complications. An individual's illness perception may affect adherence to treatment which is crucial to prevent complications of HTN. The objective of this study was to identify illness perception and treatment adherence among patients with HTN in a tertiary hospital in Kathmandu, Nepal.

Methods: Descriptive correlational study was conducted in the out-patient department of Manmohan Cardiothoracic Vascular and Transplant Center, Kathmandu Nepal. Non-probability purposive sampling was used. A face-to-face interview was conducted from September to December 2018, using a structured questionnaire that included socio-demographic variables, illness perception questionnaire (revised) and Hill bone compliance to high blood pressure therapy scale. Data analysis was done by using descriptive and inferential statistics (chi-square test, Spearman rank correlation).

Results: Among 204 participants, 51% were male, 77% were literate, mean ± S.D. age was 60±12. About 72% experienced headache and 88% said that headache is related to HTN. Behavioural factors and psychological factors were regarded as the leading cause of HTN. Almost 63% participants believed HTN as highly threatening illness. Higher scores in timeline (acute/chronic), personal control, and treatment control revealed that patients believed HTN as a chronic disease with a higher rate of personal and treatment control. Regarding treatment adherence, the mean score was 16.58 (SD = 2.08), and only 14.7% had perfect adherence. Participants were more adherent to medication and appointment keeping rather than reduce salt intake. Duration of HTN diagnosis (p=0.027) and duration under HTN medication (p= 0.021) were found to be significantly associated with treatment adherence. There was a significant positive correlation between illness perception and treatment adherence (ρ = 0.282, p<0.01).

Conclusion: Illness perception and treatment adherence are correlated. Hence, it is beneficial to improve illness perception to achieve perfect treatment adherence. Reinforcement is essential to maintain adherence to both medications and behaviour therapy.

Keywords: hypertension, illness perception, Nepal, treatment adherence

Introduction

Hypertension (HTN) is a global public health problem and is an essential metabolic risk factor for cardiovascular disease. HTN has a critical role in expediting severe complications such as stroke, kidney failure, disability and premature deaths.[1] HTN declines the quality of life of patients and also increases the financial and health burden among individuals and countries.[2] Having no warning signs or symptoms

(thus referred to as the silent killer) is the main reason that the majority of the hypertensive patients go undiagnosed.[3] Globally, almost 31% of the adult population is affected by HTN, among which only 36.9% were under antihypertensive therapy, and 13.8% were having their HTN under control.[4] The prevalence of HTN is highest in African countries (46%) followed by the Eastern Mediterranean (41%) and Southeast Asian countries (38%) and lowest in America (35%).[5] Research reports show that two-third of the global population with HTN belong to low- and middle-income countries (LMICs)[5] which indicate an alarming escalation in the prevalence, treatment and control of HTN in those countries than in developed countries.[4]

A systematic review by Huang et al, published in 2019 recognised HTN as a shocking condition in the Nepalese male, middle-aged (more than 40 years of age) population given the alarming state of prehypertension status which disturbs nearly 40% of the rural population.[6] Prevalence of HTN in Nepal ranges from 23%-48%. A study conducted in Kathmandu, Nepal revealed that the prevalence of HTN has increased to three times within 25 years due to high salt intake and obesity.[7] Studies conducted in different areas of Nepal show a variation in the prevalence of HTN. It is 41.55% in a rural area,[8] 28.9% in semi-urban,[9] 32.5% in an urban area[10] and 48% in the mid-western region.[11] Likewise, it is 25.1% in people above 18 years of age[12] and in general, there is an increasing trend of HTN.

According to the Self–Regulatory Model of Illness (SRMI) developed by Leventhal et al in the 1980s, individuals seek to understand their illness by developing an understanding of its meaning, causes, consequences, how long it will last, and whether it can be cured or controlled. This illness perception may not be scientifically or medically validated but is formulated from personal experience (physical symptoms and emotions), social influences, and/or interaction with health-care providers.[13]

Beliefs about these components of illness help individuals to determine coping strategies.[14] Patient's perception of their illness is a decisive factor that determines their health-seeking behaviour.[15]

Adherence is regarded as a specific problem-focused coping strategy; patients weigh up whether the proposed treatment is consistent with what they believe about their illness in order to decide whether or not to adhere to it. Patients will evaluate the success of their treatment and may not continue with it if they perceive it to be unsuccessful.[16] Thus, individual's Illness perceptions and beliefs about medicine play a role in their preference for medicines for the treatment.[17] Study shows that negative illness perceptions are associated with the more delayed recovery and increased healthcare use and this illness perceptions can be changed by offering appropriate knowledge.[14]

Evidence showed that patients' views on illness affect adherence to self-management.[18,19] Thus, understanding patient's perceptions are essential for improving treatment adherence. A study has found that patients' illness perceptions (identity or symptoms, cause, and control) have significant influences on adherence to prescribed medication and self-management.[20] Several studies[21–23] have shown that illness perception and beliefs about medication have a significant effect on adherence to treatment therapy in chronic diseases like HTN.

