



M.Sc. in Rehabilitation Science



Bangladesh Health Professions Institute (BHPI)

**Faculty of Medicine
UNIVERSITY OF DHAKA**

**EFFECTIVENESS OF HEALTH EDUCATION ON MEDICATION
ADHERENCE AND FACTORS ASSOCIATED WITH MEDICATION
ADHERENCE AMONG HYPERTENSIVE PATIENTS ATTENDING MEDICAL
CLINIC OF A TERTIARY LEVEL HOSPITAL OF WESTERN NEPAL**

By

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Submitted in Partial Fulfillment of the Requirements for the Degree of

M.Sc. in Rehabilitation Science

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Bangladesh Health Professions Institute (BHPI)

Faculty of Medicine

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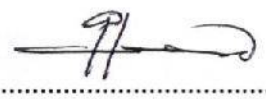
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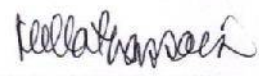


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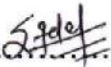
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DECLARATION

- This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.
- This dissertation is being submitted in partial fulfillment of the requirements for the degree of M.Sc. in Rehabilitation Science.
- This dissertation is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references. A Bibliography is appended.
- I confirm that if anything identified in my work that I have done plagiarism or any form of cheating that will directly awarded me fail and I am subject to disciplinary actions of authority.
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LIST OF ABBREVIATIONS AND ACRONYMS

ACD	:	Acute Cardiovascular Disease
ASHP	:	American Society of Health System Pharmacists
BHPI	:	Bangladesh Health Professions Institute
BP	:	Blood Pressure
CI	:	Confidence Interval
C-MLSHP	:	Chinese Medication Literacy Scale for Hypertensive Patients
HPLP	:	Health-Promoting Lifestyle Profile
HTN	:	Hypertension
ICF	:	International Classification of Functioning
LMR	:	Linear Multiple Regression
LPH	:	Lumbini Provincial Hospital
MASES	:	Medication Adherence Self Efficacy Scale
MMAS	:	Modified Morisky Medication Adherence Scale
NCDs	:	Non Communicable Diseases
NEHI	:	The New England Health Care Institute
OPD	:	Out-Patient Department
SPSS	:	Statistical Package for Social Science
WHO	:	World Health Organization

ABSTRACT

Background: Being highest in morbidity and mortality rates hypertension is an overwhelming challenge worldwide. Compliance to medication therapy is often overlooked aspect of patient care with chronic illness which should be evaluated as a integral part of management. Health education is vital to increasing level of medication adherence and preventing poor adherence to anti hypertensive therapy which is usually associated with bad outcome of the disease and wastage of limited health care resources. **Objectives:** The study aimed to determine effectiveness of health education on medication adherence among hypertensive patients attending medical clinic of tertiary level hospital of western Nepal and factors associated with medication adherence. **Methods:** A pre-test post-test only study design was conducted in Lumbini Provincial Hospital. A total of 110 samples were taken through hospital random sampling method. Two educational session of 15 days interval was given. Validated (Modified Morisky Medication Adherence Scale MMAS-8) and self structured questionnaire for other socio demographic variables was used to collect data. **Results:** Regarding medication adherence, in the low adherence group the number change from 35(31.8%) to 11(10.0%) to 2 persons (1.8%) from pre-test to post-test1 to post-test2 respectively. In the high adherence group the number change from 49(44.5%) to 61(55.5%) to 77(70.0%) respectively. Most persons change from low to moderate and from moderate to high adherent. While comparing the score in three measurements, mean difference from pre-test to post-test1 was 0.77 and from post-test1 to post-test2 was 0.49. Both differences are statistically significant ($p < 0.001$). Medication adherence is associated with socio-demographic variables like age, level of education and area of residence. Physician counseling on medications and complication of hypertension, financial support for drugs and present blood pressure status. **Conclusion:** Clinical based health education intervention increase level of medication adherence among hypertensive patients. The most prominent change in medication adherence score is after the first health education session, but it improves further after the second health education session.

Keywords: *Hypertension, Intervention, Health education, Medication adherence, Modified Morisky Medication Adherence Scale.*

1.1 Background

Hypertension is a term used to define increased blood pressure where systolic blood pressure is ≥ 140 mmHg and diastolic blood pressure is ≤ 90 mmHg, which if remained uncontrolled leads to increased risk of cardiovascular events (World Health Organization, 2013).

In general population, those who are < 60years of age goal BP should be <140/90mm of hg whereas in 60years or older people goal BP should be <150/90 mm of Hg (Mahajan, 2014). Patient with 80years and up systolic up to 150 is acceptable.

Hypertension related heart disease ranks in 10th place among the top 10 leading cause of death globally, approximately 1.1 million death occurred worldwide in 2012 due to hypertensive disease (Hema & Padmalata, 2014).

An individual over the age of 55 has a lifetime likelihood of 90% being the victim of HTN (Hernandez-Vila, 2015). Around 970 million individuals around the world have high blood pressure. It is projected that 1.56 billion adolescents will live with HTN by 2025. The general incidence is comparable, but varies with age, between males and females. Increased blood pressure is more prevalent in males than females for those younger than 45 years, but contrary to it, high blood pressure impacts females more than the males who are above 65 years (Bell, Twiggs & Olin, 2015).

The report by "The Nepal Demographic and Health Survey", 2016 says that, prevalence of hypertension to be 15% in females and 23% in males among aged 15 years and above (Ministry of Health, Nepal; New ERA; and ICF, 2017) and overall prevalence in both sexes rule out to be 25.5% in recent step survey (Nepal Health Research Council, 2019).

Studies depicts the relationship between medication adherence and increased risk of acute cardiovascular disease (ACD), those who are non-adherent to drugs are likely to suffer from ACD up to 1.4 to 1.8 times more than those who are adherent to prescribed medication (Yang et al., 2016).

According to World Health Organization, in low- and middle-income countries mortality due to high blood pressure and related cardiovascular problem is more than 80% which is more common in people with low socio-economic status (Hareri& Abebe, 2013).

An approximately 41 million fatalities from non-communicable illnesses happened in 2016, representing 71% of the total 57 million fatalities. Most of these fatalities were triggered by the four major NCDs: cardiac illness (17.9 million fatalities, 44% of all NCD fatalities); cancer (9.0 million fatalities, 22%); acute pulmonary illness (3.8 million fatalities, 9%) and diabetes (1.6 million fatalities, 4%) among which cardiac illness ranks the first (World Health Organization, 2018).

Lower-middle-income countries are at greater risk of premature dying because of Non-Communicable Diseases (NCDs) including hypertension which is highest in the WHO South-East Asia for men and for women in the African region.

In year 2016, the possibility of men aged 30years dying due to an NCD before reaching 70years was (21.6%) and in women it was only (15.0%). This shows that men are at greater risk than women in all region and income group of premature death due to NCDs(World Health Organization, 2019).

Medication Adherence is usually defined as the level to which the patient is exactly following the medication regime as recommended or advised by their health professionals. Non-Adherence to prescribed medication is responsible for 30 to 50% of poor outcome due to failure of treatment and 10 to 25% of all health care facilities admission(National Council Medical Director Institute, 2018). Therefore, Adherence to pharmacological regimen for any chronic health condition is important factor for desired clinical outcome.

A NEHI study reports that, by adhering to prescribed medication 89,000 early death can be successfully avoided.

Non-adherence to medication in hypertensive patients is directly linked to treatment failure and disuse of health resources. Although many researches on medication adherence was done adherence rate remained unchanged in past one decade (Hareri& Abebe, 2013).

Factors such as age, educational status, duration of diagnosis, monthly income, perception about the condition, regular clinical visit and regular checkup of blood pressure are possibly linked with level of medication compliance. Identifying the independent variables of poor medication adherence can be helpful in improving the adherence level in many patients with hypertension (Shaik et al., 2016).

Although many studies has stressed on efficacy of antihypertensive drugs on improving the outcome in hypertensive patients, the antihypertensive drug can only become effective in controlling blood pressure if the patient is accurately following the recommendation given by their health care provider and this will help in reducing mortality and morbidity due to hypertension. Among many barriers of medication adherence most important is patient own knowledge and attitude towards hypertension and medicine use therefore more attention should be given to the strategies which can improve patient's knowledge and understanding(Lee et al., 2013).

In the treatment of hypertension, adherence to lifestyle modification along with medication is equally important therefore there is an emergency need for patient education on adherence to lifestyle modification and to make strategies to improve their knowledge (Pan et al., 2019).

1.2 Justification of the study

In developing nations like Nepal, the medication adherence towards anti-hypertensive seems very low. A study conducted in Pokhara, Nepal revealed that 64.6% of the sample population were non-adherent and only 35.4% of them were adherent to the prescribed anti-hypertensive medication (Muhammad Khan et al., 2013).

An experimental study conducted in western Nepal shows that result of post-test has improved regarding adherence to medication than in pre-test. Forgetting to take medicines, perception which was bad regarding disease and use of medicine will be improved by appropriate health education and counseling (Khadka, Das & Basnet, 2017).

Likewise, a cross sectional study carried on Srilanka found that, although patient had good knowledge on hypertension, 40.5% of patients did not know about the status of their illness and most patients had bad adherence with treatment, causing them to forget and interrupt their regular routine (Pirasath, S., Kumanan, T., & Guruparan, 2017).

Another observational cross-sectional study conducted in Malaysia showed among 162 participants, 32.1% had uncontrolled hypertension. High adherence (29%), moderate adherence (36.4%) and low adherence (34.6%) were recorded. Several factors including gender, marital status, BMI, co-morbid disease, number of medications, financial status have attributed to hypertension (Mueke, 2015).

For Hypertensive patients Health Education can only become effective, once the patient's belief about disease and medication is explored by the physician and this belief varies unpredictably across and within the countries (Akingbemisilu, 2018)

This showed that even in developed countries, low adherence to medication was found for which various factors are found to be responsible and need of effective health education for improving adherence level.

Hence, the prevalence of hypertension as well as non-compliance to anti-hypertensive medication is quite high which can be improved through accurate health education. And, this type of study hasn't been significantly conducted in Lumbini Provincial Hospital, particularly in Nepal. So, this study can help calculate the overall efficacy of education on patients about adherence level among patient with hypertension in Nepal and various factors associated with it. This could be essential in overall decreasing the amount of non-compliance in improving measures to increase the amount of compliance and in raising the chance of attaining the required results in education. It will also contribute to find out the reason of treatment failure due to not adhering to medicines and inadequate patient information and preventing this in time.

Above all, since this is an area of interest, the study will be carried out in the proposed topic.

1.3 Research Questions

- What is the status of medication adherence among hypertensive patients?
- What are the factors linked with medication adherence and chosen variables?
- How effective is the health education to raise the level of medication compliance in patient with hypertension?

1.4 Operational Definition

Hypertension

Hypertension is a diastolic blood pressure of more than or equals to 140mmHg and diastolic blood pressure of more than or equals to 90mmHg (WHO, 2013).

Hypertensive patient

Patient who have high blood pressure and already on medication for at least one month.

Adherence/compliance

Adherence/compliance to medicine is explained as "the extent to which a person's response- taking medicines, following a diet or performing activities alterations, is consistent with the health service provider's accepted suggestions" (WHO, 2003). For the purpose of this research the word compliance and adherence are used interchangeably.

Low adherence

If respondents score <6 in Modified Morisky Medication Adherence Scale (MMAS-8)

Moderate adherence

If respondents score 6-<8 in Modified Morisky Medication Adherence Scale (MMAS-8)

High adherence

If respondents score 8 in Modified Morisky Medication Adherence Scale (MMAS-8)

Health Education

Health Education is a mixture of studying experience intended to assist individuals and groups to enhance their health by enhancing their understanding or influencing their attitude (WHO).

A randomized controlled study was conducted to view the potency of a structured educational program for patients with vital hypertension on Austria. Among 256 total patients from 13 centers were divided into two groups (Group-1, n-137) were undergone educational program immediately (Time-0) and another (Group-2, n-119) were given education after 6 months (Time-6). To see the significant difference in blood pressure (Group-1) follow up was done after 6 months and there was quite improvement in the blood pressure (systolic) in office and home as compared to (Group-2). Office BP systolic 139 (134–150) mm Hg vs. 150 (135–165) mm Hg ($P < 0.01$); diastolic 80 (76–85) mm Hg vs. 84 (75–90) mm Hg (ns); home BP systolic 133 (130–140) mm Hg vs. 142 (132–150) mm Hg ($P < 0.01$); diastolic 80 (75–85) mm Hg vs. 80 (76–89) mm Hg (ns). Similarly, after follow up was done to (Group-2) after 12 months, this remarkable deviations in BP between two groups disappeared. This study gives the compelling grounds that structured educational program is vital for medication adherence and lifestyle modification which control and maintains BP in hypertensive patient therefore there is need for educational strategies care for hypertensive patient (Perl et al., 2015).

