

ASSESSMENT OF HYPERTENSION RELATED COMPLICATIONS AND ASSOCIATED FACTORS AMONG HYPERTENSIVE PATIENTS HAVING FOLLOW UP AT JIMMA UNIVERSITY MEDICAL CENTER, JIMMA, SOUTHWEST ETHIOPIA.



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A RESEARCH PAPER TO BE SUBMITTED TO DEPARTMENT OF INTERNAL MEDICINE, INSTITUTE OF HEALTH, JIMMA UNIVERSITY FOR PARTIAL FULFILMENT OF THE REQUIREMENTS OF SPECIALTY IN INTERNAL MEDICINE.

***JANUARY, 2021
JIMMA, ETHIOPIA***

***JIMMA UNIVERSITY INSTITUTE OF HEALTH
DEPARTMENT OF INTERNAL MEDICINE***

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Summary

Background: *Hypertension is an important public health challenge because of the associated morbidity, mortality, and cost to society. Complications due to undetected and uncontrolled hypertension have been recorded to be devastating. Among these are cerebrovascular, cardiovascular, and renal complications.*

Objective: *The objective of this study is to assess the prevalence of hypertension-related complications and associated factors among hypertensive patients having a follow up at JUMC*

Methods: *A hospital-based cross-sectional study was conducted on Hypertensive patients having follow-up at JUMC from September 01, 2020, to October 30, 2020. The patient chart was reviewed for any previously documented hypertension-related complications and the patient was asked if they have symptoms related to complications of hypertension. The findings were discussed and compared with similar studies done elsewhere. Based on the results recommendations and conclusions were made and disseminated.*

Result: *In this study four hundred fourteen patients (response rate 98.57%) were assessed at JUMC for hypertension related complications. From this the most common complication of hypertension is coronary heart disease (37.2). The most common associated risk factor for hypertension related complications are Diabetes mellitus (13.3%) and smoking (8.7%).The majority of patients (60.1%) are from rural areas and 58.5% of them are male patients.*

Conclusion and Recommendation: *This study Revealed most of the patients have coronary artery disease followed by cerebrovascular disease and chronic kidney disease as the main complication of hypertension, therefore preventive measures should be undertaken to prevent these complications. Treatment and lifestyle changes can help control the high blood pressure to reduce these life-threatening complications. Effective management and treatment of hypertension requires clinicians and patients to work together to balance pharmacologic and non-pharmacologic interventions and prevent target organ damage.*

Key Words; *Hypertension, Jimma University Medical Center, Ethiopia*

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Abbreviations and Acronyms

- ***BP:*** *Blood pressure*
- ***CHD:*** *Cardiovascular Disease*
- ***CKD:*** *Chronic Kidney Disease*
- ***CVA:*** *Cerebrovascular Accident*
- ***DM:*** *Diabetes Mellitus*
- ***HHD:*** *Hypertensive heart disease*
- ***HTN:*** *Hypertension*
- ***mmHg:*** *millimeter of mercury*
- ***NCD:*** *Non communicable disease*
- ***PAD:*** *Peripheral Arterial Disease*
- ***SH:*** *Systolic Hypertension*
- ***SSH:*** *Sub-Saharan Africa*
- ***TOD:*** *Target Organ Damage*
- ***WHO:*** *World Health Organization*

Chapter One

1. Introduction

1.1. Background

Hypertension is one of the leading causes of cardiovascular disease and premature mortality in the world. It is defined as a persistent systolic blood pressure of 140 mm Hg or greater and a diastolic blood pressure reading of 90 mm Hg or greater. According to the 7th report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7), the prevalence estimates worldwide for hypertension may be as much as 1 billion individuals, and approximately 7.1 million deaths per year may be attributable to hypertension (1).

Globally all nations have committed to reducing premature mortality arising from Non-communicable Disease by 25% by the year 2030. This declaration was reached after a world health global report indicated that out of 57 million deaths; 36 million (63%) were due to non-communicable diseases majorly; mainly hypertension, stroke and heart attack, diabetes, cancer, and chronic respiratory disease. Sadly, these are projected to reach 80% of the major cause of death by the year 2030. A large percentage of the non-communicable disease is preventable through the reduction of the four main modifiable behavioral risk factors; unhealthy diet, physical inactivity, harmful use of tobacco and excessive alcohol consumption, and reducing obesity (2).

The impact of hypertension and cardiovascular disease is influenced by a wide variety of risk factors such as tobacco use, excessive alcohol consumption, unhealthy diet, physical inactivity, overweight and obesity, elevated blood glucose, and abnormal blood lipids. The combination of a reduction of risk factors in the general population, primary prevention in high risk groups, and intensive treatment in secondary prevention was claimed to be the best strategy to reduce CVD premature mortality. Research from several countries has consistently shown that the treatment of risk factors such as hypertension has a higher impact on CVD than the treatment of established CVD (3).

Several hypertensive patients may present for the first time with target organ damage (TOD) involving various organs. Therefore at initial diagnosis, they already have hypertensive heart disease (HHD); some with LVH, while some have frank congestive heart failure (CHF). Major TODs of hypertension such as LVH, diastolic dysfunction, CHF, ischemic heart disease(IHD), stroke, and renal failure have been documented by various workers in Nigeria and these were mostly hospital-based studies. Autopsy studies confirmed that the commonest cause of sudden, unexpected death in Nigerians is hypertension (4).

Hypertension is the commonest cardiovascular disorder and one of the important non-communicable diseases due to its role in the causation of coronary heart disease, stroke, and other vascular complications. It is posing a major public health challenge to populations in socioeconomic and epidemiological transition. It is one of the major risk factors for cardiovascular mortality, which accounts for 20-50% of all deaths in the world (5).

Hypertension, the most common cardiovascular disorder affecting approximately one billion people globally, remains the leading single contributor to the global burden of disease and mortality accounting for approximately 9.4 million deaths annually. In 2000, there were an estimated 972 million people with hypertension, 65 % of whom lived in the developing world, with the number predicted to grow to 1.5 billion by 2025. The effects of hypertension if not controlled are devastating and may include stroke, myocardial infarction, cardiac failure, and renal failure among others (6). Some studies indicate that hypertension in Sub Saharan Africa (SSA) is a widespread problem, and in some communities, it has been reported to be as high as 38 %. It is estimated that out of the approximately 650 million people in SSA, between 10 to 20 million may have hypertension. However many countries in SSA still lack detailed basic data on the prevalence of hypertension, and how this is distributed in the different SSA populations (6).

Hypertension doubles the risk of stroke, myocardial infarction, chronic kidney disease, and peripheral arterial disease. Good control of hypertension is important to decrease these complications. For good control, lifestyle modification and different antihypertensive medication are used (7).