Medication adherence is essential for optimal blood pressure control, which significantly reduces the risk of cardiovascular disease.[24] However, a study by Taheri-Kharameh et al conducted in Iran revealed a high proportion of patients with HTN who have poor medication adherence.[22] Thus, non-adherence to antihypertensive therapy has become a therapeutic challenge.[25,26] A cross-sectional study conducted in China showed that the prevalence of HTN was around 33%, and one-third of Chinese adults need antihypertensive treatment.[27] However, only 46.4% of them were under treatment, and the overall control rate was 4.2%.[27] Another study conducted among 154 patients with HTN in eastern Nepal revealed that only 56.5% of patients were adherent to antihypertensive therapy.[28] The importance of understanding illness perception while providing medical advice and initiating treatment plans had been revealed in different studies.[17] A cross-sectional study in Nepal among hypertensive patients has reported that the majority of patients have a moderate threatening view about illness and favoured taking medications rather than lifestyle modification.[29]

Various studies[20,21,30] done in different countries suggest that a patient's perception of illness can affect treatment adherence. Thus, we assume that patient's perception of illness has an essential role in adherence to antihypertensive therapy. A limited number of studies[28] have been done in the context of Nepal. With this background, the main objective of this study is to find out a relationship between perceived illness and treatment adherence of HTN among patients attending a tertiary level hospital. Interventions for health promotion based on illness perception will be beneficial for public health improvement.

Methods

Study Design and Setting

We adopted a descriptive correlational study design to carry out this study in Manmohan Cardiothoracic Vascular and Transplant Center (MCVTC) throughout September–December, 2018. MCVTC is 80 bedded specialised cardiac hospital under Tribhuvan University, Institute of Medicine (IOM). It was established in 2009 A.D. and is located within premises of Tribhuvan University Teaching Hospital (TUTH) in Kathmandu, Nepal. The center is now recognised as the tertiary referral center for cardiac cases from all over Nepal. It runs out-patient department (OPD) 6 days in a week and on an average of 50 patients per day visit the OPD for different cardiac cases along with HTN.

Study Population, Inclusion and Exclusion Criteria

The study population for the study were adult patients meeting the inclusion criteria; age 20 years and above, diagnosed with HTN and under anti-hypertensive therapy for at least six months. Both male and female patients attending the OPD in MCVTC were included in this study. The patient's diagnosis and treatment status were confirmed by assessing OPD card, history taking along with medication history.

Those who can communicate in Nepali and willing to participate were included and patients who were hospitalised, medically unstable (having high B.P., symptoms like headache, dizziness at the time of interview) and unable to communicate were excluded from the study.

Sampling Procedure and Sample Size

We used a nonprobability purposive sampling technique in this study.

The sample size was calculated using Cochran formula $n_o = Z^2pq/e^2$, where n_o = minimum sample size, z = standard normal variate, p = estimated prevalence or proportion of population, q = 1-p, e = desired level of precision or margin of error and confidence interval = 95%. Therefore, z-score = 1.96. Estimated prevalence p = 56.5% (based on study conducted in eastern Nepal,[28] q = 43.5%). Taking 95% confidence interval and 7% margin of error and 5% of non-response rate, the sample size was calculated 204.

$$n_o = 1.96^2 X 56.5 X 43.5 / 7^2 = 194$$

$$Sample\ size = n_o + 5\%\ non\text{-}response\ rate$$
$$= 194 + 10 = 204$$

Research Instrumentation

We used a structured interview schedule for data collection. English version instrument (Appendix I) was translated into the Nepalese language and examined by a bilingual translator. The translated version of the questionnaire was used for the interview, which included questions in three parts.

Socio-Demographic Information

Included questions related to socio-demographic data (age, sex, education, occupation, marital status, family type, income), disease and service-related variables (blood pressure, family history of HTN, duration of diagnosis, duration of medication, number of medications, monthly expenses for medication) which were prepared by the researcher based on literature review, consultation with an advisor, co-advisor, subject experts and peers.

Illness Perception Questionnaire-Revised (IPQ-R) in HTN

The illness perception scale was developed by Weinman & Petrie 1997[31] and was revised by Moss-Morris et al 2002[32] to assess the patient's illness perception. The revised illness perception scale (IPQ-R) is based on Leventhal's common-sense model (self-regulatory model)[33] and is used for a variety of illnesses (HTN, diabetes mellitus, asthma, etc.). IPQ-R version has 3 sections to assess illness perception. In the first section identity of HTN is assessed using 14 commonly experienced symptoms. The responses were recorded as yes/no.