In a developed country like the United States of America, a quantitative, cross-sectional study was conducted on knowledge about hypertension, compliance to medication, and skill of person's self-perception or belief in one's potential among 315 African-American men in New York City. Using SPSS Package, univariate and bivariate analyses were done to find out the factors related to compliance and personality-self-belief to medication. There was no significant difference in knowledge of hypertension by country of origin or nationality; $p=0.70$. Graduates of secondary school or lower level had similar knowledge regarding hypertension in comparison to at least some kind of education in college; $p=0.96$. Knowledge of hypertension by marital status did not differ; $p=0.9$ (Francois, C., 2015).

A qualitative research on factors influencing resistance to antihypertensive drug was also performed in Greece. Semi structured interactions and focus groups were assessed for details to capture the views of participants about hypertension and antihypertensive medication as well as vantage point with regard to patient and doctor and also patient and pharmacist relation. The outcome found to be prior experience with hypertension, fear of difficulties, behavioral illness governance, recognition of hypertension as a chronic illness, integration of the patient's position and a more private connection with the physician (Tsiantou V, Pantzou P, et al. 2010).

Research on factors influencing therapy adherence among hypertensive clients was performed in 3 district clinics in Tanzania, an African nation, in a total of 135 patients in the research using simple random sampling method, and corresponding statistics were gathered using structured questionnaires. Frequency distribution, bivariate analysis using chi-square and Pearson correlation to compare ratios, while the multivariate assessment was performed using Linear Multiple Regression (LMR), which showed adherence with the therapy was 56%. It showed patients of the same age and under 64 years of age (56.8%) had a high level of compliance with treatment as compared to participants of the same age or above 65 (53.2%). The research also disclosed that women were statistically more comfortable (63.2%) than men (36.8%). Married respondents (61.0%) were more comfortable than the single respondents and job holder patients were more contented than non-married respondents. The factors (perceived susceptibility, perceived profit, perceived obstacle and indications of intervention) were statistically important with the use of bivariate assessment (Pearson correlation and Chi-Square); the perceived seriousness did not indicate statistical importance. The highest predictor for hypertensive therapy was viewed with multivariate assessment (Joho, A. A. 2012).

From a total of 150 participants, the sociodemographic study conducted at Jimma University Specialized Hospital in Southwest Ethiopia showed that most of the features were in the gender classifications, woman topics had a greater proportion of 56.7% without compliance opposed to masculine topics, the same meaning was noted for 50-year old and 63.3% and 50% for academic analphabets, respectively. There were no important variations in the features of the respondents' occupation, region of residence, earnings, and status. Different variables have been evaluated to determine

the specific reasons behind the non-adherence of hypertensive drugs, most of them (120 topics) reporting side impacts of hypertensive drugs, and forgetfulness is one of the main aspects, their medicine is missing, accompanied by economic and religious beliefs (Yenesew, A., Gashi, F., & Tatiparthi, R. 2015).

Adama Referral Hospital performed an institution-based cross-sectional survey to evaluate patient adherence to antihypertensive treatment. The information was gathered using a pre-tested organized questionnaire after being converted into local language, the leave interview technique instantly after the patients got the required treatment, and the information gathered were stored and assessed using SPSS version 20. Result: Out of 96 participants, 42 (43.75%) were men and the remaining were women during the research period. 33.33% of the participants were > 64 years of age and 20.83% were employed. Larger number of participants could read and write about the instructional stage. 45.83% of participants were traditional among the survey respondents and only 3.12% were other participants. 29.16% of participants had a monthly revenue of between 100 and 800 Ethiopian birrs per month. Due to absence of cash, the majority of the participants were non-adherent. The amount of schooling was discovered to have no significant impact on understanding towards compliance. In addition, most patients > 64 years of age did not adhere to their treatment (Anuwer, R., & Seifu, M. F. 2015).

A potential cohort survey was performed at the Groups Hospitalier Paris Saint-Joseph's 12-bedded stroke center in France to assess the efficacy of the drug compliance and blood pressure control instructional program for patients with hypertension ensuing cerebrovascular accident to avoid relapse rate. After a few days of hospitalization, one to one-person meeting was given to a total of 64 clients by pharmacist and assessment was performed by administering a questionnaire before and after the instructional meeting. Patients had to recognize the right reaction and evaluate self-confidence in their responses. The outcome indicated that the right reaction level improved from 77.9% to 94.1% and the complete reliable reaction level increased from 52.9% to 80.8%. Therefore, patient education can increase understanding and thus enhance adherence to medicines and the control of blood pressure (Nasr et al., 2018).

A community based quasi experimental study was conducted from June to November 2018 in Enugu state & Nsukka cities, South-East, Nigeria among retirees to compare the effectiveness of health education intervention. Among total of 400 participants, 200 to each treatment and control group were randomly assigned where each group contained 100 males and 100 females. Treatment and control group were from Enugu & Nsukka respectively. Pretest of all participants was done before intervention (baseline). Treatment group (T-group) received health education by health professionals and control group (C-group) did not. Culturally fitting health education tool was developed based on implementation research framework, the information-motivation-behavioral skills (IMB) model given by Fisher & Fisher. Post test was done after 1 month of intervention to all participants. Paired t-test showed that hypertension knowledge significantly increased in treatment group between baseline and 1-month post intervention compared to control group ($p < 0.0001$). Health education also significantly improved medication adherence ($p = 0.000$), healthy diet ($p = 0.000$), physical activity ($p = 0.007$), temperance of substance use ($p = 0.000$) and sleep pattern and quality ($p = 0.003$) in treatment group compared to control group. This study emphasizes the importance of health education in improving medication adherence level and knowledge on hypertension and prevention of complications (Ozoemena et al., 2019).

A transverse study was done from August to December 2016 in Yuelu district of the city of Changsha in the southern part of China to find out the linkage between medication literacy and compliance to medication among patients with hypertension. Stratified clustered sampling was done with a stratified 20% sampling ratio to randomly select three tertiary hospitals, two secondary hospital and three community-based health services. A total of 420 sample was taken among which 198 were females and 222 were males hypertensive patients attending outpatient unit of selected health facilities. Chinese Medication Literacy Scale for hypertensive patients (C-MLSHP) and Chinese version of Morisky Medication Adherence Scale-8 (C-MMAS-8) was used to measure medication literacy and medication adherence status. Result showed that 63.6% were low adherent, 29.5% were moderate adherent and 7.6% were highly adherent. The Pearson correlation showed that three dimension of medication literacy: knowledge ($r = 0.284$, $P < 0.01$), attitude ($r = 0.405$, $P < 0.01$) and behavior ($r = 0.237$, $P < 0.01$) were significantly associated with medication adherence.

Binary logistic regression revealed that two dimension of medication literacy: patients with good attitude[OR 2.174 (95% CI: 1.748–2.706); P = 0.000] and good behavior[OR 1.139 (95% CI: 1.002–1.294); P = 0.046] and high yearly income[OR 1.199 (95% CI: 1.011–1.421); P = 0.037] were more likely to be adherence towards antihypertensive medication. This study conclude that medication literacy level can affect medication adherence level therefore subsequent strategies to improve educational level on medication targeted to attitude and behavior are necessary for better adherence level among hypertensive patients (Shi, Shen, Duan, Ding & Zhong, 2019).

Community based cross sectional study was conducted in Dharan Municipality of Eastern Nepal from September 2009 to February 2010 to assess the level of medication adherence and important factors associated with non-adherence. Simple random sampling was done to select the sample and medication adherence was measured by using 4 items of Morisky Medication Adherence Scale, among the total 154 hypertensive patient 56.5% were adherent to prescribed medication and by using logistic regression analysis at 95% CI, factors of non-adherence were found to be illiteracy (OR 5.34, CI=1.23-23, P=0.025), high cost of medicine (OR 5.14, CI=1.1-23.9, P=0.037), missed medication due to high cost(OR 0.143, CI=0.02-0.78, P=0.025), more than one medication per day (OR 5.33, CI=1.19-23.7, P=0.028), absence of family history of hypertension (OR 4.46, CI=1.21-16.4, P=0.024) and irregular follow up (OR 6.39, CI=1.22-33.3, P=0.028) (Bhandari et al., 2015).

An analytical-observational and transverse study was conducted from May to September 2018 in general and geriatric outpatient clinic of Mengwi I Public Health Center of Bali to rule out the relationship between medication adherence and hypertension status. Among total 55 hypertensive patients most of them were females 61.8% and 47,3% were non-adherent to prescribed medication 58.2% had an uncontrolled hypertension. The result shows that there is association between medication adherence and number of visits to health center ($p < 0.05$) is an indication that combine effort of patients with supportive health system is imperative for diagnosis, medical treatment, non-pharmacological management and healthy lifestyle prescribed by physician(Lestari &Widyadharma, 2019).

A quasi- experimental study of pre and post control was done to assess the effectiveness of a theory of planned behavior-based intervention for promoting medication adherence among rural elderly hypertensive patients in Iran. Total 109 sample was taken using multistage random sampling. Ministry of health approved educational materials was prepared for the intervention. Analysis was done using independent t-test, paired t-test and regression analysis and result showed that, medication adherence behaviors of elderly patients increased significantly after the educational session in the intervention group as compared to control group ($p < 0.001$). The study showed that educational program affects medication adherence level in the elderly rural patient having hypertension (JalaliJavaran, Sharifi, Hasani, Borhaninejad, & Iranpour, 2020).

An experimental pretest- posttest study was conducted to assess the effect of health education on medication adherence, hypertension management, healthy lifestyle behavior and BMI in a primary health care setting in central Erzincan Turkey from February to November 2006. Total 120 hypertensive patients were taken as a study sample, test group A=40, B=40 and control group=40. Health education was given using MASES- Medication Adherence self-efficacy scale and HPLP- Health-promoting lifestyle profile. Participants in Group A receive health education on medication adherence only where Group B receives combined education on medication adherence and lifestyle behavior. Both the groups A and B were given total of six-month educational session four during clinical visit and two in home visit. Results was compare using paired sample t-test and found that there was significant increase in medication adherence in test Group A and B ($p < 0.001$) and there was no significant increase in medication adherence in the control group ($p > 0.05$). The consequences of educational sessions were more in Group B who receives education on both medication adherence and lifestyle behavior than Group A, who receives education on medication adherence only (Hacihasanoglu&Gozum, 2011).

3.1 Study Objectives**3.1.1 General**

- To assess the effect of health education on level of medication adherence and its associated factors among hypertensive patients attending medical OPD of LPH.

3.1.2 Specific

1. To find out the socio-demographic information of the respondents;
2. To find out the physician related factor affecting on level of medication adherence;
3. To study the medication related factors of medication adherence;
4. To study the disease related factors of medication adherence;
5. To measure the efficacy of health education on level of medication adherence;
6. To compare the effectiveness of health education on level of medication adherence;
7. To research on relationship between medication adherence and selected variables.

