



Impact of community pharmacy-based educational intervention on patients with hypertension in Western Nepal

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RESEARCH

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ABSTRACT

Background

There is a paucity of data regarding the feasibility and impact of community pharmacy-based educational interventions on the management of chronic diseases in developing countries.

Aims

The aim of this study was to establish the feasibility, and to investigate the impact, of community pharmacy-based educational intervention on knowledge, practice, and disease management of patients with hypertension in Western Nepal.

Method

A single-cohort pre-/post-intervention study was conducted from August 2012 to April 2013. The participants included in the study were patients diagnosed with hypertension attending a pharmacist-led hypertension clinic. The educational intervention was conducted by pharmacists, was individualised, and consisted of three counselling sessions over a period of six months. The patients' knowledge of

hypertension, their practice of lifestyle modification and non-pharmacological approaches concerning hypertension management, and blood pressure were assessed at baseline and again after nine months by using a pre-validated questionnaire.

Results

Fifty patients met the inclusion criteria and were enrolled in the study. The median (IQR) knowledge score changed from 6 (4) to 13 (0) after the intervention ($p < 0.01$) with the median (IQR) practice score changing from 7 (4) to 16 (2) ($p < 0.01$). The mean (SD) systolic BP changed from 150.1 (7.8) to 137.7 (9.9) ($p < 0.01$) and the mean (SD) diastolic BP from 104 (9.5) to 94.5 (7.8) after the intervention ($p < 0.01$).

Conclusion

A simple, educational intervention by community pharmacists had improved patients' disease knowledge, practice, and management of their hypertension. Evidence suggests Nepalese community pharmacists need could play an important role in the management of chronic diseases like hypertension through simple interventions such as providing educational support for patients.

Key Words

Community pharmacy; educational intervention; hypertension; Nepal

What this study adds:

1. What is known about this subject?

As lifestyle modifications and other non-pharmacological approaches play an important role in controlling blood pressure, educating patients about these factors is of paramount importance. However, most educational programmes and studies have been conducted either in hospital settings, by non-pharmacists, or in developed countries where their findings cannot be easily



extrapolated to developing countries because of differences in the healthcare system.

2. What new information is offered in this study?

This study shares the positive impact and success of a community pharmacy-based educational intervention on knowledge, practice, and disease management of patients with hypertension in a low resource setting of a developing country.

3. What are the implications for research, policy, or practice?

Community pharmacists need to be encouraged to run a long-term chronic diseases management programme. Such an endeavour will help reduce pressure on the healthcare system and promote quality pharmaceutical service in low resource settings.

Background

The global burden of hypertension has dramatically increased in recent years. Hypertension contributes to approximately 17 million deaths worldwide every year despite the fact that it is one of the major, modifiable risk factors of cardiovascular diseases.^{1,2} The prevalence of hypertension increased from 26.4 per cent in 2000 to 40 per cent in 2008, and this figure is projected to reach 60 per cent by 2025.^{3,4} The prevalence of hypertension is higher in low- and middle-income countries, while mortality rates of cardiovascular diseases are also higher in these countries, and accounts for major economic burdens.³ In Nepal, it is estimated that the prevalence of hypertension ranges from 18.8 to 41.8 per cent, and shows an increasing trend, posing unique challenges to the Nepalese healthcare system.⁴

Despite effective pharmacological approaches for controlling blood pressure, there is an upsurge in hypertension-associated complications worldwide.^{5,6} Uncontrolled or poorly managed hypertension leads to several complications such as coronary heart diseases, peripheral vascular diseases, and kidney disease.⁷ These complications account for approximately 9.4 million deaths worldwide every year.⁷ As lifestyle modifications and other non-pharmacological approaches play equally important roles in controlling blood pressure, educating patients about these factors is of paramount importance. In the relevant literature, several patient educational programmes have been investigated to determine their effectiveness in achieving good control of chronic diseases including hypertension.⁸⁻¹⁴ However, most of these studies were conducted either in hospital settings,^{8,10,11} by non-pharmacists,⁹ or in developed countries¹²⁻¹⁴ where their findings cannot be easily extrapolated to developing countries because of differences in the healthcare system. In the south Asian region that includes Nepal, healthcare

structures for chronic diseases target only selected conditions, are oriented toward episodic care, and lack an integrated chronic diseases management model.¹⁵ Moreover, community pharmacies are among the most easily accessible and often the first institutional contact point of the patients seeking primary healthcare services in Nepal.¹⁶ However, there is a paucity of information regarding the community pharmacy-based interventions in terms of their feasibility and effectiveness in the management of hypertension. Therefore, this study aimed to establish the feasibility, and to investigate the impact of community pharmacy-based educational intervention on knowledge, practice, and disease management of patients with hypertension in Western Nepal.