In the second section, seven dimensions of illness representations for HTN were assessed with 35 items, 5 items for timeline (acute/chronic), 4 items for timeline cyclical, 5 items for consequences, 6 items for personal control, 4 items for treatment control, 5 items for treatment coherence and 6 items for emotional representations. These 35 items were presented with five-point response scale: strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4 and strongly agree = 5. In the third section, 18 possible causes of hypertension are listed. Responses were recorded on a five-point response scale.

Scoring of Illness perception: based on scores of the second section. Low threatening illness perception = scores between 35 and 81.66. Moderate threatening illness

perception = scores between 81.66 and 128.26. High threatening illness perception = 128.26–175 (Grouped frequency distribution, n.d.).

Part III: Hill Bone Compliance to High Blood Pressure Therapy Scale (HBCTS)

This scale assesses the patient's behaviours for three important behavioural domains of high blood pressure treatment: reduced salt intake; appointment keeping and medication taking.[34] It consists of 14 questions of 4 points Likert scale, which are: 9 questions related to medication adherence, 3 questions related to reduced salt intake and 2 questions related to appointment keeping. Scoring of Hill Bone scale. If the score is 14 = perfect adherence. If the score is >14 = non-perfect adherence (score 15–22 = optimal adherence, score >22 = poor adherence).[35]

Validity of Instrument

Both IPQ-R and HBCTS are standard tools. Their validity has been tested in different studies.[32,34,36] Consultation with subject experts, advisor and co-advisor was done to maintain content validity of the translated instrument.

Reliability of Instrument

We did a pretesting of the instrument among 21 patients of TUTH who met the inclusion criteria, sample size to check for its clarity, sequentially, feasibility in administration and to calculate reliability. The modification of the questionnaire was done as required. Internal consistency was tested by calculating Cronbach's alpha.[37] The value of Cronbach's alpha ranged from 0.700 to 0.855 for IPQ-R and 0.560 to 0.723 for HBCTS, which is considered as an acceptable value.

Ethical Considerations

The study was reviewed and approved by Institutional Review Committee (IRC), Institute of Medicine and research committee, Maharajgunj Nursing Campus, Tribhuvan university. This study complied with the Declaration of Helsinki. Before data collection, the respondents were informed about the purpose and objective of the study and written consent was obtained from each of them. The identity of the respondents was kept confidential.

Data Collection Procedure

Data collection was started after getting approval from the research committee, Maharajgunj Nursing Campus. In OPD of MCVTC, patients were screened by reviewing OPD cards for inclusion in the study; then the researcher introduced herself and explained the purpose of data collection. Voluntary participation was encouraged, and they were provided full authority to withdraw from the study at any time. Informed consent was obtained from each respondent, and confidentiality was maintained by assuring patients that the collected data will be used for study purposes only. Precautions were taken to protect rights and maintain the privacy of patients. Before the interview, clear instructions were given to maintain the quality of data. The researcher conducted face to face interviews at times and places convenient for the patient. The average time to complete the interview was approximately 30–35 minutes. After data collection, patients were provided education about HTN and its management as necessary, then leaflets on HTN were distributed, which was prepared by a team of researchers.

Data Analysis

The obtained data were processed and analysed by using statistical package for social sciences (SPSS) version 20. Data were analysed and interpreted based on the objectives of the study. Descriptive statistics (frequency, percentage, mean, standard deviation) were used to describe socio-demographic data, disease and service-related data and level of illness perception. Inferential statistics (chi-square test) was used to assess the association between demographic variables and treatment adherence. Spearman correlation was used to determine the relationship between illness perception and treatment adherence. The significance level was set at a p-value <0.05.

Results
Socio-Demographic Characteristics

The socio-demographic characteristics of the participants are summarised in Table 1. Of the 204 participants, 51% were male, and 49.1% were aged between 45 and 64 years. Mean age was 60±12 years. Among them, 58.3% reside within Kathmandu valley, and 56.4% belong to Brahmin and Chhetri ethnic group. Majority of participants (88.2%) were married, literate (77%) and almost half (50.5%) lived in a joint family.

Disease and Service-Related Variables of Participants

Table 2 shows the disease and service-related variables of participants. The mean systolic and diastolic blood

Table 1 Socio-Demographic Characteristics of Participants (n= 204)