3.2 Conceptual Framework

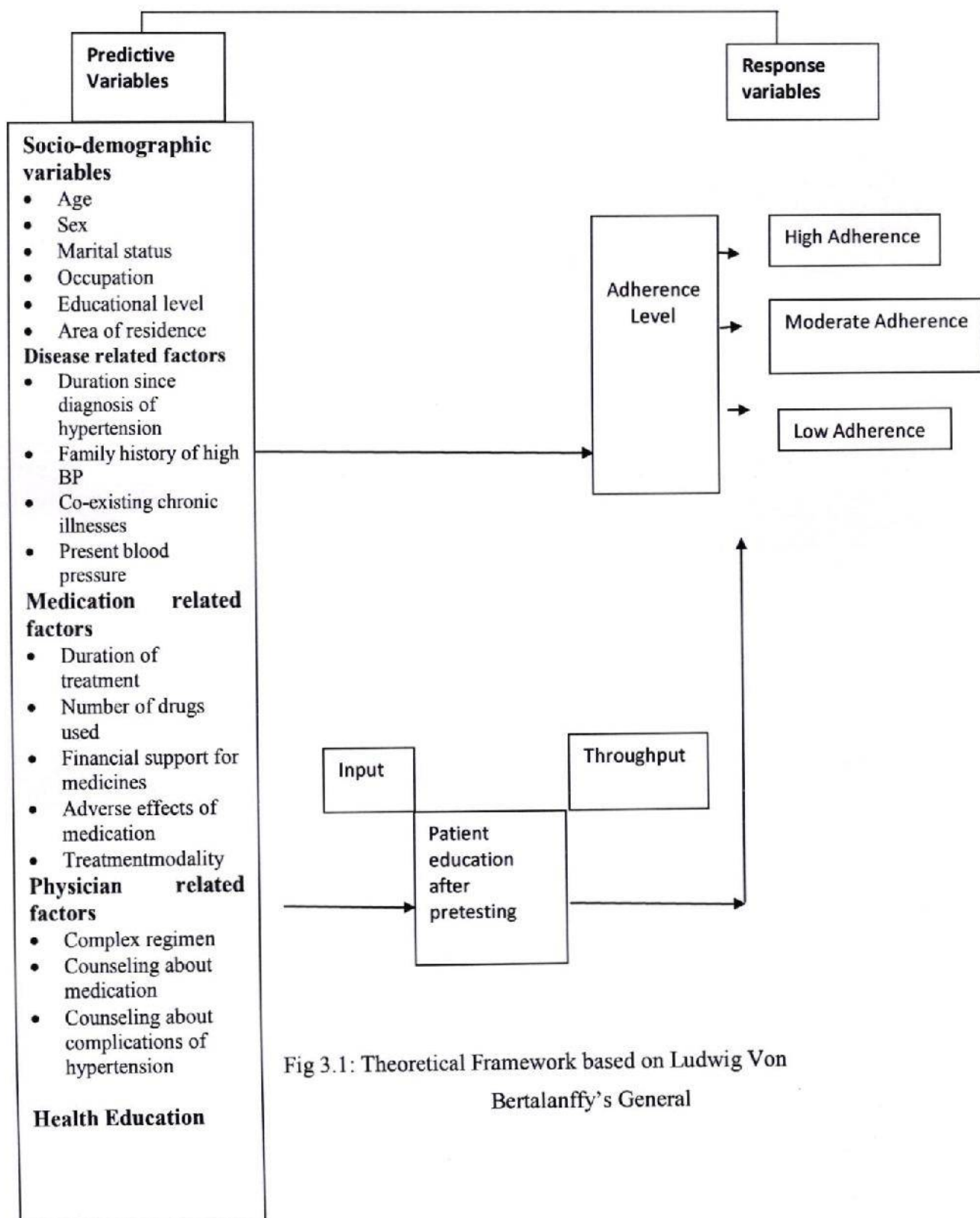


Fig 3.1: Theoretical Framework based on Ludwig Von Bertalanffy's General

3.3 Study Design

This study is pre-test post-test only design because pretesting was followed by first session of health education then after 15 days first post-test followed by second session of health education via phone call and 15 days later second post-test was done through phone call. Two session of health education was provided to the patients to compare the effectiveness of health education on level of medication adherence. Health education was given on one-to-one basis.

3.4 Study Population

In this study, hypertensive patients who are taking anti-hypertensive medication for more than one month attending medical OPD of LPH had included as study population.

3.5 Study Area/Site

The study was conducted in Lumbini Provincial Hospital (Government hospital) of Province 5, Rupandehi district of Western Nepal.

3.6 Data collection Period

Data collection was done from September 2019 to October 2019

3.7 Sample Size

During one-month period, all the patients who attended medical OPD of Lumbini Provincial Hospital and had met the inclusion criteria were taken. Total 110 samples were collected during this time.

3.8 Selection Criteria

Inclusion criteria:

1. Patient with hypertension and recommended to take anti-hypertensive medication for at least one month.
2. Those agreeing to take part in the research.
3. Patient aged >25years.

Exclusion criteria:

1. Patients who are not prescribed anti-hypertensive medications or prescribed for less than one month.
2. Patients with language or cognitive barrier.
4. Pregnant women.
5. Patient who do not consent for the study.
6. Patient aged <25years.

3.9 Sampling Technique

The Researcher had used Hospital random sampling method. The reason for selecting this method is to collect the total number of data based on developed inclusion and exclusion criteria within the proposed time period. Researcher had performed this technique because of random selection of subgroup of hypertensive patients in out-patient department of Lumbini Provincial Hospital.

3.10 Tools and Techniques for Data Collection

The Morisky Medication Adherence Scale (MMAS-8) was used to obtain information regarding compliance to medication and self-structured questionnaire for other variables was used and the tools were divided into the following section:

Section A: Socio- demographic data

This questionnaire contains total 9 items which are demographic information of respondents. It included age, sex, marital status, educational level, occupation, monthly income, ethnicity, religion and area of residence.

Section B: Aspects linked to Physician

This questionnaire consists of 3 items of physician related factors about complex regimen, physician counseling on medication and about complication of hypertension.

Section C: Aspects linked to Medication.

This questionnaire includes 6 items of medication related factors such as duration of treatment, number of drugs used, and financial support for medicines, experience of adverse effect of medicine, trust on medicine prescribed and other treatment modalities.

Section D: Aspects linked to Disease

This questionnaire includes 5 items of disease related factors which are duration since diagnosis of hypertension, family history of hypertension, coexisting chronic illness, symptoms related to hypertension and present blood pressure status.

Section E: Modified Morisky Medication Adherence Scale (MMAS-8)

The adherence level regarding medication was assessed using 8-items of Morisky Medication Adherence Scale (MMAS-8) which is a self-reported measure towards medication taking behavior.

MMAS-8 is a well validated tool developed by Morisky et al. This valid instrument has been used to assess the medication adherence in patients with chronic diseases.

The instrument consists of 8-items. For question no.1 to 7 patients have to give dichotomous response (yes/no) and it address the most common cause of missing medication. The 8th question is answered using 5 points Likert scale regarding how often patient has difficulty remembering to take medication. For items 1-7 respondents will get 1 point if they answer "NO" and 0 points for "Yes" answer except for question no.5 in which respondents will get 1 point for "Yes" response and 0 points for "No" response. In 8th question if respondents choose "never/rarely" option they will get 1 point and if they choose "all the time" then they will get 0 points and "usually", "sometimes", and "once in a while" response are rated as 0.25, 0.5 and 0.75 respectively.

Total score ranges from 0- 8. Study subjects who scores <6 said to have low/poor adherence, who scores 6-<8 are considered moderate/average adherence and those who scores 8 points are said to have high adherence.

Data collection was done in Medical OPD of LPH. Pilot study was performed on anticipated 10% patient before the actual data collection which is not included in the actual sample. At first, consent was taken from the illegible respondents. The interview technique was put-upon to gather the information using Modified Morisky Medication Adherence Scale (MMAS-8) and the questionnaire regarding the other relevant independent variables. Health education tool was developed by using ASHP Guidelines on Pharmacist-Conducted Patient Education and Counseling. A separate room was used for data collection and to maintain confidentiality of the respondent. During first one-month respondents were pretested and at the end of the interview effective health education was given to each respondent regarding Hypertension and importance of medication adherence for its management and prevention of complications and after 15 days first post-test of total respondents was done through phone call using MMAS-8 and at that time all of the respondents received another session of health education and again after 15 days second post test of all the participants was done using MMAS-8 through phone call.

3.11 Data analysis

Data collection and analysis were carried out in an iterative manner. Data collected was reviewed, coded, verified and statistically analyzed using the Statistical Package for Social Science (SPSS version 22).

Descriptive statistics were used to analyze the all studied variables and chi-square was used to assess the association between medication adherence and selected variables. Paired sample t-test was used to compare the data between pre and post test1 and between post test1 and post test2. A p value of <0.05 was considered significant throughout the study.

3.12 Quality control and assurance

Questionnaire was to assess the medication taking behavior in hypertensive patients. To ensure and improve the quality of study, first questionnaire was translated in national language that is Nepali language following the standard procedure of linguistic validation.

Forward and backward translation of the instrument was done for language clarity.

Then the pilot study had been conducted to ensure the validity of the study. Pilot study was done in 10% of anticipated sample. With the help of the survey, the unmet and necessary changes have been made and rearranged the questionnaire to make it simple, understandable and clear to the participants. The filled questionnaire was kept safely and reviewed many times before entering the data on SPSS program.

3.13 Ethical consideration

Study was conducted following the standard guidelines for ethical consideration. First, research proposal was presented and submitted to Institutional Review Board (IRB) of Bangladesh Health Professions Institution (BHPI) for the conduction of the research. The researcher obtained the written permission from the Ethical Committee of BHPI. Researcher obtained written permission from the hospital authority and permission was taken from in charge of medical OPD to start the collection of data.

Before proceeding the objective of the study was clearly explained in understandable language. All the participants were informed about their right to withdraw from the interview anytime if they are not willing to participate in the study. Then appropriate informed consent was taken from interested participants. Participants were not forced for this study. Principle of respect for human dignity and justice was maintained. Confidentiality was maintained throughout the study. They were informed that there will not be any harm to participate in this study.

Section A: Socio demographics

Table 4.1 reveals that among total 110 population, about half of respondents (51.8%) were from 30-60 age group, (47.3%) were >60 years and only 1 person (0.9%) was <30 years.

Regarding Gender, more than half (55.5%) were females and rest of the respondents (44.5%) were males.

According to Marital Status, majority (80.9%) was married, (17.3%) were widow/widower and only 2 persons (1.8%) were unmarried.

According to Ethnicity, more than half (56.4%) of respondents were Brahmin and Chhetri, less than that (29.1%) were Janajati and Dalit were only 16 persons (14.5%).

Out of 110 respondents, most of the respondents (54.5%) resided in rural area and (45.5%) in urban area.

Table 4.1 Distribution of Respondents according to Age, Gender, Marital Status, Ethnicity and Area of Residences

(n=110)

Variables	Frequency	Percentage
Age		
<30	1	.9
30-60	57	51.8
>60	52	47.3
Gender		
male	49	44.5
female	61	55.5
Marital Status		
Married	89	80.9
Unmarried	2	1.8
widow/widower	19	17.3
Ethnicity		
Dalit	16	14.5
Janajati	32	29.1
Brahmin and Chhetri	62	56.4
Residence		
Urban	50	45.5
Rural	60	54.5

Table 4.2 Shows that, majority of participants (38.2%) were illiterate, less than that (31.8%) were literate without formal education so, in total (70%) lack formal education, respondents who got primary education, secondary education, high school level and bachelor level education were (18.2%), (4.5%), (6.4%) and (0.9%) respectively. So, in total 30% got formal education.

Regarding Occupation, almost equal number of respondents were housewife (24.5%) and male not engaged in any work (25.5%), less than that (18.2%) were farmer, (11.8%) were service holder, (10.9%) were labor and only (0.9%) were retired from job.

The data regarding Monthly Income manifest that, majority of respondents had no income (52.7%), those with monthly income <10000 rupees were (24.5%), (16.4%) had income between 10000-25000 rupees which is considered to be a modal income for living and only (6.4%) earned >25000 rupees.

Table 4.2 Distribution of respondents according to Level of Education, Occupation and Monthly Income

(n=110)

Variables	Frequency	Percentage
Level of Education		
Illiterate	42	38.2
Literate without formal education	35	31.0
primary	20	18.2
secondary	5	4.5
high school level	7	6.4
bachelors	1	.9
Occupation		
housewife	27	24.5
business	9	8.2
service	13	11.8
farmer	20	18.2
labor	12	10.9
retired	1	.9
not engaged in any job	28	25.5
Monthly Income		
no income	58	52.7
<10000	27	24.5
10000-25000	18	16.4
>25000	7	6.4

Section B: Aspects linked to physician

Table 4.3 reveals that, majority of respondents (72.7%) did not feel the regimen to be complex and rest of them (27.3%) felt the regimen complex.

Regarding Physician counseling on medication, majority of respondents (72.7%) said that their physician do proper counseling on medication given and minority of the respondents (27.3%) answered that their physician do not counsel them regarding medication.

According to Physician counseling on complication of hypertension most of the respondents (70.9%) answered they do, whereas (29.1%) answered that they do not received any counseling regarding complication of hypertension.

Table 4.3 Distribution of respondents according to Physician related Factors

Variables	Frequency	Percentage
(n=110)		
Complex Regimen		
no	80	72.7
yes	30	27.3
Physician counseling on medication		
no	30	27.3
yes	80	72.7
Physician counseling on complication of hypertension		
no	32	29.1
yes	78	70.9

Section C: Aspects linked to medication

Table 4.4 depicts that, majority of respondents (62.7%) were taking antihypertensive medication for more than 3years, followed by (22.7%) for 1-3years and only (14.5%) were taking for less than 1year.

According to number of drugs per day, most of the respondents (64.5%) used to take only one tab per day, (16.4%) used to take two tab per day and (19.1%) used to take three or more than three tab per day.

Regarding financial support for drugs, majority of the respondents (49.1%) had family support for buying drugs with no financial problem, followed by (39.1%) who purchase their drugs by themselves and had no any financial problem, 7 persons (6.4%) who said their family support them to buy medicine had big financial problem whereas 6 persons (5.5%) who invest themselves in medicine had big financial problem. In total 13 persons (11.9%) had financial problem in taking their prescribed drugs.

