Factors Influencing Medication Adherence in Nepalese Patients with Essential Hypertension*

Prabha Shrestha[1], Doungrut Wattanakitkrileart, RN, DNS[1],

Kanaungnit Pongthavornkamol, RN, PhD[1]

Abstract

Purpose: To identify the rate of medication adherence and to examine the predicting factors of medication adherence in Nepalese patients with essential hypertension.

Design: Correlational predictive study.

Methods: A cross-sectional study was conducted among 140 participants attending a tertiary level university hospital in Kavre district of Nepal between December 2017 and January 2018. Research instruments included Hill Bone Medication Adherence Scale, Modified Medical Outcome Study Social Support Survey, Patient Doctor Relationship Questionnaire, and Hypertension Knowledge Level Scale. Descriptive statistics, and binary logistic regression analysis were applied for data analysis.

Main findings: Mean age of the participants was 53.82 (SD = 12.12), in which 55 % were male. Medication adherence rate in Nepalese patients with essential hypertension was 62.1%. Logistic regression model explained 39% of the variance on medication adherence. The significant predictors of medication adherence were; Patient-doctor relationship (OR = 1.10, 95% CI[1.01-1.20]) and knowledge about hypertension (OR = 1.29, 95% CI[1.14-1.45]). Participants who had better relationships with their doctor were 1.10 times more likely to adhere with their medication regimen. Similarly, the participants with more knowledge about hypertension were 1.29 times more likely to have the better adherence medication regimen.

Conclusion and recommendations: Medication adherence rate among Nepalese hypertensive patients were low which is significantly predicted by patient-doctor relationship and the patients' knowledge about hypertension. Health care facilities and nursing authorities of Nepal need to promote knowledge about hypertension and encourage positive relationship between patients and providers to improve medication adherence.

Keywords: essential hypertension, knowledge, medication adherence, patient-doctor relationship

ปัจจัยที่มีอิทธิพลต่อความร่วมมือในการใช้ยาในผู้ป่วยความดันโลหิตสูงชนิดไม่ทราบสาเหตุในประเทศเนปาล*

Prabha Shrestha[1], ดวงรัตน์ วัฒนกิจไกรเลิศ, พย.ด.[1], คนึงนิจ พงศ์ถาวรกมล, PhD[1]

บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อระดับความร่วมมือในการใช้ยาในผู้ป่วยความดันโลหิตสูงชนิดไม่ทราบสาเหตุในประเทศเนปาล

รูปแบบการวิจัย: การวิจัยความสัมพันธ์เชิงทำนาย

วิธีดำเนินการวิจัย: กลุ่มตัวอย่างของการศึกษาภาคตัดขวางได้แก่ ผู้ป่วยโรคความดันโลหิตสูงชนิดไม่ทราบสาเหตุ จำนวน 140 คนที่มารับบริการในโรงพยาบาลมหาวิทยาลัยระดับตติยภูมิแห่งหนึ่งในอำเภอกัฟเรของประเทศเนปาล ระหว่างเดือนธันวาคม 2017 ถึงมกราคม 2018 เก็บรวบรวมข้อมูลด้วยแบบวัดความร่วมมือในการใช้ยา แบบสอบถาม แหล่งสนับสนุนทางสังคม แบบสอบถามสัมพันธภาพระหว่างผู้ป่วยกับแพทย์ และแบบวัดความรู้เกี่ยวกับความดันโลหิตสูง วิเคราะห์ข้อมูลโดยใช้สถิติพรรณนาและการวิเคราะห์ถดถอยโลจิสติกทวิ (binary logistic regression)

ผลการวิจัย: กลุ่มตัวอย่างมีอายุเฉลี่ย 53.82 ปี (SD = 12.12) ร้อยละ 55 เป็นเพศชาย พบความร่วมมือในการใช้ยาร้อยละ 62.1 การวิเคราะห์ถดถอยโลจิสติกทวิพบว่า ตัวแปรอิสระสามารถทำนายความร่วมมือในการใช้ยาได้ร้อยละ 39 โดยมีตัวแปรสัมพันธภาพระหว่างผู้ป่วยกับแพทย์ (OR = 1.10, 95% CI[1.01-1.20]) และความรู้เกี่ยวกับความดันโลหิตสูง (OR = 1.29, 95% CI[1.14-1.45]) ที่สามารถทำนายได้อย่างมีนัยสำคัญ กลุ่มตัวอย่างที่มีสัมพันธภาพกับแพทย์ดีจะมีความร่วมมือในการใช้ยาเพิ่มขึ้น 1.10 เท่า และกลุ่มตัวอย่างที่มีความรู้เกี่ยวกับความดันโลหิตสูงในระดับสูงจะมีความร่วมมือในการใช้ยาเพิ่มขึ้น 1.29 เท่า