Method

Study design, subjects, and setting

A single-cohort pre-/post-intervention study was conducted from August 2012 to April 2013. The participants included in the study were patients diagnosed with hypertension attending “a pharmacist-led hypertension clinic” Sunday, Thursday, and Friday every week at Sankalpa pharmacy. Sankalpa pharmacy, located at Pokhara, Kaski, Nepal, is a community pharmacy run under the Sankalpa Foundation, which is a pharmacist led non-profit organisation. Patients from both genders, with or without concurrent illnesses, and willing to participate in the study, were included. The patients attending the pharmacy were from the urban areas. The educational intervention was provided free of cost. However, the other expenses, particularly the costs of medicines, were borne by the patients.

Data collection

Socio-demographic variables and a blood pressure reading were collected using a patient profile standard form. A pre-validated 22-item questionnaire was used to assess the patients' knowledge and practice (KP) of lifestyle modification and non-pharmacological approaches concerning hypertension management such as salt intake, exercise, smoking and alcohol cessation, and compliance with medication. The questionnaire was prepared in English then translated into Nepali. The questionnaire was piloted with 20 patients (10 male and 10 female). A team comprising a medical doctor, two clinical pharmacists, and a registered nurse reviewed the pilot study results. The tool was modified and finalised according to the results. The KP questionnaire used in this study is given in the Appendix.



Study procedures and intervention

Initially, patients meeting the inclusion criteria were recruited to the study following their verbal informed consent. The participants were informed that participation was strictly voluntary and that they were free to withdraw at any time during the study without giving any reason, without their medical care or rights being affected. They were also free not to answer any question they were uncomfortable with. Moreover, the participants were also assured that their personal data would be confidential and no information that could lead to identification of any individual would be revealed. In the first visit to the pharmacy, all the socio-demographic variables and initial BP were recorded, and their baseline level of knowledge and lifestyle practices were also recorded. At the end of nine months, patients' levels of knowledge and lifestyle modification practices were reassessed and their blood pressure was recorded.

A team of healthcare professionals, including two community pharmacists, a nurse, and a physician, was involved in the intervention programme. The educational intervention was individualised (i.e., one-to-one counselling) and consisted of three counselling sessions. The first session was conducted during the first visit, then at two months, and again at four months. Patients were notified and reminded about their follow-ups via telephone conversations. The educational sessions were run in the private counselling area in the community pharmacy, and the average duration of each session was 15–30 minutes. Two community pharmacists provided the educational intervention, whereas a physician did the general physical and clinical examination, and a registered nurse monitored the blood pressure and weight of the patients along with other vitals measurements.

The intervention programme consisted of face-to-face counselling sessions. All the patient educational sessions were provided free of cost. These educational sessions focused on providing information about the hypertension disease and its management including lifestyle modifications. The sessions on lifestyle modifications emphasised information about salt intake moderation—with special reference to Nepalese eating habits such as reducing the amount of salt while cooking lentil and curry; not taking more than one curry in the meal; avoiding pickles; avoiding food with baking soda and baking powder; avoiding table salt; adopting a healthy eating plan in line with DASH (Dietary Approaches to Stop Hypertension) diet; weight reduction; physical exercise; cessation of risk factors (smoking and alcohol intake); and drug compliance. In addition, two sets of educational materials were also distributed. Educational material-I was distributed after the first session and included information about the disease and a dietary plan. Educational material-II was distributed at the second educational session

and included information about exercise and weight reduction. For illiterate patients, the educational material was read to them and audiovisuals on hypertension and healthy lifestyles were shown via a laptop in the counselling room. For the purpose of this study, the literate patients were those who were able to read and write in Nepali language while those unable to do so were considered illiterate.

