

**FACTORS ASSOCIATED WITH ADHERENCE TO
ANTIHYPERTENSIVE MEDICATIONS AMONG PATIENTS
ATTENDING HYPERTENSIVE CLINIC AT JAKAYA KIKWETE
CARDIAC INSTITUTE, DARESSALAAM**

Andrew M. Magelewanya

MSc. In Critical care and Trauma Dissertation
Muhimbili University of Health and Allied Sciences
October, 2021

Muhimbili University of Health and Allied Sciences
Department of Clinical Nursing



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MEDICATIONS AMONG PATIENTS ATTENDING HYPERTENSIVE CLINIC AT
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"A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master
of Science in Critical care and Trauma of the Muhimbili University of Health and Allied
Sciences"

October, 2021

CERTIFICATION

The undersigned certify that they have read and hereby recommend for a dissertation entitled **“factors associated with adherence to antihypertensive medications among patients attending hypertensive clinic at JKCI Dares salaam”**, in(partial) fulfillment of the requirements for the degree of Master of Science in Critical care and Trauma of Muhimbili University of Health and Allied Sciences.

Dr. Menti Ndile

(Supervisor)

Date: _____

Baraka Malaki

(Co - Supervisor)

Date: _____

**DECLARATION
AND
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I, **Andrew M, Magelewanya**, declare that this dissertation is my original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature..... **Date**.....

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ACKNOWLEDGMENT

To the almighty God, from whom we receive all that we are and all that we have. I would like to express my sincere gratitude to Dr. Menti Ndile and Mr. Baraka Malaki who are my research supervisors and mentored me through developing and implementing this work of research. I am also grateful to Jakaya Kikwete Cardiac Institute for allowing me to conduct this study. My sincere appreciation also goes to all hypertensive patients who provided valuable information that led to the realization of this dissertation. The lecturers and other staff in the department of clinical nursing and community health nursing, I would like to thank you for making my research course enjoyable. To my parents for their dedication and investment in my education and development as a person. To my loving wife Grace Yona and my son Andres for their self-love, tolerance, and support. God may bless you all.

ABBREVIATIONS

ICU	Intensive care Unit.
IRB	Institutional Review Board.
JKCI	Jakaya Kikwete Cardiac Institute.
MI	Myocardial Infarction.
MUHAS	Muhimbili University of Health and Allied Sciences
WHO	World Health Organization.

DEFINITION OF TERMS

Medication adherence: Defined as taking medication to the level as it has been ordered by a health care provider (WHO, 2003a).

Uncontrolled hypertension: Defined as an average systolic blood pressure of greater or equal to 140 mmHg or average diastolic blood pressure of greater or equal to 90 mmHg, among those with hypertension (Shen et al., 2015).

Stroke: Defined as a neurological deficit condition in which blood flow to the brain is reduced and causes brain cell death (Patricia, 2018).

Kidney injury: Sudden episode of loss of kidney function or kidney damage that happens within hours or a few days (Patricia, 2018).

Healthcare delivery system: Defined as “the organization of people, institutions, and resources to deliver health care services to meet the health needs of a target population.” (Piña et al., 2015).

Myocardial Infarction: Defined as “the irreversible death (necrosis) of heart muscle secondary to prolonged lack of oxygen supply (ischemia)”(Wang et al., 2017).

Patient-related factors: According to WHO patient-related factors represent the resources, knowledge, attitudes, beliefs, perceptions, and expectations of the patient toward illness and antihypertensive medications adherence (WHO, 2003b).

ABSTRACT

Background: Medication adherence is essential in the treatment of chronic conditions such as hypertension. In Tanzania little is known about adherence status to antihypertensive medications and its associated factors

Aim of the study: This study aimed to identify factors associated with adherence to antihypertensive medication among the patients with hypertension attending Jakaya Kikwete Cardiac Institute.

Materials and Methods: This was a cross-sectional study design. About 379 hypertensive patients who were prescribed one or more regular antihypertensive medications for least a month were recruited in the study using simple random sampling. Self-reporting method of the 8 items Morisky Medication adherence scale was used to measure medication adherence. SPSS software computer program version 20 was used to enter and analyze data. Descriptive statistic was used. Associations of variables with medication adherence were determined by using the chi-square test and logistic regression.