There was limited published data on hypertension related complications and the effect of non-adherence to practice guidelines in Ethiopia. An open level retrospective cohort study done at Gondar University hospital in 2017 showed that of the total number of 612 patients examined,

the overall prevalence of hypertension related complications is 40.3%. Presence of comorbidities and non-adherence to practice guidelines were correlated with the incidence of TOD. Appropriate management of hypertension and modification of triggering factors are essential to prevent complications (1).

1.2. Statement of the Problem

Hypertension is one of the most important modifiable risk factors for cardiovascular diseases (CVD) worldwide. The complications of hypertension account for 9.4 million deaths worldwide every year (3). Hypertension is responsible for at least 45% of the deaths from CVD and 51% of the deaths from stroke. Cardiovascular disease accounted for more than 17.3 million deaths in 2013 which represented 31% of all global deaths and made it the world's leading cause of death and disability (3).

Hypertension is a major public health problem and an important area of research due to its high prevalence and is a major risk factor for cardiovascular diseases and other complications. It is a silent killer as very rarely any symptom can be seen in its early stages until a severe medical crisis takes place like heart attack, stroke, or chronic kidney disease. Since people are unaware of excessive blood pressure, it is only through measurements that detection can be done. Although the majority of patients with hypertension remain asymptomatic, some people with HTN report headaches, lightheadedness, vertigo, altered vision, or fainting episode (8).

In China, there has been a steady increase in the prevalence of hypertension during the past decade. In addition to the patient's geographical region, a patient's sex, age, and several other characteristics (e.g., income, education, occupation, control of tobacco consumption, and obesity, etc.) may also play a role in the disease's prevalence. The nature of hypertension-related health risk is similar in all populations, but the distribution of diseases concerning those risk factors may vary (9).

Many studies indicate that hypertension in Sub Saharan Africa (SSA) is a widespread problem, and in some communities, it has been reported to be as high as 38 % (6). It is estimated that out of the approximately 650 million people in SSA, between 10 to 20 million may have hypertension. However many countries in SSA still lack detailed basic data on the prevalence of hypertension, and how this is distributed in the different SSA populations. (6) The effects of hypertension if not controlled are devastating and may include stroke, myocardial infarction, cardiac failure, and renal failure among others (6).

In a study done in Tanzania, Four hundred and fifty hypertensive patients with a mean age of 57.00 ± 12.60 years were enrolled in the study. Females accounted for 52.90% of the study population. More than one-third (35.60%) of patients had a low level of awareness of the risk

factors, complications, and preventive measures of complications of hypertension. Having a higher education level, having a long-standing history of hypertension of more than 5 years, and a positive family history of hypertension were all associated with a high level of awareness among hypertensive patients (10).

Hypertension is a growing public health problem in many developing countries including Ethiopia. However, its prevention and control have not yet received due attention in these countries'. Meanwhile, the developed nations such as the USA have successfully reduced the end results of hypertension to a significant level. This has to do with earlier detection and proper management. The first step in the process is measuring the burden of the disease and its very complications. Complications due to undetected and uncontrolled hypertension have been recorded to be devastating. Among these are cerebrovascular, cardiovascular, and renal complications.

1.3. Significance of the Study

The morbidity and mortality caused by hypertension and its complications have such a big impact on the country's economy and health care system; thus decreasing this burden is absolutely necessary. For this, it is vital that the general public and patients are aware of the risk factors, presenting features, and complications of hypertension to enable better and earlier care-seeking behavior and thus earlier diagnosis.

This study was a baseline data on hypertension-related complications and associated factors so that efforts were made by health professionals to decrease its prevalence and work on the associated factors. It also guides the policymakers to know the burden of the disease and act accordingly. This study will also help the patients to know the associated factors in this area and work on preventing these factors.

Chapter Two

2. Literature Review

2.1. Prevalence of systemic Hypertension

Hypertension has been acknowledged as one of the greatest and established risk factors for cardiovascular diseases. According to the 7th report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7), the prevalence estimates worldwide for hypertension may be as much as 1 billion individuals, and approximately 7.1 million deaths per year may be attributable to hypertension (11).

According to Kearney et al, by 2025 about 75% of the world's hypertensive population was in developing countries. In Nigeria for example, it is the number one risk factor for stroke, heart failure, ischemic heart disease, and kidney failure. With an increasing adult population as well as the rising prevalence of hypertension, Nigeria will experience economic and health challenges due to the disease if the tide is not arrested. As far back as the early 60s a lot of interest has been shown by workers on the blood pressure of Nigerian Africans (12).

Although a large proportion of CVDs is preventable, they continue to rise mainly because preventive measures are inadequate and it has been projected that by the year 2030; almost 23.6 million people will die from CVDs. Similarly, the majority of CVD deaths in low-income countries occur in individuals less than 60 years of age.

These premature deaths have grave economic and social implications. Interestingly, while actions to reduce blood pressure and cholesterol are having an impact on overall CVD mortality in high-income countries, there is a worsening of CVD risk profiles in most developing regions of the world.

Data from Africa indicate that hypertension-induced vascular damages are still relatively uncommon. CVD incidence rates for Sub-Saharan Africa in 1990 were reported to be 60 per 100,000, with the major etiologies cited as cardiomyopathies, hypertension (African nations report prevalence rates ranging anywhere between 1.2% to 33%), and rheumatic heart disease. For example, a report from Nigeria reviewing cases of sudden cardiac death found that the majority were due to hypertensive heart disease

In sub-Saharan Africa, the prevalence of CVDs has reached near epidemic proportions with SH being the main driver of cardiovascular complications. Whereas SH was said to be rare in Africans in the first half of the twentieth century, current shreds of evidence have shown it affects between 30 and 60% of Black Africans. It is the commonest cause of heart failure, stroke, and kidney disease from many studies in Africa. This upsurge in the incidence of SH and its complications in Sub Saharan Africa with a high burden of infectious diseases and poverty had greatly reduced the life expectancy in this part of the world (13).

In a Survey done in recognition of world hypertension day in 2014 in Addis Ababa, a total of 2716 adults were included in this study and the mean age is 36.9 +/-14.2 years with males (mean age 38 years) older than females (mean age 36 years). More than half (58.1%) were females. Six hundred and seventy-seven (25%, (95% CI 23.4-26.7)) were found to have hypertension, 1/3rd of them had stage 2 hypertension. And 47.3% had prehypertension. Men had a significantly higher prevalence than women (AOR 1.4 (1.2-1.7), $P < 0.0001$). The prevalence significantly increased with increasing age with an increase of 10% per decade (AOR for age group > 65 years is 23 [95%CI: 14.0-37.4] compared to those under 25 years of age). Residents of sub-cities in the inner part of Addis Ababa had a significantly higher prevalence of hypertension (14).

In a hospital-based cross-sectional survey done Study at Jimma University in 2013, the mean age of the participants was 42.3 ± 13.2 years and 71.7% of them were 35 years and older; 58% of them were females. The overall prevalence of hypertension – defined by systolic blood pressure >140 and/or diastolic blood pressure >90 or reporting the history of hypertension – was found to be 13.2%. Only 35.1% of them were aware of their hypertension and only 23.7% were on treatment. The overall control rate was 15.5%. A family history of hypertension, having diabetes mellitus, being overweight, and oral contraceptive use were associated with high blood pressure. (15).