Socio-Demographic Characteristics of Participants	Number	Percentage
Age group (completed years)		
<44	25	12.2
45–64	100	49.1
>65	79	38.7
Mean age ± SD = 60± 12		
Sex		
Male	104	51.0
Female	100	49.0
Religion		
Hinduism	175	85.8
Buddhism	19	9.3
Others (Christianity, Islam, Kiranti)	10	5.0
Ethnicity		
Dalit	6	2.9
Disadvantaged Janajati	30	14.7
Relatively advantaged Janajati	53	26.0
Brahmin and Chettri	115	56.4
Marital status		
Married	180	88.2
Widowed/widower	24	11.8
Type of family		
Nuclear	101	49.5
Joint	103	50.5
Education status		
Cannot read and write	47	23.0
Can read and write	157	77.0
Level of education status (n = 157)		
Primary level	62	39.6
Secondary level	39	24.8
Higher secondary level	25	15.9
Bachelors level and above	31	19.7
Occupation		
Service	21	10.3
Agriculture	38	18.6
Business	25	12.3
Labour	7	3.4
Homemaker	66	32.4
Retired	26	12.7
Unemployed	21	10.3

pressure was 127 mm of Hg and 82 mm of Hg, which was recorded on the patient's OPD card. The mean duration of diagnosis and medication was 8 and 7 years, respectively. Participants took 73 minutes to reach a health facility and

Table 2 Disease and Service-Related Variables of Participants (n = 204)

Disease and Service-Related Variables	Mean	Standard Deviation
Blood pressure status (based on OPD card)		
Systolic blood pressure (mm of Hg)	127	15.0
Diastolic Blood Pressure (mm of Hg)	82	8.0
Duration of diagnosis (in years)	8	7.0
Duration under antihypertensive medicines (in years)	7	6.5
Monthly expenditure for antihypertensive medications (NRs.)	942	876.0
Duration to reach a health facility (min.)	73	103.0

spent Nepalese Rupees (NPR) 942 [equivalent to USD 7.94] antihypertensive medications on an average.

Disease-Related Variables of Participants

Table 3 shows the disease-related variables of participants. More than one-fourth (28.5%) had a family history of hypertension. About half (55.9%) had comorbid conditions, and diabetes (48.3%) was most common. Majority

Table 3 Disease-Related Variables of Participants (n = 204)

Variables	Number	Percentage
Family history of hypertension		
Yes	58	28.5
Presence of comorbid conditions		
Yes	114	55.9
Comorbid conditions (n=114)		
Diabetes	55	48.3
Heart diseases	16	14.0
Thyroid	9	7.9
Uric acid/arthritis	9	7.9
Others (COPD, gastritis, gout)	25	21.9
Number of antihypertensive medicine		
One	165	80.9
Two and more	49	19.1
Commonly prescribed medicine		
Amlodipine	120	58.8
Losartan	35	17.2
Combined tablets (amlodipine, atenolol, losartan)	20	9.8
Metoprolol	10	4.9
Others (atorvastatin, carvedilol, enalapril)	13	6.4

Table 4 Cognitive Perception of Illness of Participants: Symptoms Related to HTN (n=204)

Symptoms	Experienced Since Illness		Related to Illness	
	Number	Percentage (%)	Number	Percentage (%)
Chest Pain	85	41.7	112	54.9
Palpitations/fast heart rate	122	59.8	135	66.2
Flushed Face	100	49.0	118	57.8
Breathlessness	97	47.5	102	50.0
Tinnitus	75	36.8	91	44.6
Fatigue	149	73.0	144	70.6
Nausea	58	28.4	81	39.7
Blurred vision or double vision	130	63.7	154	75.5
Fainting	43	21.1	131	64.2
Headache	160	78.4	181	88.7
Epistaxis	25	12.3	101	49.5
Dizziness	141	69.1	166	81.4
Loss of Strength	146	71.6	155	76.0
Sleep Difficulties	95	46.6	94	46.1
	Mean ±SD = 7±2.94		Mean ±SD = 8.7±3.25	

of 80.9% were prescribed one pill per day, and amlodipine (58.8%) was common.

Cognitive Perception of Illness of Participants: Symptoms Related to HTN

Table 4 summarises majority (78.4%) participants had experienced headaches since their illness and most of the participants (88.7%) had related headaches to be attributed to HTN. On average, 7 symptoms were experienced by participants, and nearly nine symptoms were related to hypertension.

Mean Scores of IPQ-R and HBCTS

Table 5 shows mean scores and standard deviations of subscales of illness perception and treatment adherence. The high scores were obtained in the timeline (acute/chronic), personal control and treatment control subscales which indicate that participants mostly perceived

Table 5 Mean Scores of IIPQ-R and HBCTS (n= 204)

Subscale	Item	Mean	Standard Deviation	Mean by Item Range (1–5)
Illness perception	35			
Timeline(acute/chronic)	5	22.83	2.76	4.56
Timeline cyclical	4	13.60	3.68	3.39
Personal control	6	26.17	3.28	4.36
Consequences	5	17.74	3.76	3.50
Treatment control	4	17.79	2.28	4.44
Coherence	5	18.01	4.05	3.60
Emotional	6	18.93	6.03	3.15
Cause	18			
Psychological factors	6	22.64	4.02	3.77
Behavioral risk factors	7	27.41	3.96	3.91
Immunity factors	3	8.02	2.88	2.67
Accident or chance	2	4.97	1.97	2.48
Treatment adherence	14	16.58		
Medication	9	10.09	1.49	
Reduced salt intake	3	3.79	0.77	
Appointment keeping	2	2.69	0.87	