สรุปและข้อเสนอแนะ: ผู้ป่วยความดันโลหิตสูงในประเทศเนปาลมีความร่วมมือในการใช้ยาอยู่ในระดับต่ำ สถานบริการด้านสุขภาพและหน่วยงานการพยาบาลของประเทศเนปาลจำเป็นต้องมุ่งเน้นในเรื่องของการส่งเสริมความรู้เกี่ยวกับโรคความดันโลหิตสูงให้ผู้ป่วย และส่งเสริมสัมพันธภาพระหว่างผู้ป่วยกับแพทย์ เพื่อความร่วมมือในการใช้ยาที่ดี

คำสำคัญ: ความดันโลหิตสูงชนิดไม่ทราบสาเหตุ ความรู้ ความร่วมมือในการใช้ยา สัมพันธภาพระหว่างผู้ป่วยกับแพทย์

Background and Significance

Hypertension (HTN) is one of the most prevalent non communicable diseases (NCD) globally with more than 970 million individuals impacted by the illness. According to the data from 2003-2014, an increase in HTN associated health care cost was noted with an approximated $131 billion spent annually, leading patients with HTN in the USA to the need of strong efforts towards prevention and management of HTN[1]. The effective management of HTN is a health care objective. HTN does not produce physical symptoms in most of the hypertensive people so patients are reluctant to take antihypertensive medication. Medication adherence is less than 50% among hypertensive patients as reported by WHO[2]. Non-adherence to prescribed antihypertensive medication is the principal factor contributing to the ineffective management of HTN. Uncontrolled HTN impacts on a range of clinical outcomes including increased risk for cardio-vascular diseases, stroke, renal failure, disability and premature death. Effective treatment approaches are available for the management and control of HTN[3]. In Nepal, the prevalence of HTN among adults has increased rapidly over the past two decades with current estimates ranging from 20.4% to 32.5%[4-5] and the medication adherence among HTN patients ranging from 35% to 56%[6-7].

According to Multidimensional Medication Adherence Model (MAM) developed by WHO, medication adherence is shown to be influenced by multiple factors which are incorporated in five dimensions; social/economic, patient-related, health care team and system-related, therapy-related and condition-related factors[2]. Among the numerous factors associated with medication adherence from MAM, empirical evidence found inconsistent association of socio-demographic variables; social support and economic status on medication adherence in hypertensive patients[8-10]. Positive experience with doctors which included mutual decision making and sense of trust between doctor and patients improved patients' adherence to antihypertensive medicines[11-12]. Patients with good knowledge of HTN were also found significantly more adherent to antihypertensive medication[13-14].

Nepal is a low income country but 55% of total health care expenditure is out of pocket in Nepal. This is placing the poor people at more risk to the disadvantages and non-adherence to medication of HTN and other NCDs[15]. Medication adherence research is a newly emerging field in Nepal. In order to improve medication adherence, better

understanding about the factors associated with HTN treatment adherence among patients with HTN living in Nepal is needed. There is inadequate information about medication adherence and its influencing factors among Nepalese patients as shown by very few published studies from Nepal[6-7]. Research from Eastern Nepal has identified illiteracy, cost, no family history of HTN and irregular follow up as the predictive factors of non-adherence to medication in hypertensive patients[6]. Among the various factors described by WHO, only few factors have been studied previously in eastern Nepal while such studies are completely lacking about central Nepal which constitutes a significant proportion of the whole population of Nepal. This study focuses on four variables; economic status, social support, patient-doctor relationship and knowledge about HTN from MAM since these factors were consistently found to have significant association with medication adherence but has not yet been studied in Nepalese population. This paper, therefore, focuses on the influence of these factors on medication adherence in Nepalese patients with essential HTN.