2.2. Prevalence of hypertension and its comorbidity

In a study done in Rajshahi Medical college of Bangladesh One hundred hypertensive patients were selected randomly from medicine indoor; 66 were males, 34 were females. Age ranges were 20 to 70+ years. Incidence of TOD was as follows: 65.15% of males and 52.94% of females developed stroke; 70% of total patients developed some forms of cardiac complications, 14%

had left ventricular failure, 43.93% of males had left ventricular hypertrophy (LVH) 26.47% of females had LVH; 27% of patients had renal complications; 23% of patients had retinopathies; 6% of patients had malignant hypertension; 20% of patients had peripheral vascular disease (16).

According to a study on prevalence and risk factors of comorbidities among hypertensive patients done in china in 2017; gender and age had been proved as important risk factors for hypertension comorbidities specifically they found that being male significantly increased the risk of hypertension comorbidities, respectively, by 1.06 fold for diabetes mellitus, 1.13 fold for hyperlipidemia, and 1.17 fold for coronary heart disease (9). In the same country, an epidemiological study of hypertension in a rural population of china revealed that Poor management of hypertension was observed in women. Being female, old, poorly educated, a smoker, ignorant of the dangerousness of hypertension, and having uncontrolled hypertension made patients more prone to hypertension complications (17). In a study done in India, the prevalence of hypertension was 32.9% (male: 40.9 % female: 26%) (8).

Data from Nepal Demographic and health survey in 2016 showed a total of 19.9% study participants were diagnosed as hypertensive of which majority were male(male-24.3%,female-16.9%) and residents of an urban area(urban-20.9%,rural-18.3%). Hypertension prevalence has shown a growing trend with the increase of age. This prevalence was also higher among rich and overweight/obese individuals. In multivariable logistic regression analysis older age groups, male gender, better education, and residence in urban areas were found to have a positive association with having hypertension. Among the study participants aged 65 years or more, the prevalence was highest (41.7%), followed by 55-64 years old (34.9) (18).

According to a study done in Kenya in 2016- Eighty hypertensive patients admitted to medical wards were enrolled in the study. The mean age was 49.7 years (SD 15.1) with most participants being in the 40-59 age groups. Sixty percent of participants were females and the male to female ratio was 2:3. There was a significant relationship between patients' level of education and hypertension complications ($p=0.001$). The risk of hypertensive complications was 94% lower in clients with primary compared to no education (OR0.06; 95% CI 0.01-0.6) the risk of hypertension complication increased 2.84 times (OR = 2.84; 95% CI 1.07-7.53) in clients with high systolic blood pressure compared to those with normal systolic blood pressure. Financial

constraints and lack of adequate knowledge among hypertensive patients were the main factors cited to be contributing to the development of hypertension complications (19).

In a study done in Tanzania of 203 enrolled patients, 138(68%) had a hypertensive emergency; and 65(32%) had hypertensive urgency. Altered mental status was the most common presenting symptom in a hypertensive emergency; a low Glasgow coma scale was the most common physical finding, and the cerebrovascular accident was the most common final diagnosis (20).

In research done in Nigeria in 2012 of the total 3108 admissions, 735 (23.7%) were due to hypertension-related complications, with a mean age of 51.9 ± 17.5 years. Diabetes complications with SH as a comorbidity was seen in 96 (3.1%) patients, peripartum cardiomyopathy in 51 (1.64%), and stroke in the young not related to SH was diagnosed in 25 (0.8%) patients. Others included dilated cardiomyopathy in 18 (0.6%) patients and coronary artery in 2 (0.06%) patients. Stroke/TIA was the commonest complication of SH in the patients, and it accounted for 44.4% of cases. This was followed by hypertensive heart failure (27.8%), hypertensive emergencies (16.7%), and chronic kidney disease (11.2%). Mean SBP and DBP were 167.4 ± 18.2 and 98.6 ± 13.5 at presentation. Although 498 (67.8%) patients were aware of their SH status at presentation, only 269 (36.4%) were compliant with their antihypertensive medications (21).

In another study done in Nigeria, a total of 415 hypertensive participants were examined and of those, 179 (43.1%) had evidence of TOD, and 45 (10.8%) had established CVD. TOD was associated with significantly higher systolic (SBP) and diastolic blood pressure (DBP). The prevalence of LVH was 27.9%, atrial fibrillation 16.4%, microalbuminuria 12.3%, proteinuria 15.2%, hypertensive retinopathy 2.2%, stroke 6.3%, congestive heart failure (CHF) 4.6%, ischemic heart disease 1.7%, and peripheral vascular disease 3.6% (4).

In a retrospective analysis done at Tikur Anbessa Hospital in 2015, a total of 106 medical charts of hypertensive patients were reviewed. Among the patients involved in the study, 51% were male, 45% were in their fifth and sixth decades and two-third of them did not have any comorbidity. Sixty-seven percent of these patients had the cerebrovascular disease (stroke), 11% had a stroke and hypertensive heart disease, 8% had a stroke, hypertensive heart disease, and chronic kidney disease (all three), and 5% had a stroke with chronic kidney disease. However, there was no significant association between the considered variables and the outcome (4).

In a community based cross-sectional study done in Debra Tabor General hospital, northwest Ethiopia in 2019 a significant proportion of hypertensive patients poorly adhere to antihypertensive medications. Age, residence, pill burden, and knowledge about hypertension and its treatment are important predictors of medication adherence (22).

In a study done in Adama Referral Hospital, Oromia region, Ethiopia- from 96 respondents of hypertensive patients 45.8% was non-adherent to the prescribed medication. There were a number of perceived problems of patients with hypertension. This includes forgetfulness, negligence, adverse effect of medication and old age or disability, economic problems, and use of social drugs (23).