HTN as a chronic disease, lasting for life long period. Mean score in timeline cyclical indicates the participants' belief about a somehow stable nature of the illness. They believed that their illness could be controlled by personal behaviour and medical treatment. The mean scores in emotional representations, consequences and coherence represent that they agree their illness may affect them emotionally and may cause some physical consequences. They believed that they have some knowledge about their illness. The high mean scores in behavioral factors (diet, smoking, alcoholic, sedentary lifestyle) represent that these are perceived as significant causal factors for HTN, followed by psychological factors. Mean score of treatment adherence is 16.58. The proportion of perfect adherence in medication, salt restriction and appointment keeping were 49.5%, 37.7% and 56.9%, respectively.

Level of Perceived Illness and Treatment Adherence of Participants

Table 6 shows the illness perception level and treatment adherence level of participants. More than half (63.4%) had high threatening illness perception and only 14.7% were perfectly adherent to treatment therapy, and 83.8% were optimal adherent.

Association of Treatment Adherence and Selected Socio-Demographic Variables

Table 7 reveals that there is no statistically significant association between treatment adherence and demographic variables (age, sex, education status, marital status and family type, occupation, and monthly income).

Table 6 Level of Perceived Illness and Treatment Adherence of Participants (n=204)

Variables	Number	Percentage
Level of perceived illness		
Moderate threatening Illness Perception (scores:81.66–128.26)	75	36.8
High threatening Illness Perception (scores:128.26–175)	129	63.2
Treatment adherence		
Perfect adherence (score = 14)	30	14.7
Optimal adherence (score = 15–22)	171	83.8
Poor adherence (score > 22)	3	1.5

Association of Treatment Adherence and Selected Disease-Related Variables

Table 8 shows that there was a significant statistical association between duration of diagnosis and treatment adherence and duration of medication and treatment adherence of participants (*p*-value 0.027 and 0.021, respectively). In contrast, there was not statistical association between treatment adherence and family history of HTN, comorbidity, duration to reach a health facility.

Correlations Between Perceived Illness and Treatment Adherence Variables

Table 9 shows that significant associations were found between different IPQ-R scores and overall treatment adherence except for identity, emotional and psychological attributions. Regarding treatment adherence, medication has a significant association with IPQ-R scores, whereas salt restriction and appointment keeping have no significant association with IPQ-R scores. Coherence is negatively correlated with overall treatment adherence and medication. All other domains of IPQ-R are positively correlated with treatment adherence. The strongest correlation was found between scores of treatment control and medication ($\rho = 0.364$, $p <0.001$).

Discussion

We examined illness perception, level of treatment adherence and their relationship among patients with HTN in Kathmandu, Nepal. Our study revealed that people regarded HTN as a highly threatening illness. The majority of the population have an acceptable level of treatment adherence, yet, interventions are required to achieve perfect adherence. The high percentage of adherence level may be due to the high literacy rate and urban locality; however, we did not find a significant association between the two. Our study showed that the duration of diagnosis and duration of treatment therapy was associated with perfect adherence. It shows that there is a significant correlation between illness perception and treatment adherence.

Illness Perception of Hypertension

Our study result shows that most of the patients (63.2%) had a highly threatening view of HTN. This finding is nearly similar to the studies on illness perception, that showed moderate threatening view.[15,29,38] Counselling and education programs are frequently organised in the

Table 7 Association of Treatment Adherence and Selected Socio-Demographic Variables (n= 204)

Socio-Demographic Characteristics	Treatment Adherence Status			
	Perfect Adherence N (%)	Non-Perfect Adherence N (%)	Chi-Square	*p*-value
Age				
<45 years	5 (17.2)	24 (82.8)	3.955	0.138
45–65 years	11 (10.2)	97 (89.8)		
>65 years	14 (20.9)	53 (79.1)		
Sex				
Male	13 (12.5)	91(87.5)	0.823	0.364
Female	17 (17.0)	83(83.0)		
Education status				
Cannot read and write	9 (19.1)	38 (80.9)	0.961	0.327
Can read and write	21 (13.4)	136 (86.6)		
Marital status				
Married	26 (14.4)	155 (85.6)		0.754[a]
Widow/widower	4 (17.4)	19 (82.6)		
Family type				
Nuclear	11 (10.9)	90 (89.1)	2.321	0.128
Joint	19 (18.4)	84 (81.6)		
Occupation				
Employed	8(9.9)	73 (90.1)	2.667	0.264
Unemployed/retired	11(19.3)	46 (80.7)		
Homemaker	11(16.7)	55 (83.3)		

Notes: [a]Fisher's exact test, *p*-value significant at <0.05.