Table 4.4 Distribution of respondents according to Medication related Factors

n=110

Variable	Frequency	Percentage
Duration of intake of medication		
<1 year	16	14.5
1-3years	25	22.7
>3years	69	62.7
Number of drugs per day		
One tab per day	71	64.5
Two tab per day	18	16.4
three or more than three tab per day	21	19.1
Financial support for drugs		
self, financially no problem	43	39.1
self, financially big problem	6	5.5
family, financially no problem	54	49.1
family, financially big problem	7	6.4

Table 4.5 shows that, more than half of respondents (54.5%) had not experienced any adverse effects of drugs and those who had experienced adverse effects of drugs were 50 persons (45.5%). Among 50 respondents who had presence of adverse effect of drugs, majority had said sedation (86%), followed by dizziness (60%), increased urination (4%) and (10%) said other adverse effects of drugs like fast heartbeat, blurred vision, and headache.

Out of 110 respondents, majority of them (86.4%) believe in excellent effect of allopathic treatment and minority 15 persons (13.6%) did not believe in allopathic treatment.

Among 110 respondents, (89.1%) did not believe in any other treatment modalities whereas only 5 persons (10.9%) believe in other treatment modality as superstitious believe.

Table 4.5 Distribution of respondents according to Medication related Factors

(n=110)

Variable	Frequency	Percentage
Presence of adverse effect of drugs		
no	60	54.5
yes	50	45.5
		n=50
If present		
Sedation	43	86
Dizziness	30	60
Increased urination	2	4
others	5	10
Believe in excellent effect of allopathic treatment		
no	15	13.6
yes	95	86.4
Believe in other treatment modalities		
no	98	89.1
yes	12	10.9

Section D: Aspects linked to disease

Table 4.6 reveals that, almost half of the respondents (50%) were diagnosed as hypertensive for less than 5years and equal number of respondents (50%) for more than 5years.

Regarding family history of hypertension, more than half of the respondents (53.6%) had family history of hypertension and (45.5%) did not have family history of hypertension whereas only (0.9%) did not know about it.

According to symptoms related to hypertension (38.2%) said it to be present whereas (61.8%) said they had no any hypertensive symptoms.

Regarding present blood pressure status, more than half of the respondents (66.4%) had controlled BP, (30.9%) did not know their blood pressure status and only 3 persons (2.7%) had uncontrolled status.

Table 4.6 Distribution of respondents according to Disease related Factors

(n=110)

Variable	Frequency	Percentage
Duration of diagnosis of hypertension		
<5years	55	50
>5years	55	50
Family history		
absent	50	45.5
present	59	53.6
don't know	1	.9
Symptoms related to hypertension		
absent	68	61.8
present	42	38.2
Present blood pressure status		
uncontrolled	3	2.7
controlled	73	66.4
don't know	34	30.9

Table 4.7 shows that among total 35 persons (35.8%) with associated co morbidities majority of respondents (57.1%) had diabetes among them (50%) had it for less than 5years and (50%) had for more than 5years followed by other coexisting illness (40%) presented with blood cholesterol, DVT, thyroid and asthma among them (57.1%) had this for less than 5years and (42.9%) had for more than 5years, and heart disease was present on (20%) of respondents, among heart disease (57.1%) had it for less than 5years and (42.9%) for more than 5years. For all co morbid illness continuation of treatment was (100%).

Table 4.7 Distribution of respondents according to presence of co-existing illness

Co-existing illness	Frequency	Percentage	Duration		Continuing treatment
			<5years	>5years	
Diabetes mellitus	20	57.1%	10(50%)	10(50%)	20(100%)
Heart disease	7	20%	4(57.1%)	3(42.9%)	7(100%)
others	14	40%	8(57.1%)	6(42.9%)	14(100%)

Figure 4.1 shows that, respondents in the low adherence group changes from 35 (31.8%) to 11 (10.0%) to 2 persons (1.8%) from pre-test to post-test1 and post-test2 respectively. This indicates that 33 persons in the low adherence group improved their level of medication adherence.

In the high adherence group the numbers change from 49 (44.5%) to 61 (55.5%) to 77 (70.0%) from pre-test to post-test1 to post-test2 respectively. This indicates that 28 more persons than at pre-test appeared to become highly adherent. Most persons change from low to moderate and from moderate to high adherence.

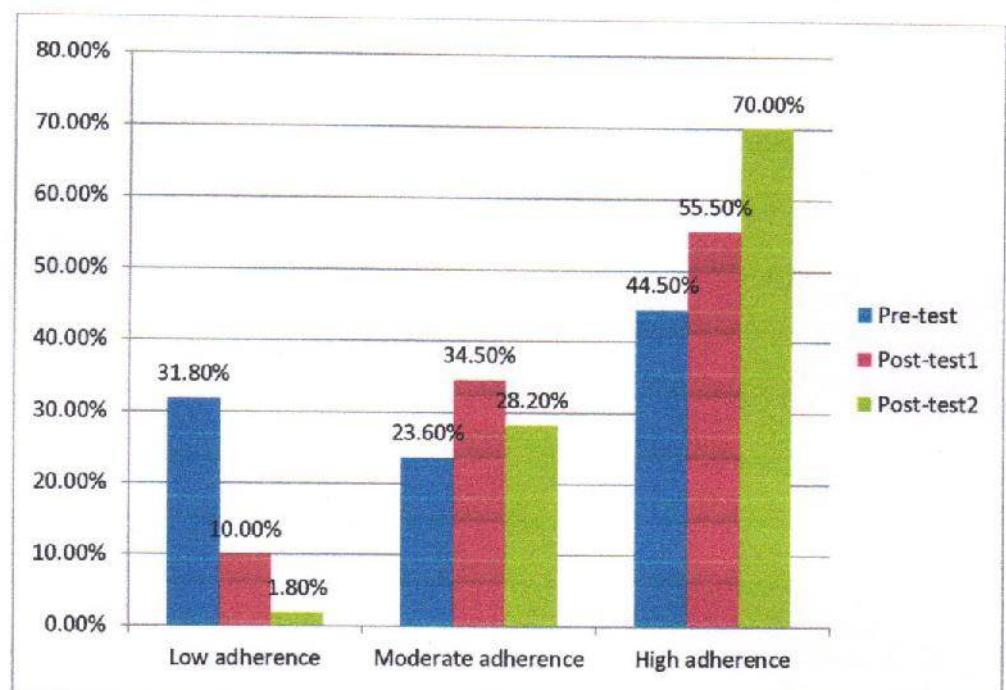


Figure 4.1: Adherence Level of respondents to Antihypertensive Medication in pre-test, post-test1 and post-test2 on the basis of MMAS-8.

Table 4.8 shows that the average medical adherence score before health education was 6.51 and the average medication adherence after first health education session was 7.29. The medication adherence score increased by 0.77 in average after first health education session and the mean difference was found to be statistically significant ($P < 0.001$). This can be concluded that the medication adherence level increases after first health education.

Table 4.8: Paired t-test between pretest and post test1

Medication Adherence	Mean	N	Std. Deviation	Mean difference	P value
Pre test	6.51	110.00	1.83	0.77	<0.001
Post test 1	7.29	110.00	1.19		

Table 4.9 shows that the average medical adherence score after first health education was 7.29 and the average medication adherence after second health education session was 7.78. The medication adherence score increased by 0.49 in average after second health education session and the mean difference was found to be statistically significant ($P < 0.001$). This can be concluded that the medication adherence level increases with frequent health education session.

From the table 4.8 and 4.9, mean difference from pre-test to post-test1 is 0.77 and from post-test1 to post-test2 is 0.49. This indicates that most prominent change in adherence score is after the first health education session, but it improves further after the second educational session.

Table 4.9: Paired t -test between first post test and second post test

Medication Adherence	Mean	N	Std. Deviation	Mean difference	P value
Post test 1	7.29	110.00	1.19		
Post test 2	7.78	110.00	0.72	0.49	<0.001

ASSOCIATION BETWEEN LEVEL OF MEDICATION ADHERENCE AND SELECTED VARIABLES

Section A: Socio-demographic variables

In Table 4.10 the association between level of medication adherence at pre test, post test 1, post test 2 and age was found by using Chi-square test. The results showed that the association between level of medication adherence and age of respondents is statistically significant in pre-test at (p value= 0.022) whereas in post-test1 (p value=0.088) and post-test2 (p value=0.246) it is statistically not significant.

In pre-test, most of those patients in the age group of 30-60 years, 33 (57.9%) are already highly adherent to prescribed drug and most of those 23 (44.2%) of >60 years were low adherent. This makes the difference significant between 30-60 years and >60 years at pre-test. After the first educational session, in post-test1 high adherent increase to 38 (66.7%) but in >60 years low adherent become less 8 (15.4%) and changed to moderate 22 (42.3%) and high adherence 22 (42.3%). This means that the effect of health education is highest in the >60 years subgroup. And thus, there is no statistical difference in mean adherence scores between age groups after the first educational session.

Table 4.10 Association between Level of Medication Adherence and Age of respondents

Time	Adherence level	Age			P- value
		<30	30-60	>60	
Pre-test n=110	Low	0 (0.0%)	12 (21.1%)	23 (44.2%)	0.022
	Moderate	0 (0.0%)	12 (21.1%)	14 (26.9%)	
	High	1 (100%)	33(57.9%)	15 (28.8%)	
	Total	1 (100%)	57 (100%)	52 (100%)	
Post-test1 n=110	Low	0 (0.0%)	3 (5.3%)	8 (15.4%)	0.088
	Moderate	0 (0.0%)	16 (28%)	22 (42.3%)	
	High	1 (100%)	38 (66.7%)	22 (42.3%)	
	Total	1 (100%)	57 (100%)	52 (100%)	
Post-test2 n=110	Low	0 (0.0%)	1 (1.8%)	1 (1.9%)	0.246
	Moderate	0 (0.0%)	11 (19.3%)	20 (38.5%)	
	High	1 (100%)	45 (78.9%)	31(59.6%)	
	Total	1 (100%)	57 (100%)	52 (100%)	

p value <0.05 was considered statistically significant

Table 4.11 shows that association between gender and level of medication adherence is not statistically significant with (p value=0.738) in pre-test, (p value=0.485) in post-test1 and (p value=0.487) in post-test2. This concluded that there is no association between gender and level of medication adherence.

Table 4.11 Association between Level of Medication Adherence and Gender of Respondents

Time	Adherence Level	Gender		p-value
		Male	Female	
Pre-test n=110	Low	16 (32.7)	19(31.1)	0.738
	Moderate	13 (26.5)	13 (21.3)	
	High	20 (40.8)	29 (47.5)	
	Total	49 (100)	61 (100)	
Post-test1 n=110	Low	5 (10.2)	6 (9.8)	0.485
	Moderate	14 (28.6)	24 (39.3)	
	High	30 (61.2)	31 (50.8)	
	Total	49 (100)	61 (100)	
Post-test2 n=110	Low	1 (2.0)	1 (1.6)	0.487
	Moderate	11 (22.4)	20 (32.8)	
	High	37 (75.5)	40 (65.6)	
	Total	49 (100)	61 (100)	

p value <0.05 was considered statistically significant

Table 4.12 reveals that association between level of education and level of medication adherence is statistically significant in pre-test at (p value=0.019), post-test1 (p value=0.028) and in post-test2 at (p value=0.032).

All tests have shown that level of medication adherence is increased with increased level of education. Most of the respondents 77 (70%) had not got any formal education and this groups stays significantly behind the person that have got some formal education although they made big changes in improvement of medication adherence.

Table 4.12 Association between Level of Medication Adherence and Level of Education of respondents

Time	Adherence level	Level of Education						p-value
		Illiterate	Literate without formal education	Primary	Secondary	High School	Bachelor	
Pre-test n=110	Low	21 (50)	10 (28.6)	4 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.019
	Moderate	12 (28.6)	7 (20)	5 (25.0)	1 (20.0)	1 (14.3)	0 (0.0)	
	High	9 (21.4)	18 (51.4)	11 (55.0)	4 (80.0)	6 (85.7)	1 (100)	
	Total	42 (100)	35 (100)	5 (100)	5 (100)	7 (100)	1 (100)	
Post-test1 n=110	Low	8 (19.0)	3 (8.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.028)
	Moderate	20 (47.6)	10 (28.6)	7 (35.0)	1 (20.0)	0 (0.0)	0 (0.0)	
	High	14 (33.3)	22 (62.9)	13 (65.0)	4 (80.0)	7 (100)	1 (100)	
	Total	42 (100)	35 (100)	20 (100)	5 (100)	7 (100)	1 (100)	
Post-test2 n=110	Low	2 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.032)
	Moderate	20 (47.6)	8 (22.9)	3 (15.0)	0 (0.0)	0 (0.0)	0 (0.0)	
	High	20 (47.6)	27 (77.1)	17 (85.0)	5 (100)	7 (100)	1 (100)	
	Total	42 (100)	35 (100)	20 (100)	5 (100)	7 (100)	1 (100)	

p value <0.05 was considered statistically significant

Table 4.13 shows that area of residence and level of medication adherence is significant with (p value=0.009) in pretest and with (p value=0.019) in post-test1 whereas it is not significant in post-test2 (p value=0.154).