2.3. Conceptual Framework

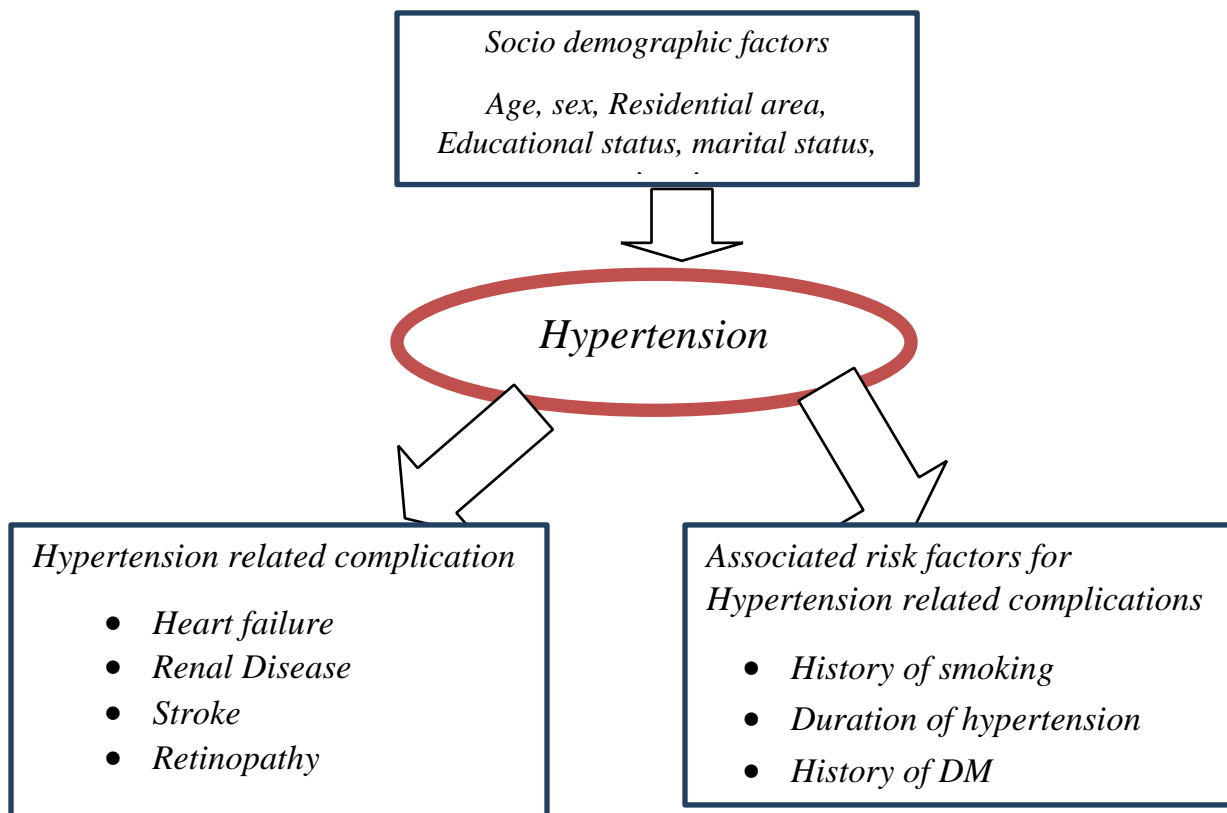


Figure 1: Conceptual framework

Chapter Three

3. Objectives

3.1. General Objective

- *The objective of this study is to assess the prevalence of hypertension related complications and associated factors among hypertensive patients having follow-up at JUMC.*

3.2. Specific Objectives

- *To assess and identify hypertension related complications and their prevalence*
- *To assess and identify factors associated with complications of hypertension*

Chapter Four

4. Methodology

4.1. Study area

The study was conducted at JUMC which is located in Jimma town, Southwest of Ethiopia, in the Oromia region, 350km southwest of the capital, Addis Ababa. It is one of the oldest public hospitals in the country. It was established in 1930 E.C by Italian invaders for the service of their soldiers. JUMC is the only referral and teaching hospital in the southwestern of the country. The hospital gives health services at the inpatient and outpatient level as a referral hospital with a catchment area of 20 million populations in the South West of the country.

Under the Department of Internal Medicine, there are two weekly follow up clinics for Hypertensive patients, every Wednesday and Thursday. The service is provided by Internists, Medical residents, General practitioners, and medical interns

4.2. Study period

The study was conducted from October 01, 2020, to November 30, 2020

4.3. Study design

A hospital-based cross-sectional study was conducted

4.4. Population

4.4.1. Source population

The source population was all adult Hypertensive patients having follow up at JUMC

4.4.2. Study population

The study population was all selected patients with Hypertension having follow-up at JUMC during the study period

4.5. Inclusion and Exclusion Criteria

4.5.1. Inclusion Criteria

All adult patients with hypertension have followed up at JUMC who are willing to participate in the study during the study period.

4.5.2. Exclusion Criteria

Hypertensive Patient having followed up at JUMC who are not willing to participate in the study.

4.6. Sample size and sampling technique

4.6.1. Sample size

Sample size was determined by using the sample size determination formula for single population proportion at $Z_{\alpha/2}$ value of 1.96, margin of error of 5% and $p = 0.5$, as there is no similar study in the area to take the proportion it is assumed to be 50%.

$$n = \frac{(Z_{\alpha/2})^2 * P(1 - P)}{d^2}$$

$$n = \frac{(1.96)^2 * 0.5(1-0.5)}{(0.05)^2}$$

$$n = 384$$

Adding 10 % for non-response rate, the sample size was **420**.

4.6.2. Sampling techniques

A simple random sampling technique to give every patient an equal chance of being selected for the study was used to enroll participants. The list of hypertensive patients having follow-up at JUMC was used as a sampling frame. The list was obtained from the registration list of the follow up clinic.

4.7. Study Variables

The following variables was measured

4.7.1. Dependent variables

- ❖ Presence of hypertension related complications.

4.7.2. Independent variable

- ❖ Demographic characteristics
- ❖ Age, Sex, Residency, Marital status, Occupation, Income, Educational status
- ❖ Medical history
- ❖ Smoking history, duration of hypertension and history of DM.

4.8. Data Collection Process and Measurement

Data collection format containing individual patient characteristics was prepared before the data collection time. Data collectors will visit patients at the Hypertension Follow up clinic every Wednesday and Thursday and will go through all the patients' files to identify those with Hypertension. The patients who were identified will then be assessed for inclusion in the study. A

structured pre-tested questionnaire was used and the patient was interviewed to fill the data collection format with needed information. The Questionnaire will have 2 parts. The first part contains questions about socio-demographic variables; the second part contains questions about clinical characteristics and presence or absence of hypertension-related complications and associated features

4.8.1. Infection precaution during COVID-19

Standard precaution for COVID-19 prevention like hand washing after touching each patient, using personal protective equipment like face mask preferably N-95, gloves, face goggles and hand sanitizers. A participant who is suspicious for COVID-19 was excluded from the study and safe injection practice was used during sample collection. Around 5 ml of blood sample was taken from the patient for determination of renal function test.

4.9. Data collectors

Data collection was undertaken by a total of five personnel: one first year and one second-year internal medicine resident and three BSC nurses after they are trained for half-day about the study matter. They will also take training on the objective of the study, variables on the questionnaire, and its implication. Then, they were assigned to fill the data collection format. All data collection activities were supervised by trained medical residents and principal investigators.