Objectives

1. To identify medication adherence rate in Nepalese patients with essential HTN.

2. To investigate potential predictors of medication adherence including economic status, social support, patient-doctor relationship, and knowledge about HTN in Nepalese patients with essential HTN.

Methodology

This study was a correlational predictive study.

Population and Sample

The participants were the volunteer sample of HTN patients taking antihypertensive medications. They were recruited from the cardiology and medical Out Patient Departments (OPD) of a large university hospital, located in the central Nepal through the convenience sampling technique. The inclusion criteria included age at least 18 years old, currently taking medication for hypertension for at least 6 months, ability to take medication without assistance, and ability to communicate in Napali language. Patients who suffered from acute physical illness, mental illness and cognitive impairment (screened by General Practitioner Assessment of Cognition)[16] were excluded. Sample size was calculated based on Cohen's power analysis using G* power software version 3.1.9.2[17]. Researchers obtained the Odd ratio (1.92) of economic status to plot in the G power equation from the similar study[9]. The

required sample size for predictability using binary logistic regression at α .05, power of test .80 was 140.

Research Instruments

There were five sets of questionnaires used in this study. First, Patients' demographic and clinical characteristics questionnaire developed by the researchers consisted of 20 questions asking demographic and clinical background information of participants. Economic status was categorized as less than enough, enough, and have some saving as reported by the participants. The medical information includes duration of treatment, type of antihypertensive medications, comorbidity and blood pressure measurement record.

Second, Hill Bone Medication Adherence Subscale (HBMA) was used to measure antihypertensive medication adherence. This 8-item instrument was developed in 2011 by Song, et al.[18], Cronbach alpha coefficient was .77. The response scale was 4-point Likert scale ranging from (1) all of the time to (4) never with total score ranging from 8-32. The higher score represents the higher medication adherence. This instrument has not provided the cutoff point to differentiate adherent or non-adherent patient. In this study, eighty percent of the maximum possible score, or 26

points, was used as a cutoff score[19]. The participants scoring 26 or more in HBMA scale were considered as adherent to antihypertensive medication.

Third, Modified Medical Outcome Study, Social Support Survey (MMOS-SSS) was used to measure social support available in Nepali version[20]. This new modified scale with 8 item measures emotional and tangible support in general population was developed by Moser, et al.[21] in 2012. Cronbach alpha coefficient was .8. The items are scored in a five-point Likert scale ranging from none of the time = 1 to all of the time = 5. The total possible score of the social support was 8-40, higher score represents the higher level of perceived social support.

Fourth, Patient Doctor Relationship Questionnaire (PDRQ-9), was used to assess relationship between patient and his/her doctor. It is a brief measure developed to assess the patient's experience of the therapeutic aspects of the patient–doctor relationship, in 2004[22]. Cronbach alpha coefficient was .94. This instrument includes nine statements that a person responses about relationship with his/her doctor in a five-point Likert scale, scoring 1 for not at all appropriate to 5 for totally appropriate. The higher score represented the better appropriate relationship.

Finally, Hypertension Knowledge-Level Scale (HK-LS) was used to measure knowledge about HTN. It was developed by Erkoc, et al.[23] in 2012. It has 22 items measured in a yes/no format. Each correct answer was scored 1. Kuder-Richardson Reliability Coefficient was .82 for the entire scale. The expression is incorrect for 9 items among the total 22. The maximum possible score is 22 for the entire scale which is divided into 6 sub-dimensions. Total score for each item were calculated and divided into three levels: 80% and above as high, 60-79% as medium and less than 60% as low level of knowledge.

Medical Outcome Study Social Support Survey (MMOS-SSS) was available in Nepali version[20]. Researchers translated the rest of the three instruments; Hill Bone Medication Adherence, Hypertension Knowledge-Level Scale, and Patient Doctor Relationship Questionnaire into Nepali language after getting permission from developers by back translation method[18,21-23].

Validity and reliability: All questionnaires were well-developed and had been used in patients with chronic conditions. These scales are widely used internationally with good validity in English validation. Researchers did not assess their content validity. Reliability of the questionnaires were tested with 30 participants who were similar to the sample in this study. The Cronbach's alpha coefficients of the instruments was .9 for HBMA, .87 for MMOS-SSS, .91 for PDRQ-9 and Kuder-Richardson Reliability Coefficient .76 for HKLS.