Analysis

Descriptive statistics were used to summarise the socio-demographic parameters. The knowledge and practice scores of the patients were tested for normality of distribution using the Shapiro-Wilk test. The data was not normally distributed. Hence, to compare the Knowledge-Practice (KP) scores, the Wilcoxon sign rank sum test was used, whereas for the comparison of blood pressure, a paired sample T-test was used because it was normally distributed. To compare the difference in knowledge and practice for the baseline, Mann-Whitney and Kruskal Wallis were used. For normally distributed data, mean (SD) was used, while for skewed data, median and interquartile range (IQR) was used.

The impact of intervention was determined by comparing patients' knowledge and lifestyle practice scores before and after the community pharmacy-based intervention. Blood pressure was also compared to examine whether there was a change. For the knowledge questions, every correct answer was scored as "1", whereas the incorrect answers were scored as "0". Similarly, for the practice questions, the greatest and lowest adherence towards the disease management guideline was scored as "2" and "1", respectively. Non-adherence was scored as "0". The maximum possible scores for knowledge and practice were 13 and 18, respectively, and the total possible KP score was 31.

Results

Socio-demographic characteristics of patients

A total of 50 patients met the inclusion criteria of the study and were included in this study. Females (n=31, 62 per cent) were higher in number compared to males (n=19, 38 per cent). In terms of age, 13 (26 per cent) participants were 61–70 years, followed by 10 (20 per cent) aged 41–50 years. The mean \pm standard deviation of the age was 60.34 ± 1.48 . The family history of hypertension was positive in 34 patients (68 per cent). Smokers (n=18, 36 per cent) were fewer in number compared to non-smokers (n=32, 64 per cent). Similarly, the majority of patients enrolled in the project were non-alcoholics (n=41, 82 per cent). The mean \pm standard



deviation of the duration of hypertension was 4.9 ± 2.6 years. There were more literate patients ($n=36$, 72 per cent) than illiterate patients ($n=14$, 28 per cent). The overall socio-demographic characteristics of the patients are presented in Table 1.

Table 1: Socio-demographic characteristics of the patients

Characteristics	Number (Percentage)*
Gender	
Male	19 (38)
Female	31 (62)
Age group	
31–40	05 (10)
41–50	10 (20)
51–60	08 (16)
61–70	13 (26)
71–80	09 (18)
≥81	05 (10)

*Total number of participants: 50

Comparison of knowledge and practice scores in terms of baseline data

Statistical analysis revealed that the knowledge and practice scores were not affected by age, gender, and duration of hypertension. There was no statistically significant difference in the total Knowledge-Practice (KP) between male (14.5) and female (12.5) participants ($p=0.18$). Similarly, there were no statistically significant differences in the total KP among different age groups ($p=0.60$). Furthermore, those newly diagnosed and those who had been diagnosed some time ago were similar on scores—education not getting through somewhere along the line ($p=0.89$). The educational level of the patient was found to affect the total knowledge and practice score. Literate patients were found to have a statistically higher KP score compared to illiterate patients (14.5 versus 11.0, respectively, $p=0.01$). The comparisons of the median KP score among different subgroups are presented in Table 2.

Table 2: Comparison of awareness and practice among different subgroups

Groups	Median scores at baseline	p value
Gender*		0.18
Male	14.5	
Female	12.5	
Age groups**		0.60
31–40	14	
41–50	14	
51–60	14.5	
61–70	12	
71–80	12	
≥80	12	
Education status*		0.01
Literate	14.5	
Illiterate	11.00	
Duration of hypertension*		0.89
≤ 5 years	13	
> 5 years	14	

*Results are on the basis of Mann Whitney test. ** Results are on the basis of Kruskal Wallis test as there are more than two categories.

Outcomes of the intervention: knowledge and practice scores and blood pressure

Outcomes of the intervention were measured in terms of the change in knowledge and lifestyle practices with regard to hypertension management. Scores of knowledge and practice were compared before and after the intervention. Also, changes in blood pressure (BP) were noted after nine months of the intervention. The median (IQR) knowledge score of the patients changed from 6 (4) before the intervention to 13 (0.00) after the intervention ($p<0.01$). Similarly, the median (IQR) practice score changed from 7 (4) before the intervention to 16 (2) after the intervention ($p<0.01$). Thus, the total median (IQR) of the Knowledge-Practice (KP) score had changed from 13 (7) before the intervention, to 29 (2) after the intervention ($p<0.01$). Furthermore, the mean (SD) systolic BP changed from 150.1 (7.8) to 137.7 (9.9) after the intervention ($p<0.01$). A similar change was noted on mean (SD) diastolic BP as well, which changed from 104 (9.5) before the intervention to 94.5 (7.8) after the intervention ($p<0.01$). Comparisons of the KP scores and blood pressure before and after the intervention are shown in Table 3.