4.10. Data analysis, processing, and Interpretation

Collected data was first cleaned, edited, and entered into a computer and analyzed using software program SPSS-20. Crude association between dependent and independent variables was assessed by Bi-variable logistic regression. The findings were discussed and compared with similar studies done elsewhere. Based on the results, recommendations and conclusions was made and disseminated

4.11. Data quality assurance

To ensure data quality pre-testing of data collection tools was made. Adequate training was provided for data collectors, and the compilation format was prepared in simple English to maintain clarity and easier understanding by those data collectors. The collected data was checked for completeness and consistency on the day of collection by the principal investigator and any inconsistency, inaccuracy, or missing data implied was returned for correction on the

same day. Technical support was provided by a senior internist on the collected data. There was also a demonstration and a practical session on interviewing and record reviewing. The participants was given appropriate manuals and guidelines during the training

4.12. Ethical consideration

Ethical clearance to conduct the study was obtained from the ethical Review Board of Jimma University, before official commencement of the data collection process. A letter of recommendation was obtained from the above responsible office to the head of out-patient medical clinics and each medical ward. Written informed consent was obtained from all patients before data collection. Patient's confidentiality, equity of services and interests of patients was ensured during the study period. This study doesn't involve any potentially harmful intervention to the patient. All patients participating in this study were offered clinical care equally with other patients.

4.13. Dissemination plan

After research completion and finalizing the report, the findings of the study are disseminated to all relevant stakeholders through presentation and publication in peer-reviewed reputable journals. Copies of the research are given to Jimma University, JUMC, from which data was collected, to the department of Internal Medicine, to the ministry of health and Ethiopian Non-communicable diseases (NCDs) association, other concerned institutions, and stakeholders and for possible intervention based on the findings.

4.14. Operational definitions

- ❖ **Hypertension:** is defined as systolic blood pressure (SBP) greater than or equal to 140 mmhg and diastolic blood pressure (DBP) greater than or equal to 90 mmhg
- ❖ **Hypertensive patients:** are patients with average systolic blood pressure of >140 mmhg and diastolic blood pressure >90 mmhg with or without the presence of the clinical outcome as a result of persistently high blood pressure.
- ❖ **Hypertension complications:** is clinical outcome that results from persistently elevated blood pressure.
- ❖ **Stroke:** is a clinical event related to impairment of cerebral circulation that lasts longer than 24 hours secondary to hypertension.

- ❖ **End organ damage:** usually refers to damage occurring in major organs fed by the circulatory system (heart, kidneys and brain) which can sustain damage due to uncontrolled hypertension.
- ❖ **Comorbidities:** is the presence of two or more conditions simultaneously.

Chapter Five

Result interpretation and presentation

In this study four hundred fourteen were assessed making the response rate of the study 98.57%. From the total of four hundred fourteen hypertensive patients included in this study about 60.1% are residents from the urban while the rest 39.9% are from rural areas. Majority of the study participant are married (88.4%) and of the respondents 58.5 % are male and the rest 41.5% are female. Many of the respondents were in the age category 50-59 which account for 36.2%, 27.5% of them are greater than sixty years old and 21.7% of them were categorized between 40-49 years old. As the socio-demographic characteristics data shows in the table below majority (88.4%) of the respondent are married, 60.1% of them are from rural residence and 58.5% of them are male participants. According to the study finding the complications associated with hypertension are serious healthcare outcomes and it's a burden for Jimma Medical Center. Hypertension, as the main cardiovascular (CV) risk factor, has its major impact on the development of CV disease and its common occurrence is in the older population. This effect of hypertension is the result of the synergistic action of a wide range of the concomitant CV risk factors and the influence of hypertension on the development of renal function decline, which, in turn, further amplifies progression of CV disease.

Table 1 *Socio demographic characteristics of patients with Hypertension who visit JUMC Internal medicine department from October 2020 to November 2020 (N=414).*

A total of 414 adult patients were participated with the response rate of 98.5%. Of the total, 242(58.5%) were male participants. Most of the respondents were married (88.4%) and farmers (31.6%).Majority of the participants (41.1%) have completed grade 1-8 while 84(20.3%) of the respondents have completed college or University level.

<i>Socio-demographic characteristics</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Age of the respondents</i>	<i><40</i>	<i>60</i>	<i>14.5</i>
	<i>40-49</i>	<i>90</i>	<i>21.7</i>
	<i>50-59</i>	<i>150</i>	<i>36.2</i>
	<i>>60</i>	<i>114</i>	<i>27.5</i>
<i>Gender of the respondents</i>	<i>Male</i>	<i>242</i>	<i>58.5</i>
	<i>Female</i>	<i>172</i>	<i>41.5</i>
<i>Educational status</i>	<i>Illiterate</i>	<i>112</i>	<i>27.1</i>
	<i>Grade 1-8</i>	<i>170</i>	<i>41.1</i>
	<i>Grade 9-12</i>	<i>48</i>	<i>11.6</i>
	<i>College/University</i>	<i>84</i>	<i>20.3</i>
<i>Occupation</i>	<i>Farmer</i>	<i>131</i>	<i>31.6</i>
	<i>Housewife</i>	<i>95</i>	<i>22.9</i>
	<i>Government employee</i>	<i>120</i>	<i>29.0</i>
	<i>Merchant</i>	<i>26</i>	<i>6.3</i>
	<i>Daily labor</i>	<i>17</i>	<i>4.1</i>
	<i>Non-government employee</i>	<i>15</i>	<i>3.6</i>
	<i>Other</i>	<i>10</i>	<i>2.4</i>
<i>Marital status</i>	<i>Married</i>	<i>366</i>	<i>88.4</i>
	<i>Divorced</i>	<i>20</i>	<i>4.8</i>
	<i>Widowed</i>	<i>28</i>	<i>6.8</i>
<i>Monthly income</i>	<i><2000</i>	<i>145</i>	<i>35.0</i>
	<i>2000-5000</i>	<i>212</i>	<i>51.2</i>
	<i>5000-10000</i>	<i>44</i>	<i>10.6</i>
	<i>>10000</i>	<i>13</i>	<i>3.1</i>
<i>Residency</i>	<i>Urban</i>	<i>165</i>	<i>39.9</i>
	<i>Rural</i>	<i>249</i>	<i>60.1</i>

As the below **table 2:** shows in the majority of patients (47.6%) the duration of hypertension is 1-5 years, in 27.8% the duration of hypertension is 6-10 years, in 11.8% the duration of hypertension is 11-16 years, 8.0% of them are on medication for <1 year and about 1.9% of the patient are on medication and follow-up for the past 30 years.