Ethical Consideration

Ethical approval was obtained from Institutional Review Board (IRB), Faculty of Nursing, Mahidol University COA No: IRB-NS2017/416.0711 and Institutional Review Committee of Kathmandu University School of Medical Sciences, (protocol approval number: 143/17). Written informed consent was obtained from literate patients whereas for 33 illiterate participants thumb print was obtained along with the signature of witness who read all the statements for them.

Data Collection

Data were collected from December 2017 to January 2018 after getting permission from IRB. The research project was introduced to the authority, in-charge and other health care providers in the OPDs. Nursing staff identified the potentially eligible participants and talked to them about the research project to determine their interest. Information sheet was provided to the participants who agreed to participate, and completed the informed consent. Total 145 eligible patients were approached but five of them refused to participate and did not sign the informed consent. Data were collected

from a final sample of 140 participants. Self-reported instrument was used to collect data but 33 illiterate participants were interviewed. Data were reviewed for completeness and acquired the missed information. Participants were acknowledged for their time and information.

Data Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 18. All the obtained data were coded for data entry. Alpha level of .05 was set for statistical significance. Demographic data and clinical information were analyzed using descriptive statistics. Data was not normally distributed so Mann Whitney U test was performed to compare the mean score between adherent and non-adherent groups. Basic assumptions for binary logistic regression were met. Dummy variables were created for categorical variables. The test of multicollinearity demonstrated low collinearity values ranging from .95 to 1.06 and the variance inflation factors (VIF) values ranging between 1.07 to 1.5. Binary logistic regression analysis was performed to examine the predicting power of independent variables on medication adherence.

Findings

Sociodemographic and clinical characteristics of the participants

The mean age of participants was 53.82 years (SD = 12.12), with the range of 25 to 78 years. Fifty-five percent among the participants were male. Sixty-eight percent of them were in the group of illiterate to primary level of education. Majority of the participants (85.7%) were married. The highest percentage of participants (34.3%) had monthly family income between 1,000-30,000 NRS ($89-$260). More than half of the participants (53.6%) perceived their income as enough. Duration of treatment within 1-5 years were 37.9%. Comorbidity was present in 36.4% participants, out of which approximately 47% were diabetic.

Medication adherence and blood pressure control

The finding showed that 62.1% of the participants were identified as medication adherents to anti-hypertensive medication. Participants with controlled blood pressure (BP < 140/90) were 30.7%. Average systolic BP = 137.14 mm Hg (SD = 18.71) and average diastolic BP = 86.63 mm Hg (SD = 11.10). Report of each item on medication adherence scale demonstrated the highest mean on the item *'miss to take hypertension medicine when feel better'* with ($\overline{X}$ = 3.74 SD = .63), and the lowest mean on the item *'forgetting to take antihypertensive medicines'* ($\overline{X}$ = 2.99, SD = .81), as shown in Table 1.

Level of patient-doctor relationship, social support and knowledge about HTN

Among the 140 participants the mean score of patient-doctor relationship was 33.95, (SD = 6.25). Mean score of social support was 79.03, (SD = 14.47) and the mean score of knowledge about HTN was 15.6, (SD = 3.81). Among the participants, 56.4% had good social support. Knowledge about HTN was high among 40.7% and 48.6 % reported moderate level of relationship with their doctor.

Table 1: Self-reported antihypertensive medication adherence among the participants

Items	Possible Range	Actual Range	$\overline{X}$	SD
Forgetting to take antihypertensive medicine	1-4	1-4	2.99	.81
Miss to take hypertension pills when careless	1-4	1-4	3.08	.84
Run out of hypertension pills	1-4	1-4	3.36	.78
Forget to fill prescription	1-4	1-4	3.37	.71
Decide not to take medicine	1-4	1-4	3.48	.81
Miss to take hypertension pill when feel sick	1-4	1-4	3.61	.70
Skip medicine before going to doctor	1-4	1-4	3.70	.69
Miss to take hypertension pills when feel better	1-4	1-4	3.74	.63

Mean score of the study variables between adherent and non-adherent groups

There were significant differences in scores of patient-doctor relationship, social support, and knowledge of HTN between adherent and non-adherent groups of participants as presented in Table 2.