The results showed that 60% people living in urban areas had high medication adherence whereas only 31.7% people of rural areas had high medication adherence. The association between area of residence and medication adherence was found to be statistically significant (P=0.009). This can be concluded that medication adherence and area of residence are significantly associated with each other.

More persons from rural areas have significantly lower and more moderate adherence than urban persons at pre-test. And although this improves after the first health education the difference with urban persons remain significant. After the second health education session more, persons in rural areas again improved, so that the difference in adherence score with urban persons was no longer significant.

Table 4.13 Association between Level of Medication Adherence and Area of Residence

Time	Adherence Level	Area of Residence		p-value
		Urban	Rural	
Pre-test n=110	Low	10 (20.0)	25 (41.7)	0.009
	Moderate	10 (20.0)	16 (26.7)	
	High	30 (60)	19 (31.7)	
	Total	50 (100)	60 (100)	
Post-test1 n=110	Low	3 (6.0)	8 (13.3)	0.019
	Moderate	12 (24.0)	26 (43.3)	
	High	35 (70.0)	26 (43.3)	
	Total	50 (100)	60 (100)	
Post-test2 n=110	Low	0 (0.0)	2 (3.3)	0.154
	Moderate	11 (22.0)	20 (33.3)	
	High	39 (78.0)	38 (63.3)	
	Total	50 (100)	60 (100)	

p value <0.05 was considered statistically significant

Section B: Physician related factors

Table 4.14 shows that the association between complex treatment regimen and level of medication adherence is highly significant at $p < 0.001$ in all pre-test, post-test1 and post-test2. Health education session have more effect on those who felt treatment regimen to be complex but they still stay significantly behind the patients who didn't felt the regimen to be complex.

Table 4.14 Association between Level of Medication Adherence and Complex Treatment Regimen

Time	Adherence level	Complex Treatment Regimen		p-value
		Yes	No	
Pre-test n=110	Low	22 (73.3)	13 (16.3)	<0.001
	Moderate	6 (20.0)	20 (25.0)	
	High	2 (6.7)	47 (58.8)	
	Total	30 (100)	80 (100)	
Post-test1 n=110	Low	9 (30.0)	2 (2.5)	<0.001
	Moderate	16 (53.3)	22 (27.5)	
	High	5 (16.7)	56 (70.0)	
	Total	30 (100)	80 (100)	
Post-test2 n=110	Low	2 (6.7)	0 (0.0)	<0.001
	Moderate	16 (53.3)	15 (18.8)	
	High	12 (40.0)	65 (81.3)	
	Total	30 (100)	80 (100)	

p value <0.05 was considered statistically significant

Table 4.15 shows that the association between physician counseling on medication and level of medication adherence is significantly associated at $p < 0.001$ in all pre-test, post-test1 and post-test2. Physicians who have counseled their patients about medication use, have better adherence at the pre-test and although the group that didn't get counseling make huge improvements in adherence scores after they have got health education sessions, they remained to stay significantly behind the group who got counseling.

Table 4.15 Association between Level of Medication Adherence and Physician Counseling on Medication

Time	Adherence Level	Physician Counseling on Medication		p-value
		Yes	No	
Pre-test n=110	Low	15 (18.8)	20 (66.7)	<0.001
	Moderate	19 (23.8)	7 (23.3)	
	High	46 (57.5)	3 (10.0)	
	Total	80 (100)	30 (100)	
Post-test1 n=110	Low	3 (3.8)	8 (26.7)	<0.001
	Moderate	23 (28.7)	15 (50.0)	
	High	54 (67.5)	7 (23.3)	
	Total	80 (100)	30 (100)	
Post-test2 n=110	Low	0 (0.0)	2 (6.7)	<0.001
	Moderate	14 (17.5)	17 (56.7)	
	High	66 (82.5)	11 (36.7)	
	Total	80 (100)	30 (100)	

p value <0.05 was considered statistically significant

The **table 4.16** shows that, physician counseling on complication of hypertension and level of medication adherence are significant with $p < 0.001$ in all tests. Those who have not counseled have made significant improvement in adherence level though they remained far behind than those who got counseling.

Table 4.16 Association between Level of Medication Adherence and Physician Counseling on Complication of Hypertension

Time	Adherence Level	Physician Counseling on Complication of Hypertension		p-value
		Yes	No	
Pre-test n=110	Low	15 (19.2)	20 (66.7)	<0.001
	Moderate	18 (23.1)	7 (23.3)	
	High	46 (57.5)	3 (10.0)	
	Total	80 (100)	30 (100)	
Post-test1 n=110	Low	3 (3.8)	8 (25.0)	<0.001
	Moderate	22 (28.2)	16 (50.0)	
	High	53 (67.9)	8 (25.0)	
	Total	78 (100)	32 (100)	
Post-test2 n=110	Low	0 (0.0)	2 (6.3)	<0.001
	Moderate	13 (16.7)	18 (56.3)	
	High	65 (83.3)	12 (37.5)	
	Total	78 (100)	32 (100)	

p value <0.05 was considered statistically significant

Section C: Medication related factors

Table 4.17 shows that, at pre-test especially within the subgroup that has to take the medicine for a very long time (>3years) already relatively more persons showed low adherence 25 persons (36.2%). That is an important factor that leads to statistical significance between subgroups. At post-test 1 and 2, so after health education in all three subgroups, the difference is not significance anymore. It is also seen that the subgroup that is taking prescribed drug since 1-3 years is doing best in terms of high adherence, in all three measurement moments.

Table 4.17 Association between Level of Medication Adherence and Duration of Intake of Medication

Time	Adherence Level	Duration of medicine intake			p-value
		<1year	1-3years	>3years	
Pre-test n=110	Low	5 (31.3)	5 (20.0)	25 (36.2)	0.032
	Moderate	8 (50.0)	6 (24.0)	12 (17.4)	
	High	3 (18.8)	14 (56.0)	32 (46.4)	
	Total	16 (100)	25 (100)	69 (100)	
Post-test1 n=110	Low	2 (12.5)	0 (0.0)	9 (13.0)	0.150
	Moderate	6 (37.5)	6 (24.0)	26 (37.7)	
	High	8 (50.0)	19 (76.0)	34 (49.3)	
	Total	16 (100)	25 (100)	69 (100)	
Post-test2 n=110	Low	1 (6.3)	0 (0.0)	1 (1.4)	0.056
	Moderate	5 (31.3)	2 (8.0)	24 (34.8)	
	High	10 (62.5)	23 (92.0)	44 (63.8)	
	Total	16 (100)	25 (100)	69 (100)	

p value <0.05 was considered statistically significant

Table 4.18 shows no statistically significant difference between subgroups, in any of the three measurement moments.

Table 4.18 Association between Level of medication Adherence and Number of Drugs taken per day

Time	Adherence Level	Number of Drugs per day			p-value
		1	2	3 or more	
Pre-test n=110	Low	22(31.0)	6 (33.3)	7 (33.3)	0.306
	Moderate	13 (18.3)	7 (38.9)	6 (28.6)	
	High	36 (50.7)	5 (27.8)	8 (38.1)	
	Total	71 (100)	18 (100)	21 (100)	
Post-test1 n=110	Low	7 (9.9)	1 (5.6)	3 (14.3)	0.718
	Moderate	22 (31.0)	8 (44.4)	8 (38.1)	
	High	42 (59.2)	9 (50.0)	10 (47.6)	
	Total	71 (100)	18 (100)	21 (100)	
Post-test2 n=110	Low	2 (2.8)	0 (0.0)	0(0.0)	0.685
	Moderate	18 (25.4)	5 (27.8)	8 (38.1)	
	High	51 (71.8)	13 (72.2)	13 (61.9)	
	Total	71 (100)	18 (100)	21 (100)	

p value <0.05 was considered statistically significant

Table 4.19 revealed that, level of medication adherence and financial support for the drugs are associated with each other in all three measurement moments. The subgroups that had financial problems with prescribed drug use were relatively small (n=13; 11.8%). However, they showed significantly lower adherence, although adherence improved also in these subgroups after health education.

Table 4.19 Association between Level of Medication Adherence and Financial Support for Drugs

Time	Adherence Level	Financial support for medicine				p-value
		Self, financially no problem	Self, financially big problem	Family, financially no problem	Family, financially big problem	
Pre-test n=110	Low	9 (20.9)	5 (83.3)	16 (29.6)	5 (71.4)	0.009
	Moderate	9 (20.9)	1 (16.7)	15 (27.8)	1 (14.3)	
	High	25 (58.1)	0 (0.0)	23 (42.6)	1 (14.3)	
	Total	43 (100)	6 (100)	54 (100)	7 (100)	
Post-test1 n=110	Low	2 (4.7)	2 (33.3)	6 (11.1)	1 (14.3)	0.016
	Moderate	10 (23.3)	3 (50.0)	20 (37.0)	5 (71.4)	
	High	31 (72.1)	1 (16.7)	28 (51.9)	1 (14.3)	
	Total	43 (100)	6 (100)	54 (100)	7 (100)	
Post-test2 n=110	Low	0 (0.0)	1 (16.7)	1 (1.9)	0 (0.0)	0.047
	Moderate	9 (20.9)	2 (33.3)	16 (29.6)	4 (57.1)	
	High	34 (79.1)	3 (50.0)	37 (68.5)	3 (42.9)	
	Total	43 (100)	6 (100)	54 (100)	7 (100)	

p value <0.05 was considered statistically significant.

Table 4.20 shows that, the subgroup that didn't believe in excellent treatment effects is relatively small. No statistically significant differences between subgroups were found.

Table 4.20 Association between Level of Medication Adherence and Believe in Excellent effect of Allopathic Treatment

Time	Adherence Level	Believe in Allopathic Treatment		p-value
		Yes	No	
Pre-test n=110	Low	29 (30.5)	6 (40.0)	0.559
	Moderate	24 (25.3)	2 (13.3)	
	High	42 (44.2)	7 (46.7)	
	Total	95 (100)	15 (100)	
Post-test1 n=110	Low	8 (8.4)	3 (20.0)	0.239
	Moderate	35 (36.8)	3 (20.0)	
	High	52 (54.7)	9 (60.0)	
	Total	95 (100)	15 (100)	
Post-test2 n=110	Low	1 (1.1)	1 (6.7)	0.319
	Moderate	27 (28.4)	4 (26.7)	
	High	67 (70.7)	10 (66.7)	
	Total	95 (100)	15 (100)	

p value <0.05 was considered statistically significant

Section D: Disease Related Factors

The table 4.21 depicts that, in pre-test there is significant difference between subgroups. Especially subgroup >5 years after diagnosis had relatively low adherence and there was statistically significant difference between the subgroups. At post-test 1 and 2 this significant difference disappeared.

Table 4.21 Association between Level of Medication Adherence and Duration of Diagnosis of Hypertension

Time	Adherence Level	Duration since diagnosis of hypertension		p-value
		<5years	>5years	
Pre-test n=110	Low	12 (21.8)	23 (41.8)	0.026
	Moderate	18 (32.7)	8 (14.5)	
	High	25 (45.5)	24 (43.6)	
	Total	55 (100)	55 (100)	
Post-test1 n=110	Low	2 (3.6)	9 (16.4)	0.053
	Moderate	18 (32.7)	20 (36.4)	
	High	35 (63.6)	26 (47.3)	
	Total	55 (100)	55 (100)	
Post-test2 n=110	Low	1 (1.8)	1 (1.8)	0.160
	Moderate	11 (20.0)	20 (36.4)	
	High	43 (78.2)	34(61.8)	
	Total	55 (100)	55 (100)	

p value <0.05 was considered statistically significant

The **table 4.22** revealed that, no significant difference found between level of medication adherence and family history of hypertension.

Table 4.22 Association between Level of Medication Adherence and Family History of Hypertension

Time	Adherence Level	Family History of Hypertension			p-value
		Absent	Present	Don't know	
Pre-test n=110	Low	16 (32.0)	18 (30.5)	1 (100)	0.566
	Moderate	10 (20.0)	16 (27.1)	0 (0.0)	
	High	24 (48.0)	25 (42.4)	0 (0.0)	
	Total	50 (100)	59 (100)	1 (100)	
Post-test1 n=110	Low	5 (10.0)	6 (10.2)	30 (0.0)	0.719
	Moderate	18 (36.0)	19 (32.2)	1 (100)	
	High	27 (54.0)	34 (57.6)	0 (0.0)	
	Total	50 (100)	59 (100)	1 (100)	
Post-test2 n=110	Low	1 (2.0)	1 (1.7)	0 (0.0)	0.534
	Moderate	12 (24.0)	18 (30.5)	1 (100)	
	High	37 (74.0)	40 (67.8)	0 (0.0)	
	Total	50 (100)	59 (100)	1 (100)	

p value <0.05 was considered statistically significant

The table 4.23 shows no significant difference between level of medication adherence and co-existing illness.