Table 2: *Duration of hypertension in patients who have follow-up at JUMC, October 2020 to November 2020 (N=414).*

<i>Duration (years) of Hypertension</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i><1 year</i>	<i>33</i>	<i>8.0</i>
<i>1-5 years</i>	<i>197</i>	<i>47.6</i>
<i>6-10 years</i>	<i>115</i>	<i>27.8</i>
<i>11-15 years</i>	<i>49</i>	<i>11.8</i>
<i>16-20 years</i>	<i>12</i>	<i>2.9</i>
<i>26-30 years</i>	<i>8</i>	<i>1.9</i>

As the below **table 3:** shows the most common complications of hypertension (37.2%) is Coronary heart disease (CHD), or coronary artery disease, that develops when the coronary arteries become too narrow, the coronary arteries are the blood vessels that supply oxygen and blood to the heart; form this coronary heart disease 17.4% is caused by HHD. Cerebrovascular disease occurs in 17.4% of patients of which 11.6% have history of hemorrhagic stroke that the complication occurs when blood from an artery begins bleeding into the brain. This happens when a weakened blood vessel bursts and bleeds into the surrounding brain. In this case the most important behavioral risk factors for heart disease and stroke are unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. Of 18.4% was calf-muscles pain that can arise from a variety of conditions ranging from accidental trauma to nerve conditions. Calf pain in the absence of trauma or other symptoms is commonly due to a muscle cramp, there are more serious conditions that lead to calf pain, such as peripheral artery disease. Calf pain can be due to deep vein thrombosis, which is a serious and life-threatening condition and 2.4% was complication occurs due to the disorders of retinopathy this is occurred when prolonged high blood pressure happen by chronic problem in which the force of the blood against in arteries is too high. The force is a result of the blood pumping out of the heart and into the arteries as well as the force created as the heart rests between heartbeats and the tissue that makes up the arteries will begin to stretch and will eventually become damaged.

Table 3: *Types of complications in hypertensive patients who have follow up at JUMC, October 2020 to November 2020 (N=414).*

<i>Types of complications</i>	<i>Frequency</i>	<i>Percentage</i>
<i>Coronary heart disease (CHD)</i>	<i>154</i>	<i>37.2</i>
<i>HHD</i>	<i>72</i>	<i>17.4</i>
<i>Systolic dysfunction</i>	<i>56</i>	<i>13.5</i>
<i>LVH</i>	<i>28</i>	<i>6.8</i>
<i>Diastolic dysfunction</i>	<i>27</i>	<i>6.5</i>
<i>Cerebrovascular Disease (CVD)</i>	<i>72</i>	<i>17.4</i>
<i>Hemorrhagic Stroke</i>	<i>48</i>	<i>11.6</i>
<i>Ischemic Stroke</i>	<i>24</i>	<i>5.8</i>
<i>Chronic kidney disease</i>	<i>20</i>	<i>4.8</i>
<i>Hypertensive Retinopathy</i>	<i>10</i>	<i>2.4</i>
<i>PAD</i>	<i>4</i>	<i>0.97</i>

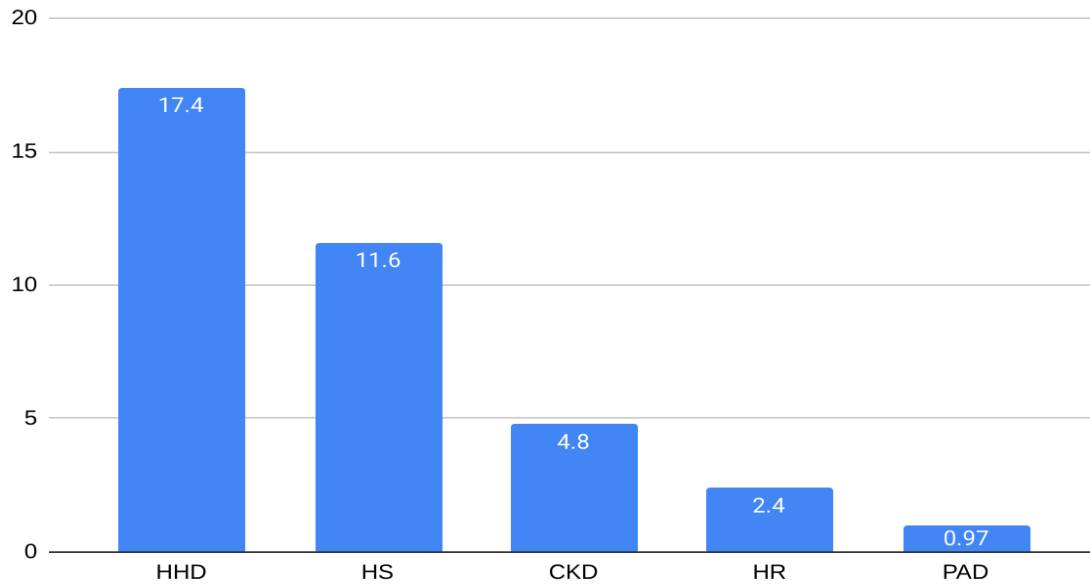


Figure 2: Complications of hypertension

As shows in the above bar chart interpretation of the associated factors indication of hypertension complication in this study were as the majority about 37.2% by coronary heart disease that the major cause of complication according to finding of this study shows of 17.4%, 4.8%, 2.4% and 0.97% was HHD, Hemorrhagic Stroke, chronic kidney disease, hypertensive retinopathy and PAD respectively complication of hypertension as show in this study.

As the below **table 4:** shows factors associated with hypertension are significantly associated with their complication ($p < 0.05$). It shows that 13.3% of them have diabetes mellitus while 8.7% of them are smokers. In this study the sex, age, educational status, duration of hypertension and the residence of the study participants are the most common risk factors associated with hypertension related complications.

Table 4: *Frequency distribution of associated factors for hypertension related complications among patients who have follow up at JUMC October 2020 to November 2020 (N=414).*

Variables	Category	Complication of hypertension		P-value
		Frequency	Percentage	
DM	Diabetic	55	13.3	0.000
	Non diabetic	359	86.7	
Smoking	Smoker	36	8.7	0.001
	Non-smoker	378	91.3	
Sex	Male	242	58.5	0.002
	Female	172	41.5	
Age	<40	60	14.5	0.000
	40–49	90	21.7	
	50–59	150	36.2	
	>60	114	27.5	
Edu	Illiterate	112	27.1	0.000
	Grade 1-8	170	41.1	
	Grade 9-12	48	11.6	
	College/University	84	20.3	
Duration of hypertension	<1 year	33	8.0	0.007
	1-5 years	197	47.6	
	6-10 years	115	27.8	
	11-15 years	49	11.8	
	16-20 years	12	2.9	
	26-30 years	8	1.9	
Residency	Urban	165	39.9	0.013
	Rural	249	60.1	