Table 2: Mean score of independent variables between adherent and non-adherent groups

Variables	Adherent		Non-adherent		Z	p-value
	$\overline{X}$	SD	$\overline{X}$	SD		
Patient-doctor relationship	35.87	5.81	30.79	5.67	4.72	.001
Social support	33.02	5.55	29.30	5.47	3.81	.001
Knowledge about HTN	17.03	3.34	13.47	3.53	5.49	.001

As shown in Table 3, the association between economic status and medication adherence was not statistically significant (χ^2 = 2.16, p = .34). Among the participants with less than enough income 51.7% with enough income 62.1% and among the participants with some saving 69.4% were adherent to medication.

Table 3: Chi-Square test between economic status and medication adherence (N = 140)

Variables	Adherent		Non-adherent		Pearson Chi-square	p-value
	n	%	n	%		
Economic Status					2.16	.34
Less than enough	15	51.7	14	48.3		
Enough	47	62.7	28	37.3		
Have some saving	25	69.4	11	30.6		

Predicting factors of medication adherence

Referring to Table 4, binary logistic regression analysis was done using enter method to identify the predicting power of independent variables on medication adherence in Nepalese patients with essential HTN. The displayed result revealed that this model account for 39% of variance in medication adherence (R^2 = .39). Two of the independent variables in this model had significant predicting power on medication adherence. First factor was patient- doctor relationship with OR = 1.10 (95% CI[1.01, 1.20], p < .01) indicating that each unit increment in patient-doctor relationship will increase the odds of medication adherence by 1.10 times. The second factor, knowledge about hypertension, with OR = 1.29 (95% CI[1.14, 1.45], p < .01) indicates that 1.29 times increment in odds of medication adherence with each unit increase in knowledge about HTN in this population

Table 4: Factors predicting medication adherence in patients with essential HTN

Variables	Odd Ratio	95% CI		p-value
		Lower	Upper	
Economic Status (Have some saving)	Reference			
Less than enough	.98	.33	2.96	.98
Enough	1.52	.44	5.21	.50
Patient doctor relationship	1.10	1.01	1.20	.02
Knowledge about HTN	1.29	1.14	1.45	.00
Social support	1.06	.97	1.15	.19

Dependent variable: medication adherence *Nagelkerke R Square = .39

Hosmer-Lemeshow goodness-of-fit P = .688

Discussion

This study found 62.1% of the participants were adherent to the antihypertensive medication in Nepalese patients with HTN. This result was consistent with the previous studies in Nepal and medication adherence rate reported by WHO, where the medication adherence rate was 56.5% and 50%, respectively[2,6]. Forgetfulness was the main reason for non-adherence among the participants with lowest mean score. This result was consistent with many other studies all around including Nepal[6,24]. The risk of HTN and memory impairment increases with age[25]. Furthermore, three fourths participants from this study were working people, putting them at further risk of forgetting to take the medicine. Study result showed that participants did not miss their medicine when they feel better with highest mean score in this item. It might be because doctors and pharmacists remind the patients at every visit to take hypertensive medication throughout their life.

Two of the studied factors, patient-doctor relationship and knowledge about HTN were significantly associated with medication adherence. In this study higher level of patient-doctor relationship and higher knowledge about HTN increase the probability of better medication adherence in Nepalese hypertensive patients. These findings have partially supported the WHO medication adherence model[2].

Patient-doctor relationship was a significant predictor of medication adherence. This result was consistent with the report of systematic review and other study finding relationship between patient-doctor relationship and medication adherence in hypertensive patients[11-12]. As per the reviews, all the studies found that good patient-doctor relationship is related to the better adherence to antihypertensive medication[11-12]. In this study, the highest scoring item was 'I trust my doctor' with mean score ($\overline{X}$ = 4.37, SD = .77). A patient's trust in doctor or other health care provider implies confidence that their words are truthful and actions are appropriate in the provision of care and treatment. A study in patients with hypertension found that increasing levels of trust in the health care provider was independently predicted medication adherence[26].