Table 3: Knowledge, practice scores, and blood pressure before and after the intervention

Characteristic	Median score (Interquartile range)	p value
*Knowledge		
Before intervention	6 (4)	< 0.01
After intervention	13 (0)	
*Practice		
Before intervention	7 (4)	< 0.01
After intervention	16 (2)	
*Total Knowledge-Practice (KP) score		
Before intervention	13 (7)	< 0.01
After intervention	29 (2)	
** Blood Pressure		
	Mean (SD)	P value
Systolic BP		
Before Intervention	150.1 (7.8)	< 0.01
After Intervention	137.7 (9.9)	
Diastolic BP		
Before Intervention	104 (9.4)	< 0.01
After Intervention	94.5 (7.8)	

*Results are on the basis of Wilcoxon signed rank test

** Results are on the basis of Paired sample T test

Before the intervention, patients had a poor level of knowledge about several aspects of hypertension, including its symptoms, complications, risk factors, and management. For example, patients especially did not have much knowledge about normal blood pressure, symptoms of low BP, being overweight, and alcoholism as risk factors of hypertension, and lifelong administration of the medicines. Hence, the scores of the questions related to these statements were low initially. Similarly, many patients did not know about the potential of medicine to cause hypotension. Therefore, the answer to the question, “Do antihypertensive medicines sometimes lower your BP below normal?” was “No” in many cases before the intervention. The patients’ responses towards each item concerning knowledge and practice in the questionnaire are shown in Table 4.

Table 4: Response of the patients towards the Knowledge questions

Questions: Knowledge about	Number (Percentage) of correct answers	
	Before Intervention	After Intervention
Normal BP reading	26 (52)	50 (100)
Condition of high BP	22 (44)	50 (100)
Complications	29 (58)	49 (98)
Hereditary transmission	20 (40)	50 (100)
Salt intake as a risk factor	47 (94)	50 (100)
Alcohol as a risk factor	26 (52)	50 (100)
Being overweight as a risk factor	26 (52)	49 (98)
Symptoms of high BP	7 (4)	48 (96)
Symptoms of low BP	19 (38)	47 (94)
Management of high BP	24 (48)	50 (100)
Medicines administration for lifelong	20 (40)	49 (98)
Potential of medicine to cause hypotension	(48)	50(100)
Importance of regular BP measurement	(40)	50 (100)

Most patients were aware of the role of salt intake in the management of hypertension, but their practice regarding it was poor. Additionally, their medication compliance was poor, as was the habit of doing physical exercise. The answer to the question, “How often you do physical exercise?”, and “How often do you avoid fatty food intake?” was “Never” in most cases. However, overall knowledge and practice significantly improved after the intervention, as revealed by the change in knowledge and practice scores shown in Table 5.

To control for the educational level, as there was a statistically significant difference between the literate and illiterate patients in terms of KP score before the intervention, a comparison between these two subgroups after the intervention was conducted. However, as shown in Table 6, there were no statistically significant differences between these two subgroups in terms of their knowledge, practice, and blood pressure control.



Table 5: Response of the patients towards the practice questions

Questions related to the practice	Response	
	Before Intervention	After Intervention
Periodic BP measurement		
Never	02 (4)	0 (0)
Occasional	34 (68)	04 (8)
Frequent	14 (28)	49(92)
Salt intake moderation		
Never	15 (30)	0 (0)
Occasional	26 (52)	01 (2)
Frequent	9(18)	49 (98)
Avoiding fatty foods consumption		
Never	36 (72)	0 (0)
Occasional	12 (24)	09 (18)
Frequent	02(4)	41(82)
Alcohol intake moderation		
Never	17 (34)	0 (0)
Occasional	02 (4)	16 (32)
Frequent	31(62)	34(68)
Physical exercise		
Never	35 (70)	01 (2)
Occasional	13 (26)	33 (66)
Frequent	02 (4)	16 (32)
Body weight measurement		
Never	29 (58)	0 (0)
Occasional	20 (40)	20 (40)
Frequent	01(2)	30 (60)
Smoking habit		
Never	25 (50)	0 (0)
Occasional	07 (14)	09 (18)
Frequent	18 (36)	41 (82)
Medicine missing habit		
Never	08 (16)	50 (100)
Occasional	38 (76)	0 (0)
Frequent	04 (8)	0 (0)
Consultation with healthcare provider		
Never	16 (32)	0(0)
Occasional	34 (68)	16(32)
Frequent	0 (0)	34(68)