Table 4.23 Association between Level of Medication Adherence and Presence of Co-existing Illness

Time	Adherence Level	Presence of Co-existing illness		p-value
		Yes	No	
Pre-test n=110	Low	13 (37.1)	22 (29.3)	0.153
	Moderate	11 (31.4)	15 (20.0)	
	High	11 (31.4)	38 (50.7)	
	Total	35 (100)	75 (100)	
Post-test1 n=110	Low	3 (8.6)	8 (10.7)	0.106
	Moderate	17 (48.6)	21 (28.0)	
	High	15 (42.9)	46 (61.3)	
	Total	35 (100)	75 (100)	
Post-test2 n=110	Low	0 (0.0)	2 (2.7)	0.250
	Moderate	13 (37.1)	18 (24.0)	
	High	22 (62.9)	55 (73.3)	
	Total	35 (100)	75 (100)	

p value <0.05 was considered statistically significant

The **table 4.24** shows that, the subgroup with uncontrolled BP status was relatively small 3 persons (2.7%). Statistically significant difference seen on all three test occasions. Especially the subgroup with controlled BP status performed best, on all 3 test occasions-46 persons (63.0%), 54 persons (74.0%) and 60 persons (82.2%) were highly adherent in pre-test, p1 and p2 respectively.

Table 4.24 Association between Level of Medication Adherence and Present Blood Pressure Status

Time	Adherence Level	Present Blood Pressure Status			p-value
		Uncontrolled	Controlled	Don't know	
Pre-test n=110	Low	1 (33.3)	13 (17.8)	21(61.8)	0.000
	Moderate	1 (33.3)	14 (19.2)	11 (32.4)	
	High	1 (33.3)	46 (63.0)	2 (5.9)	
	Total	3 (100)	73 (100)	34 (100)	
Post-test1 n=110	Low	0 (0.0)	4 (5.5)	7 (20.6)	0.000
	Moderate	2 (66.7)	15 (20.5)	21 (61.8)	
	High	1 (33.3)	54 (74.0)	6 (17.6)	
	Total	3 (100)	73 (100)	34 (100)	
Post-test2 n=110	Low	0 (0.0)	0 (0.0)	2(5.9)	0.001
	Moderate	1 (33.3)	13 (17.8)	17 (50.0)	
	High	2 (66.7)	60 (82.2)	15 (44.1)	
	Total	3 (100)	73 (100)	34 (100)	

p value <0.05 was considered statistically significant

Adherence to medication therapy among patients with chronic illness including hypertension is the key to success of treatment and avoidance of unnecessary financial burden. The study was conducted with the purpose of assessing the consequences of educational session on medication adherence and its associated factors among hypertensive patients attending medical OPD of a tertiary level hospital of Western Nepal. The total respondents of the study were 110 with hospital random sampling. This study shows that level of medication adherence is influenced by the counseling and health education they receive from their health care provider. Findings of this study also suggests that there are several associated factors of medication adherence according to which health education session can be planned for patients in future.

We have gathered in the period of one month, data from 110 patients who were treated for hypertension in medical OPD of LPH of province-5, Rupandehi district of Nepal and who participated in all measurement events.

The level of medication adherence was scored on the MMAS-8 scale, and the score were classified as being indications of low, moderate and high adherence.

We studied if there appeared changes in adherence level from pre-test to post-test1, 15 days after the first health education and to post-test2, 15 days after the second health education, and if there are factors that were related to these changes.

The study revealed that, in the low adherence group the number change from 35(31.8%) to 11(10.0%) to 2 persons (1.8%) from pre-test to post-test1 to post-test2 respectively. this indicates that 33 persons in low adherence group improved their adherence level. In the high adherence group the number change from 49(44.5%) to 61(55.5%) to 77(70.0%) respectively. This indicates that 28 more persons than at pre-test appeared to become highly adherent to medication adherence level. Most persons change from low to moderate and from moderate to high adherent which is strongly supported by research done in Tertiary care hospital of Tropical western region of Nepal where all the items of Morisky medication adherence scale were improved in

post-test experimental than in pre-test with alpha reliability 0.86 (Khadka, Das & Basnet, 2017).

The result from present study showed that the mean difference from pre-test to post-test1 is 0.77 and from post-test1 to post-test2 is 0.49. Both differences are statistically significant ($p < 0.001$). The data further indicates that the most prominent change in medication adherence score is after the first health education session, but it improves further after the second health education session. This study is consistent with the study done in Enugu state & Nsukka cities, South-East, Nigeria where analysis with paired sample t-test was used to weigh up the impact of health education and showed significant improvement in medication adherence level ($p < 0.001$) (Ozoemena et al., 2019).

We consider these results to be important short-term results and insight into the health education that was provided to these patients.

Socio demographic findings of this study showed that 56.8% were in the age group 30-60

Similarly, the study revealed 55.8% were females which are highly supported by a research done in King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia where 60.6% of respondents were females (Shaik et al., 2016).

This study showed that 80.9% were married which is strongly supported by a research done in King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia where 77.6% of respondents were married (Shaik et al., 2016).

In this study, 56.4% of the respondents were Brahmin and Chhetri and 52.7% of them had no monthly income.

Regarding level of education, 38.2% were illiterate and 54.5% resided in rural area which is strongly supported by research done in Southwest Ethiopia by Yenesew A., Gashi F., & Tatiparthi where 50% of respondents were illiterate and 55.4% resided in rural area (Yenesew, A., Gashi, F., & Tatiparthi, R. 2015).

Adherence to any medication is always crucial in control of diseases more specifically for chronic diseases and identifying the factors which determine the adherence can have significant impact on treatment outcomes.

The study found three important socio-demographic characteristics- age, educational level and area of residence.

This study showed that, the majority of the patients(57.9%) in pre-test are in the age group 30-60 years were already highly adherent to medication and most of those of >60 years(44.2%) were low adherent. Age of the respondents is associated with the level of medication adherence with p value=0.022 in pre-testbut after the first education session the study found that in the 60+age group the big low adherence group become small and more 60+changed to moderate and high adherent. This means that the effect of the education is highest in the >60 years subgroup. And because of this result there is no statistical difference(p=0.088) in mean adherence scores between age groups after the first education session.

Regarding level of education, 70% hadn't got formal education. This group stays significantly behind the persons that have got some formal education, although they made big change in improvement of medication adherence.

Health education appears to have most effect on those without formal education or primary education only.

As regard to level of education result was found to be significantly associated with level of medication adherence at p value=0.019 in pretest, p value=0.028 in post-test1 and p value=0.032 in post-test2 which is in the line with the study conducted in Saudi Arabia in 2012 where level of education and medication adherence to be significantly associated at p value=0.016(Alsolami, Hou, & Correa-Velez, 2012).

Similarly, other socio-demographic variables-gender, marital status, occupation, monthly income and ethnicity were found to be not associated with level of medication adherence so, they do not play a role in medication adherence which is

contradictory with the study done in Karachi-Pakistan revealed that gender (p value=0.008), occupation (p value=0.002) and socio-economic status are associated with non-compliance (p value=0.046)(Bilal et al., 2015). This might be due to variation in geographical location and as well as sample size. Likewise, respondents hesitate to give exact information on their monthly income which might have shown variation in result.

Regarding area of residence, is found to be associated with level of medication adherence in pretest at p value=0.009 and post-test1 at p value=0.019 but in post-test2 it is insignificant at p value=0.154.

Most persons from rural areas have significantly lower and more moderate adherence than urban persons at pre-test. And although this improves after the first health education the difference with urban persons remain significant. After the second health education session more persons in rural areas again improved. So that the difference in adherence score with urban persons was no longer significant.

The present study showed complexity of the regimen, physician counseling on medication and physician counseling on complication of hypertension are significantly associated with level of medication adherence at p value<0.001 which is contradictory with the finding of study done in Karachi-Pakistan which revealed that there is no association between complex regimen (p value=0.558), physician counseling on medication (p value=0.457) and about complication of hypertension (p value=0.362) with level of medication adherence (Bilal et al., 2015).

Physician's role appeared to be important in medication adherence. If they are communicating clearly (no complex regimen), counseling on medication and on complication of hypertension, there is better adherence at the start (pre-test), and although the group that didn't get such counseling make huge improvements in adherence scores after they have got health education sessions, they remained to stay significantly behind the other group.

Regarding complexity of regimen, it is purely a subjective feeling so there may be difference in perception among people about the treatment regimen.

The present study revealed, majority of the respondents 64.5% are taking only one prescribed dose of antihypertensive medication and number of prescribed antihypertensive drug is not associated with level of medication adherence. These findings are contradictory with the finding of the study conducted in Nigerian tertiary hospital where 84.8% of respondents are taking one tab per day with good medication adherence level and this factor is significantly associated with medication adherence at $p < 0.001$ (Olowookere et al., 2015).

Similarly, financial support for the drug is provided by family with no any problem had high adherence level (49.1%) and is associated with adherence level at $p = 0.009$ in pre-test, $p = 0.016$ in post-test1 and $p = 0.047$ in post-test2 which is supported by the research done in Nigerian tertiary hospital where 98.4% had financial support by family with good adherence level and is strongly associated with medication adherence level $p < 0.001$ (Olowookere et al., 2015).

The subgroup that had financial problems with prescribed drug use were relatively small ($n = 13$, 11.8%). However, they showed significantly lower adherence, although adherence improved also in these subgroups after health education.

Likewise, duration of medicine intake, believe in excellent effect of allopathic treatment and believe in other treatment modalities were not significantly associated with level of medication adherence.

The present study showed that, duration of diagnosis of hypertension is significantly associated with level of medication adherence in pretest at p value = 0.026 and post-test1 at p value = 0.053 but it is found insignificant in post-test2 which is contradictory with the finding of research done in Pakistan where duration of diagnosis of hypertension is not associated with level of medication adherence at p value = 0.914 (Arshad, 2015).

The study revealed that, co-morbid illness is not associated with level of medication adherence which is contradictory with the finding of research done in Pakistan where co-morbidity is associated with level of medication adherence at p value = 0.029 respondents having co morbid illness has poor adherence (Arshad, 2015).

Similarly, BP status within 3 month period is associated significantly with level of medication adherence at $p < 0.001$. Those who have controlled blood pressure are better adhering to medication.

Limitation of the study

As a result of financial and time constraints, this study was limited to Lumbini Provincial Hospital, Butwal. It could not be extended to other hospitals in other parts of western Nepal.

The Morisky medication adherence score method used in this study is inexpensive and easy but can lead to overestimation of results, because they are self-reports by the patients which can be misleading.

Short term effect only- no data on long term effect.

The institution chosen for the study as well as sample size of 110 patients limit the generalization of the findings. Further studies with large number of institutions and sample size should test the conclusions.

The research design used in this study was pretest posttest only design so the findings are concise. Hence, more comparable results can be obtained if future study will be done based on true experimental design which was limited in this study due to hospital setting.

CHAPTER-VII CONCLUSION AND RECOMMENDATION

7.1 Conclusion

A pre-test post-test experimental study entitled "Effectiveness of health education on medication adherence and factor associated with medication adherence among hypertensive patients attending medical clinic in a tertiary level hospital of western Nepal" was conducted among 110 participants.

The main objective of the study was to assess effectiveness of health education on level of medication adherence and its association with selected demographic variables.

Data was collected using hospital random sampling method using Morisky medication adherence scale for adherence level and self- structured questionnaire for other variables.

This study revealed that though the most prominent change in medication adherence score is after the first educational session, providing two educational sessions is further effective in increasing level of medication adherence. Hence this can be concluded that frequent health educational session is more important for hypertensive patient for increasing adherence level.

The study has brought some important findings that medication adherence is associated with socio-demographic variables like age, level of education and area of residence. Physician counseling on medications and complication of hypertension, financial support for drugs are associated with medication adherence level. Those who have financial support from family with not any problem for drugs are highly adherent. Also, medication adherence was high among those whose 3-month blood pressure status was found to be controlled.

7.2 Recommendation

Based on the findings following things can be recommended:

This type of research can be done in large sample size, in other setting-hospital/community using probability sampling technique.

True experimental research can be conducted on this topic to obtain more comparable results.

Duration between two educational session can be made longer so that reliable result regarding effectiveness of health education on medication adherence can be obtain which in this study was constraints to only 15 days due to limited time.

Comparative study can be conducted using variables which are directly linked to the study like-gender, educational level etc. regarding the factors associated with medication adherence.

Likewise, qualitative studies can be conducted to assess the factors associated with medication adherence.

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APPENDICES

Appendix I

Informed Consent in English



INFORMED CONSENT

I am Saraswati Sigdel, a student of Masters in Rehabilitation Science, MRS 5th batch conducted under Bangladesh Health Professions Institute, Savar, Dhaka. As per the requirement of University that all students must carry out research in partial fulfillment of degree requirements, I am here to carry out my research entitled "Effectiveness of Health Education on Medication Adherence and factors associated with Medication Adherence among hypertensive patient attending medical OPD of Lumbini Provincial Hospital of Western Nepal"

VOLUNTARY PARTICIPATION

Your participation in this research is solely voluntary. You can without any reason, withdraw your participation from this research anytime whatsoever. If you would like to participate then you will be asked to sign this consent form. You can still withdraw your participation even after you sign the consent letter. Taking part in this research work causes you no potential risk and all your valuable information will be confidential and used only for the academic purpose. Moreover, if you withdraw your participation before the data collection is completed, then all your information and data will be kindly returned to you or destroyed.