Another factor in this study which significantly predicted medication adherence was knowledge about HTN. This result was supported by other studies; the respondents who had knowledge about their disease were more likely to be more adherent than patients who do not have adequate knowledge[13-14]. In this study, Knowledge about hypertension was low to medium among more than half of the

participants. Contextually Nepalese patients were not well educated, 45% of the participants of this study had not got formal education and may not had access to social media internet, and health information sources so the health care providers were the prime source of information. Hospitals are usually overloaded with patients. Formal health teaching and counseling sessions were not foci of care because of understaffing and logistic inadequacy. Social support could not predict medication adherence in this study. This finding is consistent with a study in USA[8]. Possible explanation is that HTN usually has no symptom, participants can take care of themselves and most of them had a job, they can pay by themselves. Additionally, in Nepalese culture family members hold the responsibility to remind the patients to take medicine and most of the Nepalese families are still living in joint or extended family where one of the family member is always available to take care of the other. Similarly, economic status could not predict medication adherence in this study. The result was similar to the study conducted in India[10]. In Nepalese context, illness and medication are placed in top most priority so patients tend to reduce other expenses to buy medication. Medication adherence is not predicted by economic condition in Nepalese hypertensive patients.

Conclusion and Recommendations

It is a known fact that medication adherence leads to better BP control and less complication. This study revealed that medication adherence among Nepalese patients attending this hospital was low and BP control was even suboptimal. Majority of the participants of this study were living economically active life with busy schedule which may be the cause of forgetfulness and non-adherence. The hypertensive patients of Nepal with better patient-doctor relationship and better knowledge about HTN showed greater level of medication adherence. The findings of this study contribute to the knowledge about multidimensional factors and their influences on medication adherence. This is, however, a hospital-based study and with restricted geographical area (only one hospital), and thus its findings may not be appropriate to generalize to other settings.

The recommendation from this study are as follows.

1. For clinical practice, Nurses in Nepal need to promote knowledge about HTN among patients via video display, brochures, health education and awareness classes for the patients in a regular basis during OPD visits. Enhancing patient-doctor relationship need to be a concern for the hospital authorities to improve on their medication adherence and to better the life of

patients with essential HTN. Nurses can address forgetfulness of the participants, by setting medication reminders in patient's mobile phones.

2. For research, study, variables of the current study explained only 39% of the total variance on medication adherence. So further research is recommended regarding the other associated factors such as belief of patient on treatment regimen, complexity of treatment regimen.

References

1. Kirkland EB, Heincelman M, Bishu KG, Schumann SO, Schreiner A, Axon RN, et al. Trends in healthcare expenditures among US adults with hypertension: national estimates, 2003–2014. J Am Heart Assoc. 2018;7(11). pii: e008731. doi: 10.1161/ JAHA.118.008731.

2. World Health Organization. Adherence to long-term therapies: evidence for action. Geneva, Switzerland: World Health Organization; 2003. 194 p.

3. Lee HJ, Jang SI, Park EC. Effect of adherence to antihypertensive medication on stroke incidence in patients with hypertension: a population-based retrospective cohort study. BMJ Open. 2017;7(6): e014486. doi: 10.1136/bmjopen-2016-014486.

4. Dhungana RR, Pandey AR, Bista B, Joshi S, Devkota S. Prevalence and associated factors of hypertension: a community-based cross-sectional study in municipalities of Kathmandu, Nepal. Int J Hypertens. 2016;2016:1656938. doi: 10.1155/2016/1656938.

5. Vaidya A, Pathak RP, Pandey MR. Prevalence of hypertension in Nepalese community triples in 25 years: a repeat cross sectional study in rural Kathmandu. Indian Heart J. 2012;64(2):128-31.

6. Bhandari B, Bhattarai M, Bhandari M, Ghimire A, Pokharel PK, Morisky DE. Adherence to antihypertensive medications: population based follow up in Eastern Nepal. J Nepal Health Res Counc. 2015;13(29):38-42.

7. Khan GM, Thapa RK, Khakurel A, Shrestha G, Katila N, Bhurtel S. medication adherence and blood pressure control among hypertensive patients of Pokhara Valley. Journal of Health and Allied Sciences. 2013;3(1):64-7.