Results: The proportion of antihypertensive drug adherence among hypertensive patients was 55.40%. Use of traditional medicine (AOR=0.08, 95% CI=0.04-0.18), having belief that prayers can cure hypertension (AOR=0.15, 95% CI= 0.09-0.27), having health insurance (AOR=2.97, 95 %CI=1.07-8.30) and unsatisfactory interactions with pharmacy service (AOR=0.57, 95 %CI= 0.33-0.98) were significantly associated with adherence to antihypertensive medications. Levels of education had statistically significant associations with medication adherence but complex, respondents who had primary education (AOR= 2.08, 95%CI=1.08-4.03) and college/university (AOR=3.11, 95%CI= 1.38-7.00) had greater adherence than respondents who had secondary education.

Conclusion: Use of traditional medicine, having individual beliefs that prayer can cure hypertension, having health insurance, and unsatisfactory experiences with pharmacy service associating with poor adherence to antihypertensive medications. To improve hypertension control, these factors should be considered.

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CHAPTER ONE

INTRODUCTION

1.1. Background

Hypertension according to World Health Organization is a situation whereby blood vessels have consistently raised pressure (WHO, 2003). Hypertension is a chronic, non-communicable disease and is a leading cause of cardiovascular-related morbidity (Rachael, 2017). It has a mortality rate of at least 7.5 million deaths per year globally (Rachael, 2017) and is considered a top-three cause of morbidity and mortality worldwide (Abegaz et al., 2017). Research surrounding awareness, prevalence, adherence, and treatment are essential to provide baseline information to develop strategies for the better control of hypertension.

The global prevalence of hypertension is 31% among adults over 18 years (County, 2019). According to WHO, in 2015 it was found that 1 in 4 men and 1 in 5 females had hypertension, it is projected that, by the end of 2025, we will have 1.56 billion hypertensive patients. In African countries, its prevalence and mortality are increasing rapidly due to lifestyle change and inactive lifestyles (Ambaw et al., 2012).

Africa experiences a great burden of cardiovascular diseases resulting from uncontrolled hypertension, but this has been hidden by giving greater priority and global focus to infectious diseases such as HIV/AIDS (Bosu et al., 2019). Prevalence of hypertension was found to be 10%-20% higher in Tanzania than in other nations in the Sub-Saharan region (Galson et al., 2017). Alongside the high prevalence, awareness of the diagnosis, prevention, and management strategies was found to be very low (Galson et al., 2017). Only a small number of those found to have hypertension had achieved effective therapeutic control. It has been proposed that this treatment gap is an effect of weaknesses in communication and the health care system (Galson et al., 2017). One study done in 2017 conducted in Ukonga Dares Salaam-Tanzania showed that the prevalence of hypertension was 37% (Rachael, 2017). Tanzania is facing increasing urbanization and transition to more western styles of living especially in large cities like Dares Salaam. These lifestyle changes result in more processed diets, physical inactivity, increased alcohol consumption, and cigarette smoking (Joho, 2012).

Alcohol consumption, cigarette smoking, physical inactivity, and diet are the major modifiable determinants of hypertension (Munnangi & Boktor, 2019; Rachael, 2017; Zeller et al., 2008). One epidemiological study in Dares salaam reported that alcohol and tobacco smoking was 17.2% and 8.7% respectively and past-year cannabis use was 0.8%. Pure use of alcohol was estimated to be 7.7 liters per individual aged ≥ 15 years (average of 11.4L from males and 4.0L from females in Tanzania (McDonald & Garg, 2002).

Medication adherence is essential in the treatment of chronic conditions such as hypertension. Effective control of high blood pressure is dependent upon consistent adherence to antihypertensive medication. Poor adherence to antihypertensive medication is the biggest barrier in achieving targeted blood pressure (Ambaw et al., 2012). It also affects the efforts of the health care system, policymakers, and healthcare professionals in improving the wellbeing of the population. This poor adherence to antihypertensive medication leads to uncontrolled hypertension and uncontrolled hypertension can lead to loss of quality of life, disability, stroke, heart attack, kidney injury loss of quality of life, and disability and which can result in long-term ICU admission.

There are effective medical treatments of hypertension in Tanzania; however, hypertensive patients do not adhere to these medical treatments. In 2017 only a small number were found showed to have controlled blood pressure (Galson et al., 2017). The problem of poor adherence to antihypertensive drugs remains a challenge for health care personnel in Tanzania. As a result, a lot of hypertension patients do not obtain the full benefit of medical care, leading to poor health outcomes, decreased quality of life, and higher healthcare costs. Despite advanced research that has been done in adherence but non-adherence remains a challenge (Esmaili et al., 2017; Galson et al., 2017).