CONSENT

I have read and I understand that this research is carried for the academic purpose and I am fully aware of my right to withdraw my participation from this survey at any time I wish with no cost at all. I understand that the copy of this consent will be given to me. I voluntarily agree to take part in this research.

Participant's
Date.....
Researcher's
Date.....

Signature.....

Signature.....

Appendix II



Nepali Version

अग्रिम सहमति

मेरो नामसरस्वतीसिग्देल हो, म बंगलादेश हेल्थ प्रोफेशन इन्स्टिट्यूट, साभार, ढाकामा M.Sc. in Rehabilitation Science विषयमा अध्ययनरत छात्रा हु। विश्वविद्यालयको कोर्स पूरा गर्नका निमित्त सबै विद्यार्थीहरूले अनुसन्धानगर्नुपर्ने हुन्छ। मेरो शोधपत्रको शिर्षक "Effectiveness of Health Education on Medication Adherence and factors associated with Medication Adherence among hypertensive patients attending medical OPD of Lumbini Provincial Hospital of Western Nepal" हो।

स्वैक्षिक सहभागिता

तपाइको सहभागिता यस सोध पत्रमा केवल स्वैक्षिकहुनेछ। तपाइले बिनाकुनै कारण, कुनै पनि बेला यस सोध पत्रको सहभागिता बाट आफ्नो सहभागिताफिर्ता गर्न पाउनुहुनेछ। यदितपाई सहभागीहुनचाहेमातपाईलाई यो सहमतिपत्रमाहस्ताक्षर गर्न भनिनेछ। पत्रमाहस्ताक्षर गरिसके पछि पनि कुनै कारणवश तपाईलाई आफ्नो सहभागिताफिर्ता गर्न इच्छा भएनिसंकोच फिर्ता गर्न पाउनुहुनेछ। यस अनुसन्धानकाकममा सहभागीहुदातपाईलाई कुनै पनि सम्भावितहानी नोक्सानीहुने छैन र तपाईले दिएको अमूल्यजानकारीहरू गोप्य राखिनेछन्, केवल शैक्षिक उद्देश्यकालागिमात्रै प्रयोग हुने छन्। यस बाहेकयदि तपाई आफ्नो सहभागिता सूचना संकलनहुदै फिर्ता गर्न चाहनुहुन्छ भने पनितपाईको सबै जानकारीहरू र सूचनातपाईलाई नै बिनाकुनै संकोच फिर्ता गरिनेछ वा नष्ट गरिनेछ।

सहमति

मैले यो अग्रिम सहमतिपत्र पढेर राम्रो सँग बुझेको छु कि यो सोध पत्र केवल शैक्षिक उद्देश्यको लागि हो र मलाई पूर्णतया यो कुराको जानकारी छ कि बिनाकुनै मूल्य मैले आफ्नो सहभागिताफिर्ता गर्ने पूरा हकअधिकार राख्दछु। मलाई यस सहमतिपत्रको एक प्रतिलिपिदिइनेछ, भन्ने कुरा पनि मलाई थाहा छ। म स्वैक्षिक रुपमा यस शोध पत्रको सूचना संकलनमाभागलिनमञ्जुर छु।

सहभागीको हस्ताक्षर:

मिति:

शोधकर्ताको हस्ताक्षर:

मिति:

Appendix III

Questionnaires (English Version):

Section A: Demographic information

(Direction: this section includes the personal information of the respondents. Please tick mark[on the corresponding box which is appropriate to you.)

1. Age

- >30 years
- 30–60 years
- >60 years

2. Gender

- Male
- Female

3. Marital Status

- Married
- Unmarried
- Divorced/widow/separate

4. Level of Education

- Illiterate
- Literate without formal education
- Primary level
- Secondary level
- High school level
- Bachelors level
- Masters level

5. What is your occupation?

- Housewife
- Business
- Service
- Farmer

- Laborer
- Student
- If others please specify

6. What is your monthly income (past 1 year)? (in Rs)

- <10,000
- 10000–25000
- >25,000

7. Ethnicity

- Dalit
- Janajati
- Muslim
- Brahmin and Chhetri
- Others

1. Religion

- Hinduism
- Buddhism
- Muslim
- Christianity
- If others please specify

2. Area of residence

- Urban
- Rural

Section B: Physician related factors

1. Do you think the regimen (that is: taking medicines ... per day, on times ...) is complex? that is: do you fully understand what you have to do, and when, and in what way?

- Yes
- No

- Don't know
2. **Does your physician do proper counseling about medicine? (that is: giving enough & understandable information about what the medicine is for, what side-effects it might bring, what the consequences are of not taking the medicines as prescribed, what good things for you will come after a while if you take your medicine as prescribed, and does the physician regularly ask you if you have taken your medicines?)**
 - Yes
 - No
3. **Does your physician do proper counseling about complication of Hypertension? (that is: giving enough & understandable information about what are the sequelae of hypertension, the symptoms, and the effects on your live and health at the long term)**
 - Yes
 - No

Section C: Medication related factors

1. **How long have you been under medication?**
 - <1 year
 - 1-3 years
 - 3 years
2. **How many numbers of drugs are you taking?**
 - Monotherapy/ one kind of drug, Tablets per day
 - Ditherapy/ two kinds of drug, Tablets per day
 - 3 or more than 3 drugs, Tablets per day
3. **Who provides financial support for your drugs?**
 - Self, financially no problem
 - Self, financially big problem
 - Family, financially no problem
 - Family, financially big problem
4. **Have you ever had experienced any adverse effects of medicines?**

- Yes
- No
- If yes please specify:
 - Sedation
 - Dizziness
 - GI complications
 - Increased urination
 - Others
 - None

5. Do you believe in excellent effects of Allopathic Treatment? That is: the medicines that are prescribed by the physician

- Yes
- No

6. Do you believe in good effects of any other treatment modalities?

- Yes
- No
- If Yes please specify

Section: D Disease related factors

1. How long have you been diagnosed as having hypertension?

- <5 years
- >5 years

2. Do you have any family history of hypertension? Family that is (not in-laws)

- Present
- Absent

3. Are any co-existing chronic illnesses present?

S.No.	Disease	Duration(year)	Continuing Treatment
1.	Diabetes Mellitus		0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes
2.	Heart Disease		0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes
3.	Kidney Disease		0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes
4.	Disease of brain and nervous system		0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes
5.	Disorder of blood cholesterol		0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes
6.	Others(specify)		0 <input type="checkbox"/> No 1 <input type="checkbox"/> Yes

Do you perceive any symptoms related to hypertension? e.g. Severe headache. Fatigue or confusion, Vision problems. Chest pain, Difficulty in breathing. Irregular heartbeat. Blood in the urine, Pounding in your chest, neck, or ears.

- Present
- Absent

4. What is your present blood pressure status?

- Controlled
- Uncontrolled

Section: E Medication Adherence (Modified Morisky Medication Adherence Scale {MMAS-8})

Do you sometimes forget to take your medications?	No=1, Yes=0
People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicines?	No=1, Yes=0
Have you ever cut back or stopped taking	No=1, Yes=0

your medication without telling your doctor, because you felt worse when you took it?	
When you travel or leave home, do you sometimes forget to bring along your medications?	No=1, Yes=0
Did you take your medications yesterday?	No=0, Yes=1
When you feel like your condition is under control, do you sometimes stop taking your medicines?	No=1, Yes=0
Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	No=1, Yes=0
How often do you have difficulty remembering to take all your medications? A. Never/Rarely B. Once in a while C. Sometimes D. Usually E. All the time	A=4 B=3 C=2 D=1 E=0

अनुसन्धानकाप्रश्नहरू (Nepali Version)

भाग क) जनसांख्यिक सूचना

(निर्देशन: यस भागमा सहभागीहरूको व्यक्तिगत सूचनाहरू समावेश गरिएको छ । कृपया आफुलाई ठीक लागेको बुँदामा सही (✓) चिन्ह लगाउनुहोस्) ।

१. उमेर

- २५ वर्ष भन्दा माथि
- ३०-६० वर्ष सम्म
- ६० वर्ष भन्दा माथि

२. लिंग

- पुरुष
- महिला

३. वैवाहिकस्थिति

- विवाहित
- अविवाहित
- पारपाचुके भएको / विधवा / छुट्टै बसेको

४. शैक्षिकतह

- अशिक्षित
- शिक्षित तर औपचारिक शिक्षानलिएको
- नि.मा.वि. तह
- मा.वि. तह
- उच्चमा.वि. तह
- स्नातकतह
- स्नातकोत्तर तह

५. तपाइको पेशा के हो?

- गृहिणी
- व्यवसाय
- सेवा
- कृषि
- श्रमिक

६. तपाइको मासिकआम्दानी (गतवर्ष देखि, रुपैयामा)

- १०,००० भन्दाकम
- १०,०००-२५०००
- २५००० भन्दा बढी
- आम्दानीनभएको

७ जातियता

- दलित
- जनजाती
- मुस्लिम्
- ब्राम्हण / क्षेत्री
- अन्य

८. धर्म

- हिन्दु
- बौद्ध
- मुस्लिम
- क्रिश्चियन
- यदीअन्यभएखुलाउनुहोस्

९. बसोबास गर्ने क्षेत्र

- शहरी क्षेत्र
- ग्रामिण क्षेत्र

१०. पुरा ठेगाना

११. फोन नं. / मोबाइल नं.

पारिवारिक सदस्यको मोबाइल नं.

१२. फलो-अप

भाग ख) चिकित्सक सँग सम्बन्धित कारकहरु:

१. तपाइलाई उपचार विधि जटिल लाग्छ ? (जस्तै: कुन समयमा औषधी खाने, कहिले, कसरी राम्रो सँग बुझ्नुहुन्छ?)

- लाग्छ

- लाग्दैन
- थाहाछैन

२. के तपाइलाई चिकित्सकले दिएको औषधी सम्बन्धी उचित परामर्श दिनुहुन्छ ? (जस्तै: औषधी के को लागि, त्यसले गर्नसक्ने नकारात्मक असर, चिकित्सकले भनेको औषधीनखाएकस्तो नतिजा आउन सक्ने, चिकित्सकले भनेको औषधीखाएबित्तै कस्ता सकारात्मक कुरा देखिने र औषधीखानुभएको छ/छैन भनेर चिकित्सकले नियमित सोध्ने, जस्तापर्याप्तजानकारी पाउनुहुन्छ ?)

- दिनुहुन्छ
- दिनुहुन्न

३. तपाइको चिकित्सकले उच्च रक्तचापको जटिलता सम्बन्धी उचित परामर्श दिनुहुन्छ ? (जस्तै: उच्च रक्तचापको नियन्त्रण नगर्दाको असर, यसका लक्षण, लामो समयसम्म तपाईंको जीवन र स्वास्थ्यमार्ग गर्नसक्ने असर जस्तापर्याप्तजानकारी दिनुहुन्छ ?)

- दिनुहुन्छ
- दिनुहुन्न

भाग ग) औषधी सम्बन्धी कारकहरु:

१. तपाइले कति समयदेखि औषधी सेवन गरिराख्नु भएको छ ?

- १ वर्ष भन्दा कम
- १-३ वर्ष
- ३ वर्ष भन्दा धेरै

२. तपाइले कति वटा औषधी सेवन गरिराख्नु भएको छ ?

- एउटा
- दुई वटा
- तीनवातीनभन्दा बढी

३. तपाइको औषधीकालागि आर्थिक सहयोग कसले गर्छ ?

- स्वयं, आर्थिक हिसाबको केही समस्या नभएको
- स्वयं, आर्थिक हिसाबको ठूलो समस्या नभएको
- परिवार, आर्थिक हिसाबको केही समस्या नभएको
- परिवार, आर्थिक हिसाबको ठूलो समस्या नभएको

४. तपाइले कहिल्यै औषधीको नकारात्मक असरको अनुभव गर्नु भएको छ ?

- छ

- छैन
- गरेको भए, कृपया खुलाउनुहोस्
- भ्रमपानु / बेहोस हुनु
- रिङ्गटा लाग्नु
- पेट सम्बन्धी जटिलता
- बढी पिसाबलाग्नु
- अन्य
- हालसम्म अनुभव नगरेको

५. एलोपेथिक औषधीका उत्कृष्ट असरहरूमा विश्वास गर्नुहुन्छ ? (जस्तै: चिकित्सकले सुझाव दिएका औषधीहरू)

- गर्छु
- गर्दिन

६. तपाइले अन्य उपचार विधिहरूको राम्रा असरहरूमा विश्वास गर्नुहुन्छ ?