Chapter Six

Discussion

Hypertension is one of the leading causes of cardiovascular disease and premature mortality in patients who live in developing countries like Ethiopia. It is a risk factor for all clinical manifestations of atherosclerosis since it is a risk factor for atherosclerosis itself and an independent predisposing factor for heart failure, coronary artery disease, stroke, kidney disease, and peripheral arterial disease. Hypertension is the most common important risk factor for cardiovascular morbidity and mortality, in industrialized countries. In this study on hypertension and its complications suggests that cardiovascular cerebrovascular, Diabetes mellitus, calf muscles pain, smoking and chronic kidney disease which it means renal disease are the main Complications among others. As this study assessment feedback shows the majorities 88.4% of the study participants were married, about 60.1% of them came from the rural area and 58.5% were the male participants. Hypertension suggests that cerebrovascular, cardiovascular and renal are the main Complications among others. Either through ruptured vessels resulting in hematoma or narrowed vessels leading to ischemia are the very important mechanisms (12). Approximately 85% of strokes are due to infarction and the remainders are due to hemorrhage, either intracerebral hemorrhage or subarachnoid hemorrhage. The incidence of stroke rises progressively with increasing blood pressure levels, particularly systolic blood pressure in individuals >65 years old. In a Survey done in recognition of world hypertension day in 2014 in Addis Ababa, about 47.3% of patients had prehypertension. Men had a significantly higher prevalence than women (AOR 1.4 (1.2-1.7), $P < 0.0001$). The prevalence significantly increased with increasing age with an increase of 10% per decade (AOR for age group >65 years is 23 (95%CI: 14.0-37.4) compared to those under 25 years of age). But in this study the respondents 36.2% was category age in the 50-59 group. Of 60.1% where rural residence and 58.5% were the male participants, so this flinging's have similar outcome on hypertension (14). In a hospital-based cross-sectional survey done Study at Jimma University in 2013 71.7% of them were 35 years that have similarity with this study finding (15).

As the finding of this study the complications of hypertension disease 37.2% (N=154) were chronic heart disease. This is similar to a study conducted in Tanzania which showed (27.8%) presented with hypertensive heart failure (20). In case this CHD indication 17.4% caused by

HHD and also cerebrovascular disease were as 17.4% this is similar to the study conducted in Nigeria (23.7%) were due to hypertension-related complications, Heart failure occurred in (22%) cases while renal failure and encephalopathy accounted for (9.4%) and (1.7%) hypertensive complications respectively (21). This study in many cases shows similarity with the same study in Nigeria that means the African continent countries have similar live status but in our country specially in this study area many of hypertensive patients have no more information that used to keep their health status when I compared to others African countries. Hypertensive heart disease is the result of structural and functional adaptations leading to left ventricular hypertrophy, diastolic dysfunction, CHF, abnormalities of blood flow due to atherosclerotic coronary artery disease and microvascular disease, and cardiac arrhythmias. Individuals with left ventricular hypertrophy are at increased risk for, stroke, CHF. Aggressive control of hypertension can regress or reverse left ventricular hypertrophy and reduce the risk of cardiovascular disease. As the study conducted in Tikur Anbessa Hospital in 2015 show 51% were male, 67% of these patients had the cerebrovascular disease (stroke), 11% had a stroke and hypertensive heart disease, 8% had a stroke, hypertensive heart disease, this is significantly similar 37.2% chronic heart disease; form this CHD indication 17.4% caused by HHD and also cerebrovascular disease were as 17.4%, of 8.7% were have history of hemorrhagic stroke (11). This problem and skill gap is opening the way of losing many people due to chronic disease and their complications. In the other scenario 70% of total patients developed cardiac complications in Bangladesh, 27% of patients had renal complications and 23% of patients had retinopathies (16).

This study was specifically related to the study conducted in my study area. Diabetes has several complications of which one is hypertension or high blood pressure. Data indicate that at least 60-80% of individuals who develop diabetes will eventually develop high blood pressure. The high blood pressure is gradual at early stages and may take at least 10-15 years to fully develop. Besides diabetes, other factors that may also increase high blood pressure include obesity, insulin resistance and high cholesterol levels. In general, fewer than 25% of diabetics have good control of their blood pressure. The presence of high blood pressure in diabetes is associated with a fourfold increase in death chiefly from heart disease and strokes. It has also been shown in recent epidemiological studies that variability of blood pressure, independent of mean blood

pressure level, contributes to microvascular and macrovascular complications in those with diabetes, including heart failure.

In this study finding many of the study participants was categorized in 50-59 age which account 36.2%, 27.5% were as greater than sixty years and 21.7% was categorized between 40-49 years. This also has the similarity that study conducted from tertiary hospitals live in Nigeria most of them are found to be between 50 and 70 years and that is the usual scenario in hypertension, except for some primary cases which are seen in earlier age. This is similar to the above study done in Nigeria which revealed that about 23.7 % patients presented with hypertensive complication were with a mean age of 51.9 ± 17.5 years (21).

As the finding of this study shows a hemorrhagic stroke occurs when blood vessels in the brain rupture, causing blood to accumulate in the surrounding brain tissue and it can leave part of your brain deprived of blood and oxygen. Those the study assessed at Debra Tabor General hospital a significant proportion of hypertensive patients poorly adhere to antihypertensive medications. Age, residence, pill burden, and knowledge about hypertension and its treatment are important predictors of medication adherence (22). Thrombolytic medications are used to treat an ongoing ischemic stroke caused by a blocked artery. They stop the stroke by dissolving the blood clot that has blocked blood flow to the brain. And Blood-thinning medications drugs include antiplatelet drugs and anticoagulants and work to prevent blood clotting that causes ischemic stroke (22).

Chapter Seven

Conclusion and Recommendation

7.1. Conclusion

High blood pressure (hypertension) can quietly damage the body for years before symptoms develop. Uncontrolled high blood pressure can lead to disability, a poor quality of life, or even a fatal heart attack or stroke. Treatment and lifestyle changes can help control the high blood pressure to reduce your risk of life-threatening complications. The damage of brain outcome depends on a nourishing blood supply to work properly. But high blood pressure can cause several problems that because of a stroke occur when part of your brain is deprived of oxygen and nutrients, causing brain cells to die. Blood vessels damaged by high blood pressure can narrow, rupture or leak. High blood pressure can also cause blood clots to form in the arteries leading to your brain, blocking blood flow and potentially causing a stroke. The most common are Coronary artery disease because the arteries narrowed and damaged by high blood pressure have trouble supplying blood to your heart. When blood can't flow freely to your heart, you can have chest pain (angina), irregular heart rhythms (arrhythmias) or a heart attack. Kidney risk appears to be more closely related to systolic than to diastolic blood pressure and black men are at greater risk than white men for developing ESRD at every level of blood pressure. Hypertensive retinopathy is a condition characterized by a spectrum of retinal vascular signs in people with elevated blood pressure. Hypertension can damage the tiny, delicate blood vessels that supply blood to your eyes; Damage to the light-sensitive tissue at the back of your eye (retina) can lead to bleeding in the eye, blurred vision and complete loss of vision.

7.2. Recommendation

Effective management and treatment of hypertension requires clinicians and patients to work together to balance pharmacologic and non-pharmacologic interventions and prevent target organ damage.

- *Ensure that healthcare professionals taking blood pressure measurements have adequate initial training and periodic review of their performance.*
- *Healthcare providers must ensure that devices for measuring blood pressure are properly validated, maintained and regularly recalibrated according to manufacturers' instructions.*

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II. Consent Form

Consent Form for Study Participants

Jimma University, Institute of Health

I. Consent form in English Information to the Participant

Interview code no _____

Greeting and self-introduction and consent

Greeting: - Good morning/afternoon.