Table 6: Comparison between the illiterate and literate patients before and after the intervention

Characteristic	Median score (Interquartile range)		p value
	Illiterate	literate	
*Knowledge			
Before intervention	5 (2.25)	7 (3.5)	0.002
After intervention	13 (0.25)	13 (0)	0.52
*Practice			
Before intervention	6 (4.45)	7 (3)	0.18
After intervention	15.5 (3)	16 (2)	0.49
*Total Knowledge-Practice (KP) score			
Before intervention	11 (7)	14.5 (6.75)	0.01
After intervention	28.5 (3.25)	29 (2)	0.41
** Blood Pressure			
	Mean (SD)		P value
Systolic BP			
Before Intervention	152.86 (6.9)	149.03 (7.9)	0.1
After Intervention	140 (6.2)	136.81 (10.9)	0.3
Diastolic BP			
Before Intervention	104.3 (9.4)	103.9 (9.6)	0.89
After Intervention	93.9 (7.8)	94.7 (7.8)	0.75

* Results are on the basis of Mann Whitney t-test

** Results are on the basis of Independent sample t-test

Discussion

The improvement regarding knowledge and lifestyle practices, along with the reduction in blood pressure, clearly demonstrated the impact of community pharmacy-based intervention. In contrast to the situation in Nepal where patients had inadequate knowledge of hypertension, studies conducted in other countries^{17,18} showed that the patients had adequate knowledge about the condition of the disease. However, the situation in Nepal is similar to other countries such as Nigeria and Pakistan, where the knowledge level of the patients was reported to be low.^{8,9}

Most patients were aware of the role of moderating salt intake in hypertension management. In fact, the studies conducted in Western Nepal reflected the active care-seeking behaviour of patients, with a significant proportion actively involved in self-medication practices.



This could be the possible reason for the patients' awareness of moderating salt intake for controlling hypertension.^{19,20} Nevertheless, their practice regarding it was poor. This is because patients lack adequate knowledge on how to moderate or reduce their salt intake and how to follow a healthy dietary plan (e.g. they were not aware of some food items that contain high amounts of salt). However, the intensive community pharmacy-based intervention was effective in improving the patient practice of salt intake moderation along with other lifestyle changes. A comparison of knowledge and practice scores among different subgroups revealed no significant relationships. However, the educational status of the patients was found to affect awareness and practice. Literate patients had significantly higher scores compared to illiterate patients. This emphasises the need to consider the educational status of the patients for their treatment strategy.

The management of chronic diseases including hypertension is strongly linked to lifestyle modifications. The behavioural changes are of prime importance and include several non-pharmacological approaches such as dietary adjustment, physical exercise, and self-monitoring of blood pressure. The present study clearly revealed that the ability of the patients to comply with the disease management guidelines depends upon how well the patients are educated and informed about disease management. This finding is supported by several epidemiological studies^{21,22} that estimated the effectiveness of planned health education strategies in achieving good control of hypertension. The role of pharmacist involvement in a chronic disease care programme, including one for hypertension, is clearly demonstrated in developed countries.^{23,24} However, in a developing country like Nepal, the pharmacist-led chronic disease management programme is in its infancy. In this scenario, the present study demonstrated the effectiveness of pharmacist-led hypertension care programmes in a community setting. In Nepal, community pharmacies serve both rural and urban populations, and are generally the first institutional contact point for patients.¹⁶ Nepalese community pharmacists can reduce pressure on the healthcare system and help manage chronic diseases by providing access to regular medicines, education, and lifestyle-based information to patients, and by acting as a referral point between the patient and doctor. Hence, a pharmacist-led chronic disease care programme in the community can improve the knowledge and practice of disease management. Furthermore, in chronic disease management, it is vital to allocate sufficient time for patient education to help the patients achieve optimum therapeutic outcomes. This is possible via the pharmacist participation in the disease management programme as evidenced by the present study.