1.2. Problem of statement

Despite evidence that antihypertensive medication adherence is vital in controlling hypertension, however, a greater number of patients have poor adherence to antihypertensive (Esmaili et al., 2017; Mekonnen et al., 2017; Obirikorang et al., 2018). In Tanzania, a study

conducted in three districts; Ilala, Temeke, and Kinondoni in the Dares Salaam region, showed that the proportion of hypertensive patients who adhered to their medication regimen was found to be only 56 % (Joho, 2012). This implies that a lot of hypertensive patients in Tanzania do not adhere to antihypertensive medication so they are at risk of developing complications related to hypertensive results from uncontrolled hypertension due to poor adherence to antihypertensive medication. Tanzania has a limited number of Intensive Care Unit beds (ICU) and other specialized units to admit patients with stroke, heart attack, kidney injury, and other complications resulting from uncontrolled hypertension due to poor adherence to antihypertensive medication (Engdahl et al., 2019).

Lack of good adherence to antihypertensive medication is generally associated with the terrible outcome of the disease and further consumption of limited resources in the health care system. In Tanzania particularly in the study area little is known especially about adherent status and factors associated with antihypertensive medication adherence. This study aims to identify factors associated with adherence to antihypertensive medications among adults attending a tertiary health service (JKCI) Ilala in Dar es Salaam.

1.3. Rationale of the study

The findings from this study were anticipated to strengthen the measures on improving adherence to antihypertensive medication among hypertensive patients by identifying those factors which are associated with antihypertensive medication adherence. Also this study apart from contributing to scientific knowledge, data gathered was expected to contribute to the implementation of new approaches in the provision of antihypertensive medication practices and therefore could improve quality of life and reduce consequences from uncontrolled hypertension such as stroke and kidney injury.

1.4. General research question

The general research question of this study was what were the factors associated with antihypertensive medication adherence among the patients with hypertensive attending Jakaya Kikwete Cardiac Institute.

1.4.1 Research questions were

1. What was the proportion of antihypertensive medication adherence among the patients with hypertension attending Jakaya Kikwete Cardiac Institute?
2. What were the patients' related factors associating with medication adherence among the patients with hypertension attending Jakaya Kikwete Cardiac Institute?
3. Which healthcare delivery system factors associated with adherence to antihypertensive medication among these patients?

1.5. Objectives

1.5.1 Broad objective

The broad objective of this study was to identify factors associated with adherence to antihypertensive medication among the patients with hypertension attending Jakaya Kikwete Cardiac Institute.

1.5.2. Specific objectives were the following

1. To determine the proportion of antihypertensive drug adherence among the patients with hypertension attending Jakaya Kikwete Cardiac Institute.
2. To determine patient-related factors associating with medication adherence among the patients with hypertension attending Jakaya Kikwete Cardiac Institute.
3. To identify healthcare delivery system factors associating with medication adherence among patients with hypertension in Jakaya Kikwete Cardiac Institute.

1.6. Conceptual framework

Conceptual framework represents a synthesis of the literature on how the researcher describes phenomena; it maps out actions required in the course of the study. Given his prior experience of the point of view of other researchers and his observations on the topic of research (Crawford, 2020).

This study was guided by the conceptual model based on a literature review describing two sets of factors interacting to determine medication adherence. The factors in this model are patient-related factors and healthcare delivery system factors. The arrows indicate a relationship and show how patient-related factors and healthcare delivery factors associating

with medication adherence behavior. This model describes Medication adherence as a dependent variable that relies on two independent variables. Patient-related factors such as having a poor attitude with antihypertensive medications; alcohol intake, and use of traditional medication may associate with poor adherence to antihypertensive medication. Having good attitude helps to make appropriate decisions and avoid misconceptions that can lead to poor adherence (Maginga et al., 2016; Mekonnen et al., 2017). Alcohol intake affects antihypertensive medication adherence because alcohol intake can lead to forgetfulness in taking antihypertensive medication, which results in poor adherence (Ambaw et al., 2012). Traditional medication is seen to be challenging and it is strongly associated with poor adherence to antihypertensive medications because patients use traditional medicine regularly to control their blood pressure instead of the usual antihypertensive medication from the hospital. Also, healthcare delivery factors such as lack of health insurance, long waiting during clinic visits, and poor communication with patients during clinic visits, may associate with medication adherence among hypertensive patients. Patient insurance helps patients to get medication/s without direct cost the patient which will influence good adherence (Natarajan et al., 2013). Long waiting during clinic visit make the patient less likely to go to the clinic in the next visit this will lead to poor adherence to antihypertensive medication (Jokisalo et al., 2002). Good communication with the patient about hypertension and its treatment is an important way to increase patients' motivation and understanding which will lead to good adherence to antihypertensive drugs (Jokisalo et al., 2002).