Table 8 Association of Treatment Adherence and Selected Disease-Related Variables (n= 204)

Variables	Treatment Adherence Status			
	Perfect Adherence N (%)	Non-Perfect Adherence N (%)	Chi-Square	*p*-value
Family History of HTN				
Yes	11 (12.5)	77 (87.5)	0.600	0.438
No	19 (16.4)	97 (83.6)		
Comorbidity				
Yes	15 (13.2)	99 (86.8)	0.494	0.482
No	15 (16.7)	75 (83.3)		
Duration of diagnosis				
<10 years	18 (11.6)	137 (88.4)	4.922	0.027*
>10 years	12 (24.5)	37 (75.5)		
Duration of medication				
<10 years	18(11.5)	138 (88.5)	5.303	0.021*
>10 years	12 (25.0)	36 (75.0)		
Duration to reach a health facility				
<30 min	10 (11.1)	80 (88.9)	1.668	0.434
30–120 min	16 (17.4)	76 (82.6)		
>120 min	4 (18.2)	18 (81.8)		

Note: *p < 0.05.

Table 9 Correlations Between Perceived Illness and Treatment Adherence Variables (n=204)

Items	Treatment Adherence			
	Total (ρ)	Medication (ρ)	Reduced Salt Intake (ρ)	Appointment Keeping (ρ)
Illness Perception	0.282**	0.316**	0.068	0.147*
Identity	−0.055	0.097	−0.194**	−0.033
Timeline	0.243*	0.295**	0.046	0.111
Timeline cyclical	0.262**	0.255**	0.112	0.103
Consequences	0.190*	0.280**	−0.103	0.109
Personal control	0.167*	0.269**	0.018	0.030
Treatment control	0.260**	0.364**	0.023	0.106
Coherence	−0.172*	−0.206**	0.098	−0.080
Emotional	0.135	0.074	0.063	0.099
Cause				
Psychological	0.089	0.101	−0.021	0.143*
Risk factors	0.144*	0.199**	0.034	0.106
Immunity	0.261**	0.331**	0.023	0.054
Accident or chance	0.140*	0.167*	0.026	0.014

Notes: **$p<0.01$, *$p < 0.05$.

hospital where participants were made aware of nature, treatment, and control of HTN. However, participants believed they had minimal understanding of HTN. As opposed to the findings of our study, Nagarkar et al revealed a lower total illness perception score (34 out of 80) that indicated lower threatening view of disease by patients.[39] Also, illness perception of HTN was different for urban and rural patients. Urban patients with HTN displayed more threatening perception of their illness, experienced more symptoms, were more concerned and believed the treatment was helpful to control illness than rural patients.[39]

Majority of participants believed HTN to be chronic, the permanent illness which could bring serious consequences, emotional disturbances. This finding is in line with studies by Rahman et al[40] Maharjan et al,[29] Kolb et al,[41] which reported perceived chronic nature and devastating consequences of HTN. On the contrary study by Lo et al found low scores in consequences, emotional, timeline cyclical and coherence which means participants perceived that HTN has minimal negative and emotional consequences, is stable and they had no clear understanding of HTN.[42] Similarly, the study by Nivedita also found poor understanding of illness and more emotional problems related to HTN among patients.[43]

Hypertension is considered an asymptomatic disease. Our study showed that the majority of participants experienced headache, fatigue, dizziness and blurred vision and related as the symptoms of HTN. Previous studies by Maharjan et al,[29] Lo et al,[42] Kolb et al[41] and Nivedita,[43] also reported similar findings as this study, which stated that patients experienced headache, palpitations and dizziness which were related to HTN. Most of the people in Nepal, visit the hospital, only if they have symptoms or health issues. This may be the reason for perceiving HTN as symptomatic as they were diagnosed after symptom experience.

Though patients perceived HTN as highly threatening, they believed that personal efforts and treatment modalities could control their high blood pressure and also prevent complications. Studies by Maharjan et al[29] and Ross et al[21] are in line with these findings that reported HTN as a chronic disease which can be controlled with regular medication and behaviour modification. Rahman et al[40] also revealed that patients strongly believed HTN to be controlled by medications but were resistant for behaviour modification. On comparing scores, treatment control has a higher score than personal control, which means they have a strong belief that medication will help them control HTN.

In contrast to the findings of our study, a study in India found relatively low mean scores in treatment control, timeline, personal control and coherence which means participants perceived stable nature of the illness, ineffective control through treatment and personal effort and inadequate understanding of the illness.[43] Different settings of the study too might have contributed to these findings.