In this study, the socio-demographic characteristics of participants were similar to the national data.²⁵ In this study, there were more female patients than male patients. In Nepal, the prevalence of the non-communicable diseases including cardiovascular disease is higher among females according to a survey conducted by the Nepal Health Research Council in 2010.²⁵ Furthermore; those aged 61–70 years were greater in number. This also correlates with the fact that increasing age contributes to an increase in blood pressure in most cases. In the same study by the Nepal Health Research Council,²⁵ the overall prevalence of non-communicable diseases including cardiovascular disease was high among those aged 65–70 years, which is similar to the findings in our study.

Strengths and Limitations

A strength of this study is that the patient's follow-up period was for a relatively long period of time (i.e. nine months). This study provides evidence that supports the effectiveness of the pharmacist's role in managing chronic diseases in general and hypertension in particular. However, the limitations of this study are that it was a single cohort study, no control was done, and the sample size was relatively low. The study was, however, able to provide preliminary findings and a larger controlled trial is warranted to further explore the variables assessed during this trial.

Conclusion

A simple, educational intervention by community pharmacists improved patients' disease knowledge, practice, and management of hypertension. Therefore, Nepalese community pharmacists need to be encouraged to be involved in the management of chronic diseases such as hypertension. This in turn could help reduce pressure on the healthcare system, manage chronic diseases by providing access to regular medicines, improving healthcare education, and providing lifestyle-based information to those individuals suffering hypertension in Nepal.

References

1. Yach D, Hawkes C, Gould CL, Hofman KJ. The global burden of chronic diseases: overcoming impediments to prevention and control. *JAMA* 2004;291(21):2616–22.
2. World Health Organization. Causes of death 2008: data sources and method. 2011. [cited 2014 July 7]. Available from:



- www.who.int/healthinfo/global.../cod_2008_sources_methods.pdf
- World Health Organization. A global brief on hypertension: silent killer, global public health crisis. 2013. [cited 2014 July 20]. Available from: http://apps.who.int/iris/bitstream/10665/79059/1/WHO_DCO_WHD_2013.2_eng.pdf?ua=1
 - Dhitali, SM, Karkiii A. Dealing with the burden of hypertension in Nepal: current status, challenges and health system issues. *Regional Health Forum* 2013;17(1):44–52.
 - Ogah OS, Okpechi I, Chukwuonye II, Akinyemi JO, Onwubere BJ, Falase AO, Stewart S, Sliwa K. Blood pressure, prevalence of hypertension and hypertension related complications in Nigerian Africans: A review. *World J Cardiol* 2012;4(12):327–40.
 - Ike SO. Prevalence of hypertension and its complications among medical admissions at the University of Nigeria Teaching Hospital, Enugu (Study 2). *Niger J Med* 2009;18(1):68–72.
 - Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2013;380(9859):2224–60.
 - Olayemiand SO, Mabadeje AFB, The impact of educational intervention on the blood pressure control of elderly Nigerian hypertensives. *Nig J Health and Biomed Sciences* 2003;2(2):65–7.
 - Jafar TH, Islam M, Hatcher J, Hashmi S, Bux R, Khan A, Poulter, N, Badruddin S, Chaturvedi N; Hypertension Research Group. Community based lifestyle intervention for blood pressure reduction in children and young adults in developing country: cluster randomised controlled trial. *BMJ* 2010;340:c2641.
 - Shahina PT, Revikumar KG, Krishnan R, Jaleel VA, Shini VK. The impact of pharmacist interventions on quality of life in patients with hypertension. *Int J Pharm Sci Rev Res*, 2010;5(3):Article no. 31.
 - Sushmita S, Aarati K, Bharat P, Roshani S, Sunil S, Kalpana P, Kumar UD. Knowledge, attitude and practice outcomes: an effect of pharmacist provided counseling in hypertensive patients in a tertiary care teaching hospital in Western Nepal. *Int J Ph Sci* 2010;2(2):583–7.
 - Fikri-Benbrahim N, Faus MJ, Martínez-Martínez F, Sabater-Hernández D. Impact of a community pharmacists' hypertension-care service on medication adherence. The AFenPA study. *Res Social Adm Pharm* 2013;9(6):797–805.
 - Chabot I, Moisan J, Grégoire JP, Milot A. Pharmacist intervention program for control of hypertension. *Ann Pharmacother* 2003;37(9):1186–93.
 - Blenkinsopp A, Phelan M, Bourne J, Dakhil N. Extended adherence support by community pharmacists for patients with hypertension: a randomised controlled trial. *Int J Pharm Pract* 2000;8(3):165–75.
 - Sharma J. Chronic disease management in the South-East Asia Region: a need to do more. *WHO South-East Asia J Public Health* 2013;2(2):79–82.
 - KC B, Alrasheedy AA, Ibrahim MIM. Do community pharmacists in Nepal have a role in adverse drug reaction reporting systems? *Australas Med J* 2013;6(2):100–3.
 - Oliveria SA, Chen RS, McCarthy BD, Davis CC, Hill MN. Hypertension knowledge, awareness, and attitudes in a hypertensive population. *J Gen Intern Med* 2005;20(3):219–25.
 - Sabouhi F, Babae S, Naji H, Zade AH. Knowledge, awareness, attitudes and practice about hypertension in hypertensive patients referring to public health care centers in Khor & Biabanak 2009. *Iran J Nurs Midwifery Res* 2011;16(1):35–41.
 - Shankar PR, Mishra P, Partha P. Self-medication and non-doctor prescription practices in Pokhara valley, Western Nepal: a questionnaire based study. *BMC Family Practice* 2002;3:17.
 - Shankar PR, Kumar P, Theodore AM, Shenoy N, Partha P. Drug use patterns in Western Nepal. *Singapore Medical Journal* 2003;44:352–56.
 - Levine DM, Green LW, Deeds SG, Chwalow J, Russell RP, Finlay J. Health education for hypertensive patients. *JAMA* 1979;241(16):1700–03.
 - Iso H, Shimamoto T, Yokota K, Sankai T, Jacobs DR Jr, Komachi Y. Community-based education classes for hypertension control. A 1.5-year randomized controlled trial. *Hypertension* 1996;27(4):968–74.
 - Hawkins DW, Fiedler FP, Douglas HL, Eschbach RC. Evaluation of a clinical pharmacist in caring for hypertensive and diabetic patients. *Am J Hosp Pharm* 1979;36(10):1321–25.
 - Schilling KW. Pharmacy program for monitoring diabetic patients. *Am J Hosp Pharm*. 1977;34(11):1242–45.
 - Nepal Health Research Council (NHRC). Prevalence of non-communicable disease in Nepal: Hospital based study. 2010. [cited 2014 July 7]. Available from: <http://nhrc.org.np/files/download/3eedf5bb43e8841>