My name is. _____. I am a physician /Nurse working in JUMC. We are conducting a scientific research on assessment of hypertension related complication among hypertensive patients having follow-up at JUMC. Therefore, I would like to inform you that you are one of the potential participants in this study. This study requires you to participate so that important information can be obtained regarding your health. Your participation is entirely based on your willingness and your refusal doesn't affect the service you will get from us in any way. If you are willing to participate in the study, we will interview you and review your chart for some health related questions. The total time to be used per individual participant was around 20 minutes.

The information gathered was used for writing a proposal for partial fulfillment of a specialty certificate in Internal Medicine at Jimma University. Your participation is only determined by you. Here, I want to assure you that any information obtained from you and your medical records will remain confidential indefinitely. The participant won't be asked any fee during the study. You can dropout any time during the study and also you have full right to ask us questions. If, at any time, you have questions about the study, you may contact me at (+251-910946331).

Do you wish to participate in the study?

If the participant agrees to participate in the study, proceed with the interview after the patient has signed the consent.

I, _____ have been told of the contents of this research form and I have adequate information about the research and understood it; and I do agree to participate in this Research study.

Signature of Participant _____ Date _____

If the participant says “No, I don’t want to participate in the study”, thank him (her) and stop.

Thank you!

Name of interviewer _____ Date ____/____/____

II. Consent form in Afaan Oromoo
Odeeffannoo qoratamaaf kennamu

Ani maqaan koo Dr.Amaaree Hayiluu yoon ta’u karoora barreeffama eebbaa irratti hirmaataa akka naaf taataniif kabajaan isin gaafadha. Qorannoo ken adeems famu bifa gaaffii deebii tiin, fi kaardii yaalumsa keessanii irraa odeeffannoo fudhachuun ta’a. Odeeffannoon qorannoo kanarraa argamu hojii fuuldura adeemsifamuuf bu’aaguddaa kan kennu qoratamaa irratti immoo dhibaa kan hingeessifnedha. Qorannoo kana keessaas yeroo barbaaddanitti ba’uu kan dandeessan yoo ta’u kun immoo tajaajila isin argattanirratti dhiibbaa hin qaqqabsiisu.

Qorannaa irratti hirmaachuuf yoo walii galan bakka armaan gadii irratti mallattoon mirkaneessaa.

Galatoomaa

Mallattoo hirmaataa.....Maqaa qorataa.....Guyyaa.....

Yoo qo’annaa irratti qooda fudhachuu hinbarbaadne galateeffadhaa dhiisaa.

III. Consent Form in Amharic

የፍቃድኝንት መጠየቂያ ቅፅ (አማርኛ ግልባጭ)

ስለጥናቱ አስፈላጊ የሆኑ ሙሉ መረጃዎች በምቸለው ቋንቋ አንብቤ ወይም ተነባልኝ ጥናቱ ከጅምር ይነሽርስቲ የጥናቶች ስነ-ምግባር አጣሪ ኮሚቴ ታይቶ የፀደቀ መሆኑን ተረድቻለሁ። በተጨማሪም ስለ ጥናቱ አላማውንና ጥቅም፣ ቅድመ ተከተል፣ በጥናቱ ሳቢያ ሊከሰቱ የሚችሉ ጉዳዮች፣ ሚስጥር አጠባበቅ እና ሌሎችም ጥናቱን በሚመለከቱ ጉዳዮች ገለጻ ተደርጎልኝ በሚገባ ተረድቻለሁ። ስለዚህ በጥናቱ ለማሳተፍና ለመስጠት እንዲሁም የተጠየኩትን መረጃ ለመስጠት ፍቃድኝ ነኝ።

እኔ አቶ/ወ/ሮ/ወ/ሪት፣ _____ በጥናቱ ላይ ለመሳተፍ በፍቃድኝንት ላይ የተመሰረተ የተሳትፎ ስምምነት የሰጠሁ መሆኑ በፍርማዎ ለማረጋገጥ እወዳለው ።

ፊርማ፣ _____, ቀን፣ _____

ዳታ ሰብሳቢ ስም፣ _____ ፊርማ፣ _____

ማንኛውም ጊዜ መረጃ መስጠት ካልፈለጉ ማቋረጥ ይችላሉ።

III. Questionnaire

Questionnaire No.: _____

Data collection instrument on assessment of hypertension related complication and associated factors among hypertensive patients having follow up at Jimma university medical center, Jimma, southwestern Ethiopia

General information

Name of Hospital.....JUMC.....

Medical record (card) number.....

Part one: Demographic and socio-economic characteristics of the participant

1. Age..... (Years)
2. Sex: A. Male B. Female
3. Marital status: A. Single B. Married C. Divorced D. Widowed
4. Residence: 1. Rural 2. Urban
5. Estimated distance from hospital _____ (km) OR _____(minutes)
6. Educational level: A. Illiterate (not educated) B. Primary (grade 1-8)
C. Secondary (grade 9-12) D. University/college
7. Occupation
A. Farmer B. Housewife C. Government employed D. Merchant (business man/woman) E. student F. Daily labor G. Non-Government employed H. Other (Specify).....
8. Monthly income..... (In Birr)

Part two: Clinical characteristics of the participants

9. Duration of hypertension (in years) since diagnosis
10. Do you have DM A) Yes B) No
11. History of smoking present? A) Yes B) No
12. Is there previous history of chronic kidney disease? A) Yes B No
13. If No for q11 there any history of decreased urine output and body swelling?
A) Yes B) No

14. Any previous ultrasound of the kidneys? (check the chart) A) Yes B) No
15. If yes for q14 what is the result
A) Normal B) CKD C) Renal parenchymal Disease D) Other (specify).....
16. Have you ever had sudden onset body weakness? A) Yes B) No
17. If yes for q16 is brain CT scan/MRI done? A) Yes B) No
18. If Yes for q16 what is the result A) hemorrhagic stroke B) Ischemic stroke C) other (specify)
19. Have you ever been told to have cardiac disease? 1. Yes 2. No
20. If No for q19 do you have orthopnea, PND, body swelling or chest pain
A) Yes B) No
21. If yes for q19 was Echo or ECG done for you? A) Yes B) No
22. If yes for q19 what was the result? Be specific.....
23. Have you ever experienced blurring of vision or double vision? A) Yes B) No
24. If yes for q23 have you ever had ophthalmic evaluation?
A) Yes B) No If Yes what is the result be specific.....
25. Have you ever felt pain in the calf muscles while walking which is relieved by rest?
A) Yes B) No
26. If yes for q25 is Doppler Ultrasound done? A) Yes B) No
27. If Yes for q25 what is the result A) normal B) PAD C) other (specify).....

Thank you very much!