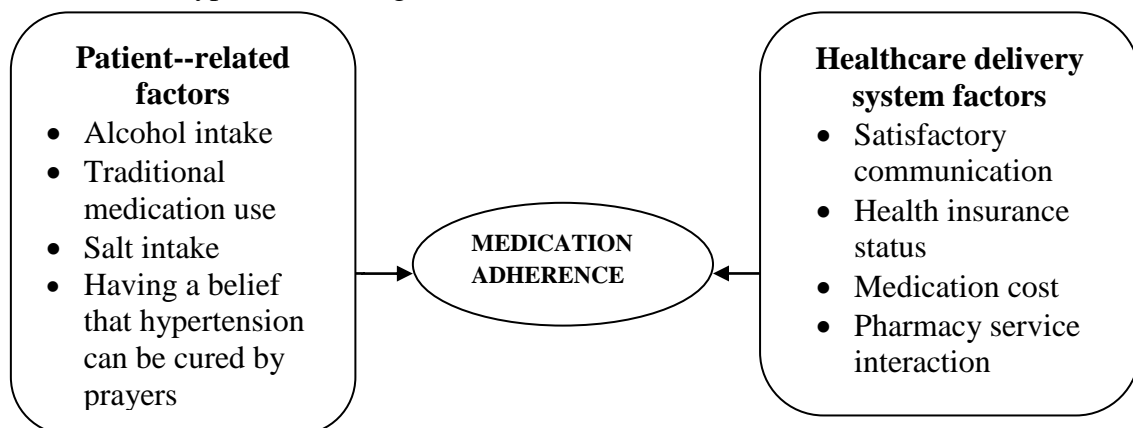


Figure 1.1: Conceptual framework describing two factors for medication Adherence

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Hypertension is a chronic disease that affects worldwide. In 2014, approximately 22% of the world's population aged 18 years and above was hypertensive (Choi et al., 2018). Hypertensive patients need to have controlled blood pressure to reduce the consequences of uncontrolled hypertension such as stroke, kidney injury, and long-term disability. Poor adherence to antihypertensive medication is the major source of uncontrolled blood pressure (Maginga et al., 2016).

In Africa, particularly Tanzania, conditions related to hypertension are the second generally common cause of hospital admission and mortality particularly in the Intensive care unit (Maginga et al., 2016).

The study done in Mwanza at Bugando Medical Centre showed that the percentage of patients with controlled Blood pressure among hypertensive patients was only 47.7% (Maginga et al., 2016).

2.2. Medication Adherence

Adherence can be defined as taking medication to the level as it has been ordered by a health care provider (WHO, 2003a). Measurement of medication adherence can be performed directly or indirectly; direct measures of adherence include a measure of drug concentration or its metabolite in urine or blood and detection of biological biomarkers which are added during drug formulation while indirect measures of medication adherence include pill counts, prescription refills, patients' clinical response, self-report by collecting patient questionnaire, using electronic medication monitors (Zeller et al., 2008).

Direct measures have a lot of shortcomings even if they seem to be the most accurate. They are expensive, and not easy to perform because they involve multidisciplinary teams including technicians, equipment, and professionals for monitoring and performing the tests. Furthermore, the test can be confounded if the patient took the medication as a single dose only, before the test (Lam & Fresco, 2015)

Indirect methods are easy to use and some are expensive. Questionnaire and clinical response are relatively easy to use, but questioning the patients can sometimes lead to overestimation of the measure of adherence because of misunderstanding of questions. Clinical response can be confounded by other factors which can influence clinical outcomes apart from adherence (Osterberg & Blaschke, 2005).