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PEER REVIEW

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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ETHICS COMMITTEE APPROVAL

Sankalpa Foundation research and extension committee has provided approval to undertake this research on June 2012.



Appendix

Questionnaire used in the study of patient knowledge and practice towards hypertension

1. Do you know about the normal BP reading? Yes No
2. Do you know what high blood pressure is? Yes No
3. Do you know what complications can arise if blood pressure is not controlled? Yes No
4. Is high blood pressure hereditary? Yes No
5. Is excessive salt intake one of the risk factors for developing high blood pressure? Yes No
6. Is excessive alcohol intake one of the risk factors for developing high blood pressure? Yes No
7. Is being overweight one of the risk factors for developing high blood pressure? Yes No
8. Do you know about the symptoms of high blood pressure? Yes No
9. Do you know about the symptoms of low blood pressure? Yes No
10. Do you know about how high blood pressure is managed? Yes No
11. Do you have to take antihypertensive medicines for lifelong? Yes No
12. Do antihypertensive medicines sometimes lower your BP below normal? Yes No
13. Is regular BP measurement necessary for high blood pressure patients? Yes No
14. How often you measure your BP?
 - Never
 - Occasional
 - Frequent
15. How often you moderate your salt intake?
 - Never
 - Occasional
 - Frequent
16. How often you avoid fatty foods consumption?
 - Never
 - Occasional
 - Frequent
17. How often you consume alcohol?
 - Never
 - Occasional
 - Frequent
18. How often you perform physical exercise?
 - Never
 - Occasional
 - Frequent
19. How often you check your body weight?
 - Never
 - Occasional
 - Frequent
20. How often do you smoke?
 - Never
 - Occasional
 - Frequent
21. How often do you miss the dose of your medicine?
 - Never
 - Occasional
 - Frequent
22. How often do you consult your healthcare provider?
 - Never
 - Occasional
 - Frequent