Regarding causal attributions to HTN, the majority of participants strongly believed that diet is the primary causal factor for HTN, followed by stress and worry, and family problems. This finding aligns with a study conducted by Maharjan et al where the majority of participants (80.11%) believed the cause of HTN to be diet and stress.[29] A similar study in line with the findings was conducted by Lo et al which revealed that participants believed life stressors, e.g. emotional state, mental attitude, and family problems were the primary cause of HTN.[42] The mixed-method study conducted in different countries of Asia (Malaysia, Hong Kong, South Korea, Taiwan, Indonesia, Thailand, and Philippines) showed consistent findings to the present study. The study revealed that patients perceived HTN as a chronic lifelong condition that can lead to severe consequences such as stroke, paralysis and heart attack and also reported stress, excess salt intake, alcohol consumption, smoking as the significant contributors to HTN.[40] Salty foods and alcohol are excessively consumed by the Nepalese people. They believed these eating habits as the principal cause of HTN. It is important to note that most of the causes are modifiable (diet, stress, family problems); therefore, it is essential to promote a lifestyle modification for better blood pressure control by raising awareness about HTN and healthy behavior through formal and informal education.

Treatment Adherence

Adherence to treatment therapy is essential to prevent complications of hypertension. Our study found that most of the population (83.8%) had an optimal or acceptable level of adherence to treatment, but only 14.7% had perfect adherence to all dimension of treatment: medication (49.5%), salt restriction (37.7%) and appointment keeping (56.9%). Majority of participants in this study were literate and resided within an urban area. Also, the data was collected in a tertiary level hospital where patients were provided with appropriate teaching and counselling. This might have contributed to the high prevalence of optimal adherence among participants. Since the dimensions of treatment adherence we used were different, the study result might not be comparable with previous studies.

Our study findings are also supported by other studies from Nepal, where the overall adherence score was at a moderate level, and the majority had high treatment adherence level.[44] Studies carried out in other countries have reported a higher adherence level viz. Beruit 71%,[38] Europe 69.8%,[45] Sudan 70.5%,[46] Ethiopia 75.1%,[47] Mangalore 78.7%,[48] Pakistan 77%,[49] Lebanon 85%.[50]

In our study, perfect adherence to medication was 49.5% which was nearly similar to the findings of studies in Kerala 46%,[51] Nepal 44.1% by Bhandari et al,[28] China 44.1–56.5% Lo et al,[42] Palestine 45.7%.[52] In contrast to our study findings, Aslolami et al found only 27% perfectly adhered to medication[53] which might be due to those people who find it easy to adhere to medication rather than behaviour change like salt restriction. This shows that adherence to medication is low in developing countries and higher in developed countries. This may be due to their knowledge level, availability and cost of medications. However, the finding of our study also indicated adherence to treatment therapy, including medication and behaviour change, was very low. This indicates that we need to promote adherence to medication, behaviour therapy like salt restriction and appointment keeping. Similarly, another reason may be due to the number of pills that patients were taking. Our study found that nearly 80% of patients were taking the only pill, so they were more adherent. A study in Zambia reported that patients taking 3 or more pills were likely to be non-adherent, where adherence prevalence was 70%.[54] Patients with multiple pills might forget or confuse about medicines which lead to non-adherence. The study showed there is a significant association between treatment adherence and duration of diagnosis ($p = 0.043$) and the duration of antihypertensive medicine intake ($p = 0.023$). Association between treatment adherence and socio-demographic, disease and drug-related variables was not statistically significant. A study in Nigeria also showed no significant differences in adherence to treatment between males and females.[55] The study is in line with the study conducted in China which concluded that the duration of medication and history of diagnosis could be related to better adherence.[56]

In contrast, to present study findings, many studies have shown a significant association of treatment adherence and demographic variables as poor adherence is associated with age >50,[47,48] males,[45,48] uneducated,[48,53,57] unemployed, retired,[48,57] having comorbidities.[53] Good adherence is associated with urban residents,[47,57] married,[58,59] annual household income, medical insurance,[58] taking fewer pills daily and having knowledge of HTN and its treatment.[47] In contrast, to present study findings, positive association ($p = 0.01$) between male and low adherence was found, and no significant association was seen between treatment

adherence and other demographic variables (marital status, residence and professional background) in that study.[45] Similarly, a study in Ethiopia showed that urban residence, taking less than two pills per day and having knowledge about HTN and treatment, were positively and significantly associated with treatment adherence. However, age more than 60 years was negatively and significantly associated with treatment adherence. In contrast to findings of the current study, a cohort study found that only 55.9% patient was adherent to treatment and older age and marital status were associated with better adherence.[58]

A study in Mangalore revealed that poor compliance among less educated and unemployed or retired male participants over 50 years.[48] Another study findings showed that the level of education and comorbidities were significantly associated with the level of adherence.[53] Similarly, the findings of a study by Zhang et al contradict the present study findings, which revealed that age, residence, educational level, annual household income, and out-patient medical reimbursement were statistically associated with non-adherence *(p< 0.05)*.[57] This means patients living in rural, low annual income and with no medical insurance reimbursement had a significantly higher rate of non-adherence.