Studies on the measure of adherence have shown that there is no standard method of measuring adherence that is suitable in all settings; each method has its advantages and disadvantages (Malmen et al., 2019; Murray et al., 2004). Furthermore, there is no agreement between researchers on which tool is standard and suitable over the others on measuring adherence, selections of method or use of multi-measure approach depend on the clinical setting, data accessibility, illness type and availability of resources and time for data collection (Malmen et al., 2019). In this study researcher opted to use an indirect method using self-reporting by interview patient using questionnaire because is easy to use less expensive and is suitable in the study setting. The questionnaire consists of eight questions that extract information about medication adherence. There is a validated version of the self-reporting method (Korb-savoldelli et al., 2012) of the 8 items Morisky Medication adherence scale developed by Dr. Donald Morisky which is used to measure medication adherence, this scale consists of 8 items questions, each question carries one score (mark) and the scale score from 0 to 8, with a score of less than 6 and greater or equal to six reflecting non-adherence and good medication adherence respectively (Korb-savoldelli et al., 2012).

2.3. Patient-related factors

Several reviews have tried to highlight some of the patient-related factors associated with antihypertensive medication adherence. Some of these factors include patient resources, knowledge, attitudes, beliefs, perceptions, and expectations of the patient, these factors can have an impact on how patient adherence to antihypertensive medications (WHO, 2003b).

Attitude of the patient towards antihypertensive medication can influence medication adherence. Having a positive attitude influences good adherence with antihypertensive medication/s, good attitude also helps to make appropriate decisions and avoid misconceptions

that can lead to poor adherence, also positive attitudes towards antihypertensive medications can lead to effective uses of health care facilities including attending clinics and adherence to antihypertensive medication (Maginga et al., 2016; Mekonnen et al., 2017). But researchers currently explored fewer patient-related factors associated with adherence to antihypertensive medication. Future research could be done to explore more factors associated with adherence to antihypertensive medication in Dares Salaam.

Alcohol intake is associated with antihypertensive medication adherence. (Asgedom et al., 2018) demonstrated that alcohol intake affects antihypertensive medication adherence because alcohol intake can lead to forgetfulness in taking antihypertensive medication, which results in poor adherence (Ambaw et al., 2012), based on current research available, no information is available in Tanzania on how alcohol can affect adherence to antihypertensive medications. Further research could be done in Tanzania to determine the association between alcohol intake and antihypertensive medication adherence.

Traditional medicine use may also affect adherence to antihypertensive medications. One study found that some patients use traditional medicine to control their blood pressure instead of taking antihypertensive drugs. The use of traditional medicine as a replacement for antihypertensive medication or alongside them is a complex component of patient management and medication adherence research (Li & Mao, 2018). A further study done by (Macquart et al., 2019), explained that traditional medication is seen to be challenging and it is strongly associated with poor adherence to antihypertensive medications because patients use traditional medicine regularly to control their blood pressure instead of usual antihypertensive medication from the hospital. Now in some countries including Tanzania have the policy to make sure that patients use traditional medicine, however, no information is available on how traditional medicine use can affect antihypertensive medication adherence. Further research could be done to investigate to what extent the use of traditional medicines can be associated with antihypertensive medication adherence in Tanzania.

Salt intake can associate with medication adherence high salt intake associated with medication adherence, one study shows that patients with high salt intake showed poor

adherence to antihypertensive medication (Choi et al., 2018), however very little is known on how the use of table salt with food associate with antihypertensive medications. So further studies could be done to determine the association between antihypertensive medication adherence and the use of table salt with the food.

2.4. Healthcare delivery system factors

Healthcare delivery system factors are an important part of adherence to antihypertensive medication because it acts as a bridge between the patient and treatments that are given to patients. The health care delivery factors include medication availability, accessible health care centers, health insurance, and health workers. Several reviews have shown how health care system factors influence antihypertensive medication adherence.

Satisfactory communication, interactive communication between patient and health care provider during appointment visits increases patient satisfaction with the care and is associated with good adherence compared to those who were not satisfied (Jokisalo et al., 2002). Communication influence what the patient understands about the disease and its treatments (Alsolami et al., 2012). Information concerning hypertension and adherence is an important factor that influences medication adherence. A study done by (Jokisalo et al., 2002) in Finland shows that the patients who are aware that adherence to hypertensive medication increases life expectancy are 9% more likely to adhere to antihypertensive medication compared to those who are not aware. However, data specific to our Tanzanian clinical environment regarding how communication between health care providers and patients influences antihypertensive drug adherence is absent. Further studies could be done in Tanzania to determine the relationship between communication satisfaction and antihypertensive drugs adherence.