- गर्छु
- गर्दिन
- अन्य भएकृपया खुलाउनुहोस्

भाग घ) रोग सम्बन्धी कारकहरू:

१. तपाइलाई उच्च रक्तचाप छ भन्ने थाहा भएको कति वर्ष भयो ?

- ५ वर्ष भन्दा कम
- ५ वर्ष भन्दा बढी

२. तपाइको कोही पारिवारिक सदस्यलाई उच्च रक्तचाप छ ? (आफ्नै परिवार भित्र)

- छ
- छैन

३. तपाइलाई तल दिइएका मध्ये कुनै दीर्घकालिन रोग लागेको छ ?

क्र.सं.	रोग	समय (वर्ष)	उपचार गराइरहनु भएको छ ?
१.	मधुमेह		छ <input type="checkbox"/> छैन <input checked="" type="checkbox"/>
२.	मुटु रोग		छ <input type="checkbox"/> छैन <input type="checkbox"/>
३.	मिगौला सम्बन्धी रोग		छ <input type="checkbox"/> छैन <input type="checkbox"/>
४.	मस्तिष्क तथा स्नायू प्रणाली सम्बन्धी रोग		छ <input type="checkbox"/> छैन <input type="checkbox"/>

	जस्तै: पार्किंसंस, अल्जाइमर, आदि		
५.	ब्लड कोलेस्ट्रॉल सम्बन्धी रोग	छ <input type="checkbox"/>	<input type="checkbox"/> छैन
६.	अन्य (कृपयाखुलाउनुहोस्)	छ <input type="checkbox"/>	<input type="checkbox"/> छैन

४. तपाइमाउच्च रक्तचाप सम्बन्धी केही लक्षणहरु देखिएको छ ? (जस्तै: अत्यन्त टाउको दुख्ने, थकानवाभ्रम, आखा सम्बन्धी समस्या, छाती दुख्ने, सास फेर्न गाह्रो हुने, अनियन्त्रित मुटुको धड्कन, पिसाबमा रगत देखिने, आदि)

- देखिएको छ
- देखिएको छैन

५. हालतपाइको रक्तचापको अवस्थाकस्तो छ ?

- नियन्त्रणमा रहेको
- नियन्त्रणमा नरहेको

भाग ड) औषधीअनुपालन(Medication adherence)

- Modified Morisky Medication Adherence Scale (MMAS-8)

के तपाइले कहिले काहीआफ्नो औषधी सेवनगर्न बिर्सिनुहुन्छ ?	बिर्सिन = 1 बिर्सिन्छु = 0
मानिसहरु कहिलेकाही बिर्सनु बाहेक अन्य अरु कारणले आफ्नो औषधी सेवनगर्न छुटाउछन्, विगतदुई हप्तामाकुनै दिनत्यस्तो छ जुनदिनतपाइले औषधी सेवनगर्न छुटाउनुभएको छ ?	छुटाएको छैन= 1 छुटाएको छु = 0
के तपाइले कहिल्यै आफ्नो चिकित्सकको सल्लाहबिनाआफ्नो औषधी सेवनगर्न बन्दगर्नुभएको छ, यसकारण कि तपाइलाई औषधी सेवनगर्दा धेरै नराम्रो महशुस हुने गर्छ ?	बन्द गरेको छैन = 1 बन्द गरेको छु = 0
तपाइले कहिलेकाही घर बाहिर जादा या कुनै यात्रागर्दा आफ्नो औषधी लैजान बिर्सनुभएको छ ?	बिर्सको छैन = 1 बिर्सको छु = 0
के तपाइले हिजो औषधी सेवनगर्नुभयो ?	छैन =1 छ =0

तपाइलाई आफ्नो अवस्था सामान्य छ जस्तो महशुस भएर कहिलेकाही औषधी सेवनगर्न बन्दगर्नुभएको छ ?	गरेको छैन =1 गरेको छ =0
कोहीमानिसहरुलाई दिनहु औषधी सेवनगर्न वास्तवमै असुविधाजनक हुन्छ, के तपाइलाई कहिल्यै आफ्नो उपचार योजनामा अडिग रहनु परेशानीमहशुस भएको छ ?	छैन =1 छ =0
तपाइलाई सदैव आफ्नो सबै औषधी सेवनगर्न सम्भनु कत्तिको गाह्रो हुन्छ ? क) कहिल्यै / बिरलै ख) धेरैमा एकपटक ग) कहिले काही घ) सामान्यतया ङ) जहिले पनि	क =4 ख =3 ग =2 घ =1 ङ =0

Appendix IV

Health Education based on ASHP Guideline

Process steps

- Namaste I am Saraswati Sigdel, I am going to give you information on hypertension and importance of medication adherence for controlling your blood pressure and prevention of complication which will take around 25 minutes. Your cooperation by giving accurate answers of any questions is valuable.

The main purpose of this health education is to improve your compliance with your medication which can result in better health outcome.

If you found any difficulty in understanding then please tell me I will try to convey you which are suitable for you. Can I proceed now?

- Assessment of knowledge on hypertension and medication used.
 - How did you come to know about your hypertension?
 - Do you know the normal level of BP?
 - Do you know the symptoms of hypertension?
 - Do you know what the complication of hypertension is?
 - Do you know the name and purpose of your prescribed drugs?
 - Do you know the regular dose and adverse effect of your medication?
 - How you are using your medication?
- Education on appropriate use of medication: Time, dose, by demonstrating them (providing written handouts to help the patient recall the information). If patient is experiencing problem with medication use obtaining enough data and notifying physician.
- Asking about medication use.
 - Correct dose of medication.
 - Timing
 - What to do if you miss your dose?

Content

Hypertension

Hypertension (HTN) or high blood pressure (systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg) and it vary with age (Kearney et al., 2005).

Symptoms

High blood pressure is called the "silent killer" because it often has no warning signs or symptoms, and many people do not realize they have it; that is why it's important to get blood pressure checked regularly.

Blood Pressure Levels Normal Systolic: less than 120 mmHg Diastolic: less than 80 mmHg

At risk (prehypertension) Systolic: 120–139 mmHg Diastolic: 80–89 mmHg

High Systolic: 140 mmHg or higher Diastolic: 90 mmHg or higher Hypertension fact sheet | Department of Sustainable Development and Healthy Environments | September 2011

- Hypertension is usually without any symptoms, but could give rise to early-morning headache, nosebleed, irregular heartbeats and buzzing in the ears.
- Symptoms of severe hypertension include tiredness, nausea, vomiting, confusion, anxiety, chest pain and muscle tremors.
- the only way to detect high blood pressure is to have it measured by a doctor or a health professional.

Complication of hypertension

- Chest pain, also called angina.
- Heart failure, which occurs when the heart cannot pump enough blood and oxygen to other organs.
- Heart attack, which occurs when the blood supply to the heart is blocked and heart muscle cells die from lack of oxygen. The longer the blood flow is blocked, the greater the damage to the heart. High blood pressure can burst or block arteries that supply blood and oxygen to the brain causing **stroke**.

About medication adherence

- Which drug patient is prescribed: providing information accordingly on trade name, generic name, common synonym. Involving visitor of patient who can better understand if patient find difficulty in understanding.
- Role of medication on hypertension: The fundamental goal of treatment is the prevention of the important endpoints of hypertension, such as heart attack, stroke and heart failure. Patient age, associated clinical conditions and end-organ damage also play a part in determining dosage and type of medication administered.

The purpose of medication is to maintain blood pressure under control not to cure permanently so regular use unless indicated by your physician is important.

- Every medication has own onset of action, if symptoms doest go away or your blood pressure is not controlled even if you take medication then informing your physician is important. Only medication may not work diet modification and including exercise may be important.
- Medication should be taken as prescribed by your doctor like correct dose right time, and as long suggested by your doctor.
- Take medications as scheduled, at the same time every day. Do not stop taking or change your medications unless you first talk with your doctor. Even if you feel good, continue to take your medications. Stopping drugs suddenly can make the condition worse.
- Have a routine for taking medications.
- Keep a medication calendar and note every time you take a dose.
- Do not decrease your medication dosage to save money. You must take the full amount to get the full benefits. If cost is a problem, talk with your doctor about ways you can reduce the costs of your medications.
- Do not take any over-the-counter drugs or herbal therapies unless you ask your doctor first. Some drugs may interact with each other, causing undesirable effects.
- If you forget to take a dose, take it as soon as you remember. However, if it is almost time for your next dose, skip the missed dose and go back to your regular dosing schedule. Do not take two doses to make up for the dose you missed.
- Regularly fill prescriptions and ask the pharmacist any questions you have. Do not wait until you are completely out of medication before filling prescriptions. If you have trouble getting to the pharmacy, have financial concerns, or have other problems that make it difficult for you to get your medications, let your doctor know.
- When traveling, keep drugs with you so you can take them as scheduled. On longer trips, take an extra week's supply of medications and copies of your prescriptions, in case you need to get a refill.
- Before having surgery with a general anesthetic, including dental surgery, tell the doctor or dentist in charge what drugs you are taking. An antibiotic may need to be prescribed prior to a surgical or dental procedure. Also, let the doctor know if you are taking aspirin and/or any other blood thinners.
- Some drugs may alter your heart rate, so take your pulse regularly.
- Drugs that relax constricted blood vessels may cause dizziness. If you experience dizziness when standing or getting out of bed, sit or lie down for a few minutes. This will increase your blood pressure. Then get up more slowly.

Appendix V Approval of thesis proposal



বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref. CRP-BHPI/IRB/09/19/1321

Date: 03/07/2019

To,
Saraswati Sigdel
M.Sc. in Rehabilitation Science (MRS)
Session: 2018-2020, Student ID: 181180125
BHPI, CRP-Savar, Dhaka-1343, Bangladesh

Subject: Approval of thesis proposal "Effectiveness of Health Education on Medication Adherence and Factor Associated with Medication Adherence among Hypertension Patient attending medical OPD of Lumbini Provincial Hospital of Western Nepal" by ethics committee.

Dear Saraswati Sigdel,

Congratulations.

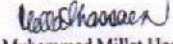
The Institution Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned thesis, with yourself, as the principle investigator. The following documents have been reviewed and approved.

S.N.	Name of Documents
1.	Thesis Proposal
2.	Questionnaire (Nepali & English Version)
3.	Information sheet and consent form

The study involves Modified Morisky Medication Adherence Scale (MMAS-8) for pretesting and the questionnaire regarding the other relevant independent variables for collecting information. All the respondents will receive health education based on ASHP Guidelines on Pharmacist-Conducted Patient Education and Counseling that may take around 40 minutes to collect data and provide health education. Since, there is no likelihood of any harm to the participants; the members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 8.30 am on 18th February, 2019.

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and asked to be provided a copy of the final report. This Ethics committee is working accordance to the Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.


Best regards,


Muhammad Millat Hossain
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

সিআরপি-চাপাইন, সাজার, ঢাকা-১৩৪৩, বাংলাদেশ, ফোন : ৭৭৪৫৪৬৪-৫, ৭৭৪১৪০৪ ফ্যাক্স : ৭৭৪৫০৬৯

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404, Fax : 7745069, E-mail : contact@crp-bangladesh.org, www.crp-bangladesh.org

Appendix VI
Permission letter for data collection


 प्रदेश सरकार
 प्रदेश नं ५
 सामाजिक विकास मन्त्रालय
 स्वास्थ्य निर्देशनालय
 लुम्बिनी प्रादेशिक अस्पताल
 बुटवल, नेपाल

फ्याक्स ०३१-५५२२८२
 email :- lzhospital@gmail.com


प.सं. २०७५-०२३
 मिति ०६/१२

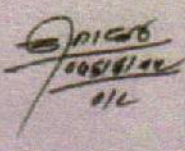
श्री Bangladesh Health Professions Institute
 बंगलादेश।

विषय : तथ्याङ्क सङ्कलन सम्बन्धमा ।

उपरोक्त सम्बन्धमा त्थस Institute मा Master in Rehabilitation Science
 दोस्रो वर्षमा अख्यवमरत विद्यार्थी श्री सरस्वती मिश्रेवल तोकिएको पाठ्यक्रम अनुसार यस
 अस्पतालमा मिति २०७५/०२/२० देखी मिति २०७५/०६/१२ गते सम्म " Effectiveness of
 Health Education on Medication Adherence and Factor Associated with
 Medication Adherence among Hypertension Patient " विषयमा तथ्याङ्क सङ्कलन
 सम्पन्न गरेको व्यहोरा जानकारी गराइन्छ ।

बोधार्थ
 श्री सरस्वती मिश्रेवल ।


 डा. कृष्ण प्रसाद श्रेष्ठ
 प्रमुख मेडिकल सुपरिटेण्डेण्ट
 लुम्बिनी प्रादेशिक अस्पताल


 ००६/१२
 ०१८