8. Wang PS, Bohn RL, Knight E, Glynn RJ, Mogun H, Avorn J. Noncompliance with antihypertensive medications: the impact of depressive symptoms and psychosocial factors. J Gen Intern Med. 2002;17(7):504-11.

9. Tong X, Chu EK, Fang J, Wall HK, Ayala C. Nonadherence to antihypertensive medication among hypertensive adults in the United States – HealthStyles, 2010. J Clin Hypertens (Greenwich). 2016;18(9):892-900.

10. Rao CR, Kamath VG, Shetty A, Kamath A. Treatment compliance among patients with hypertension and type 2 diabetes mellitus in a coastal population of Southern India. Int J Prev Med. 2014;5(8):992-8.

11. Van der Laan DM, Elders PJM, Boons CCLM, Beckeringh JJ, Nijpels G, Hugtenburg JG. Factors associated with antihypertensive medication non-adherence: a systematic review. J Hum Hypertens. 2017;31(11):687-94.

12. Mahmoudian A, Zamani A, Tavakoli N, Farajzadegan Z, Fathollahi-Dehkordi F. Medication adherence in patients with hypertension: does satisfaction with doctor-patient relationship work? J Res Med Sci. 2017;22:48. doi: 10.4103/jrms.JRMS_205_16.

13. Malik A, Yoshida Y, Erkin T, Salim D, Hamajima N. Hypertension-related knowledge, practice and drug adherence among inpatients of a hospital in Samarkand, Uzbekistan. Nagoya J Med Sci. 2014;76(3-4):255-63.

14. Jankowska-Polańska B, Uchmanowicz I, Dudek K, Mazur G. Relationship between patients' knowledge and medication adherence among patients with hypertension. Patient Prefer Adherence. 2016;10:2437-47.

15. Dhital SM, Karki A. Dealing with the burden of hypertension in Nepal: current status, challenges and health system issues. Regional Health Forum. 2013;17(1):44-52.

16. Brodaty H, Pond D, Kemp NM, Luscombe G, Harding L, Berman K, et al. The GPCOG: a new screening test for dementia designed for general practice. J Am Geriatr Soc. 2002;50(3):530-4.

17. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. Behav Res Methods. 2009;41(4):1149-60.

18. Song Y, Han HR, Song HJ, Nam S, Nguyen T, Kim MT. Psychometric evaluation of hill-bone medication

adherence subscale. Asian Nurs Res. 2011;5(3):183-8.

19. Bosworth HB. Enhancing medication adherence: the public health dilemma. London, UK: Springer Healthcare; 2012. 60 p.

20. Manandhar S, Shrestha DS, Taechaboonsermsk P, Siri S, Suparp J. Quality of life among breast cancer patients undergoing treatment in national cancer centers in Nepal. Asian Pac J Cancer Prev. 2014;15(22):9753-7.

21. Moser A, Stuck AE, Silliman RA, Ganz PA, Clough-Gorr KM. The eight-item modified medical outcomes study social support survey: psychometric evaluation showed excellent performance. J Clin Epidemiol. 2012;65(10):1107-16.

22. Van der Feltz-Cornelis CM, Van Oppen P, Van Marwijk HW, De Beurs E, Van Dyck R. A patient-doctor relationship questionnaire (PDRQ-9) in primary care: development and psychometric evaluation. Gen Hosp Psychiatry. 2004;26(2):115-20.

23. Erkoc SB, Isikli B, Metintas S, Kalyoncu C. Hypertension Knowledge-Level Scale (HK-LS): a study on development, validity and reliability. Int J Environ Res Public Health. 2012;9(3):1018-29.

24. Pirasath S, Kumanan T, Guruparan M. A study on knowledge, awareness, and medication adherence in patients with hypertension from a tertiary care centre from Northern Sri Lanka. Int J Hypertens. 2017;2017:9656450. doi: 10.1155/2017/9656450.

25. American Psychological Association. Memory changes in older adults. "Senior moments" less inevitable than once thought [Internet]. Washington, DC: American Psychological Association; 2006 [cited 2017 Dec 15]. Available from: http://www.apa.org/research/action/memory-changes.aspx.

26. Abel WM, Efird JT. The association between trust in health care providers and medication adherence among black women with hypertension. Front Public Health. 2013;1:66. doi: 10.3389/fpubh.2013.00066.