Health insurance status has shown to not influence antihypertensive medication/s adherence according to the study which was done in Mwanza-Tanzania by (Maginga et al., 2016), but the results of this study are contradictory. This study suggested patient insurance helps patients to get medication/s without direct cost the patient which will influence good adherence; it has been shown by several studies cited by Maginga, that the odds of managing overtime decreased by 20% for every 10,000 TZS increase (USD 6) and reduce by 70% after expenses exceed 35,000 TZS compared with <25,000 TZS by (Maginga et al., 2016). Another study

also supports the hypothesis that patients with health insurance show good adherence to antihypertensive drugs (Natarajan et al., 2013). So the relationship between health insurance and antihypertensive medication is unclear based on available research. Further studies could be done to determine how insurance status is associated with medication adherence.

CHAPTER THREE

MATERIAL AND METHODS

3.1. Study Design

This was a cross-section quantitative study. A cross-section study is an observational study and gives a picture in a single point of time about the characteristics of study participants, it's relatively simple to conduct compared to other studies, requires no time for follow-up (Noordzij et al., 2009). The researcher opted for this study design because was facilitated the identification of socio-demographic factors, healthcare delivery system-related factors, and patient-related factors associated with adherence to antihypertensive medications among hypertensive patients. This design also could make inferences on possible relationships or gathering data that can be used for further research and experiment.

3.2. Study Setting

This study was conducted in an outpatient setting at Jakaya Kikwete Cardiac institute located in Ilala district Dares Salaam. JKCI is a national referral hospital specializing in cardiovascular conditions, so it receives patients from different parts of Tanzania allowing a greater diversity of patients to be investigated. From September 2015 to April 2020 out of 334774 patients were treated at JKCI, 66% of the patients had high blood (JKCI, 2020).

Geographically Dares Salaam region is the largest city in Tanzania country, is located on a natural harbor on Africa Indian ocean coast. It is about 45 km south of the island of Zanzibar between latitudes 6.36 degrees and 7.0 degrees to the south of the equator and longitudes 39.0 and 33.33 to the east of Greenwich meridian. According to the National population Census of the year 2012, the city was found to have a population of 4.36 million accounting for 10 percent of the total Tanzania Mainland population.

3.3. Study population

Study population was adult patients age (18-64) years attending hypertensive clinics who were available during data collection and who were diagnosed with hypertension and prescribed one or more regular antihypertensive medications at least a month ago.

3.4. Inclusion Criteria were

1. Patients between the age of 18 to 64 years old, who were diagnosed with hypertension, with or without any other illness, and willing to participate were included in the study.
2. Participants who were diagnosed with hypertension with or without any other illness and prescribed one or more antihypertensive medications for at least one month were included in the study.

3.5. Exclusion Criteria were

1. Those who were not able to consent to participate in the study were excluded from the study.
2. Those who were not able to respond to interview questions due to his or medical illness were excluded from the study.
3. Patients who refused to participate in the study were excluded from the study.

3.6. Sample size

Similar studies conducted previously to determine the proportion of adherence, including the study conducted in three districts of Dares Salaam showed that proportion(p) was 56% (Joho, 2012). Therefore the formula for calculation of sample size was given by (Kirkwood, 2003).
 Sample size (n) = $Z^2 p (1-p) / e^2$

Whereby n = minimum sample size required.

e = margin of error (5%)

$$p = 56\%$$

z = standard normal curve score corresponding to 95% Confidence level =

1.96.

$$n = 1.96^2 * 0.56(1-0.56) / 0.05^2$$

From above sample size required became 379.

3.7. Sampling procedure

A probability technique using a simple random sampling procedure was employed to select the study participants. The sampling frame was obtained, and there were pieces of paper that written YES or NO, the word YES was used to represent the targeted study population, and NO was used to represent the population that was not going to participate in the study. The procedure of drawing papers from the box by each study participant was used, each participant was allowed to pick only once.