Illness Perception and Treatment Adherence

Our study findings suggested a significantly positive relationship between illness perception and treatment adherence which is in line with predictions of common sense model.[33] The findings are supported by a study conducted by Rajpura & Nayak (2014) which reported a significant correlation (r=0.332, *p* =0.01) between illness perception scores and medication adherence scores suggesting high, threatening perceptions of illness would translate into higher levels of medication adherence.[17] The results were also consistent with the findings of previous studies by Chen et al 2009,[60] Ross et al 2004,[21] Hsiao et al 2012.[30] On the contrary, the study done by Saarti et al showed that the patient's adherence to treatment is related to blood pressure control. It is associated with treatment satisfaction rather than illness perception.[38] The difference in results may be due to the use of different tools to assess illness perception and treatment adherence.

Furthermore, the correlation between dimensions of illness perception and medication adherence were also established in this study. However, association with other dimensions of treatment adherence was not statistically significant. Timeline (acute/chronic), timeline cyclical and consequences were positively correlated with overall treatment adherence and medication subscales. This signifies that people are likely to adhere to treatment if they believed their illness stays with them forever and have severe complications. In oppose to this, Hasio et al 2012 found that patients who believed HTN as acute illness were more adherent.[30]

Our study revealed positive associations between medication adherence and cure/control subscales. A strong correlation was seen among treatment control and medication adherence. People who have a strong belief that medicine will cure their illness and prevent complications were more adherent to medications. Also, the perception of personal control is associated with medication adherence. Similarly, a study conducted in Iran aligns with findings of our study, which concluded that patients scored higher than mean scores in treatment adherence and personal control and understanding were significantly correlated with adherence.[22] However, Ross et al 2004 reported a negative association between personal control and treatment adherence.[21]

We found that emotional representation and identity showed no significant association and coherence was negatively associated with treatment adherence. In previous studies, it was mentioned that patients age and health might impact emotional representation.[29] In our study, the mean age was 60 and blood pressure was 127/82mm of Hg, and most of the patients had no severe complications and emotional consequences of HTN. On the contrary, studies by Hasio et al.[30] Ross et al[21] and Zuglej et al[23] reported strong emotional perception to affect treatment adherence. A study in Taiwan is in line with the findings of the present study, which showed that there are significant associations between illness perception scores and medication adherence scores except for identity, timeline, coherence, and emotional representations.

Regarding causal factors, the findings indicated that those who perceived low immunity as the cause of hypertension are more likely to adhere to treatment therapy. This is supported by the study which reported no association between adherence and knowledge of HTN or its underlying cause.[53] So improving understanding of HTN and its causes may promote adherence.

We recommend an awareness program regarding personal and treatment control, and the nature of disease should be launched for patients to increase their understanding of hypertension. Treatment adherence behaviour of young and

newly diagnosed patients should be monitored closely. Similar studies can be conducted in a community setting on a large scale to make the findings generalisable, and a comparative study in urban and rural settings can be conducted to compare the treatment adherence level.

Limitations

Our study has some limitations which need to be acknowledged. First, the study design was a cross-sectional study that measured illness perception and treatment adherence among patients at a point of time. Therefore, any changes in the trend of these variables over time could not be assessed. Second, the study was conducted using a non-probability sampling technique. Thus, the findings of the study may not be generalised beyond this population. Third, the study population were recruited from a hospital setting so that the findings might have been biased towards adherence which may be the reason behind data not fitting the logistic regression model. Fourth, the tool used for assessing treatment adherence is self-reporting tool; thus, there is a risk of reporting bias and social desirability bias.

Conclusion

In conclusion, HTN was perceived as highly threatening illness. Patients believed HTN was a chronic disease of unstable nature which can have some severe complications and emotional impacts. To the bright side, patients perceived that HTN could be controlled by medication and personal efforts.

Regarding treatment adherence, one in five have perfect adherence, and remaining have optimal adherence to treatment. Patients were more adherent to medication rather than salt restriction. Treatment adherence was not associated with demographic variables but significantly associated with duration of diagnosis and duration of medication. There was a significant positive correlation between treatment adherence and illness perception of HTN. Perception of the timeline, treatment control, personal control, consequences have a significant role in improving treatment adherence. Hence, the findings suggest that motivation is needed for newly diagnosed patients for adherence, and health personnel can facilitate patients to change their illness perception to enhance treatment adherence.

Data Sharing Statement

The datasets of this study are available from the corresponding author on reasonable request.

Ethical Considerations

The study was reviewed and approved by Institutional Review Committee (IRC), Institute of Medicine and research committee, Maharajgunj Nursing Campus, Tribhuvan University. This study complied with the Declaration of Helsinki. Before data collection, the respondents were informed about the purpose and objective of the study and written consent was obtained from each of them. The identity of the respondents was kept confidential.

Disclosure

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