3.8. Data collection

Data were collected by the researcher alone in this study. Research subjects were interviewed with the same structured questionnaires which consist of the close-ended questions for data collection questions; the questionnaire was developed by the researcher according to the research objectives, the literature review, as well as the conceptual framework of the study. The participants were required to respond to all questions; each participant used approximately 10 to 15minutes to complete one form, data was collected for three weeks. The questionnaire was translated from the English language to the Swahili language since in Tanzania the most understandable and spoken language is the Swahili language. The questionnaire consists of several questions that extracted information on how socio-demographic, patient-related, and healthcare delivery system factors are associated with medication adherence. A validated version of the self-reporting method (Korb-savoldelli et al., 2012) of the 8 items Morisky Medication adherence scale developed by Dr. Donald Morisky was used to measure medication adherence, consist of 8 items, the scale score from 0 to 8, with a score of less than 6 and greater or equal to six reflecting non-adherence and good medication adherence respectively (Korb-savoldelli et al., 2012). Then Percentage medication adherence among study participants was computed to determine the proportion of antihypertensive medication adherence.

3.9. Validity

The questionnaires were translated from the English language to the Swahili language so it was easier for participants to understand the questions. The questionnaire was examined by a

panel of two cardiologists working at Jakaya Kikwete Cardiac Institute before data collection; the discussion was held together with the researcher to check for clarity, the kind of variables to be measured, and the relevance of the questionnaire in our Tanzanian context.

3.10. Reliability

Reliability was measured by internal consistency which was containing 5 items of the patient's related factors and 6 items of healthcare delivery system factors in the questionnaire. Cronbach's alpha (α) was computed using the SPSS program; this value was reflecting the internal consistency of the tool. Calculated Cronbach's alphas (α) were 0.65 and 0.67 for items of patient-related factors and healthcare delivery factors respectively. The questionnaire was pilot tested before actual data collection using 38 hypertensive patients at JKCI to find out ambiguous questions, ambiguous questions were removed or modified. The pilot questionnaire also helped to get estimated time was used to fill the questionnaire. Furthermore, the same structured questionnaire was given to all study participants. Data entrance was carefully monitored and audits were conducted on daily basis. Patients who were prior involved in the pilot study were not a part of the main study.

3.11. Data analysis

SPSS software computer program version 20 was used to enter and analyze the coded data. Data were cleaned before analysis to check for any error, ensuring accuracy. Also, questionnaires were checked for completeness and correct inappropriate responses.

Descriptive statistic was used; frequencies mean, and standard deviation was calculated. Objective number one, the percentage of medication adherence among study participants was computed to determine the proportion of patients who had good adherence. Objective number one and two, associations of patient's related factors and healthcare delivery system factors with medication adherence were determined by using the chi-square test, bivariate and multivariate analysis using the stepwise elimination method. Chi-square was performed first then variables with a P-value of 0.2 or less were included in bivariate analysis. Bivariate

analysis was conducted on each independent variable using logistic regression, the variable of P-value of 0.2 or less was added for the final analysis using a multivariate logistic regression model. In multivariate analysis, a variable with a P-value of 0.05 or less was considered a statistically significant finding. To determine the strength and direction of the association between independent and dependent variables an adjusted odds ratio (AOR) was calculated be calculated.

3.12. Ethical considerations

The ethical clearance to conduct this study was obtained from Muhimbili University of health and allied sciences Institutional Review Board (IRB), as well as permission to collect data, was asked and obtained from JKCI. Written informed consent was obtained; research subjects were required to sign or not sign before participating in the study after the researcher has fully explained the purpose of the study, benefits, risks, and how they will be involved in the study. Additionally, participants were able to withdraw from the study at any point in time, furthermore, data security and privacy during filling questionnaires were ensured the only researcher had access to raw data; also filled questionnaires will be stored in a safe and locked place.

3.13. Dissemination

The findings of this study will generate important information on factors associated with adherence to antihypertensive medications. Copy of this study report will be disseminated to Jakaya Kikwete Cardiac Institute, school of Nursing MUHAS, MUHAS Library, also the research findings will be sent to the Ministry of Health and Social Welfare. The research findings will be published in Nursing Journal and presented in scientific workshops and conferences both local and international.

CHAPTER FOUR

RESULTS

This chapter contains a description of results, starting with analyzing demographic characteristics of study respondents, followed by an analysis of data regarding the proportion of hypertensive patients who adhere to antihypertensive medications. Finally an analysis of patient-related factors and healthcare delivery system factors associated with adherence to antihypertensive medications among study participants.

4.1. Sociodemographic characteristics of the participants

A total of 379 study participants were interviewed, making an effective response rate of 100%. The mean age of study participants was 56.72 years with a standard deviation (SD) of ± 8.46 years. Among all participants, the majorities were females 55.94% (212/379) and males made up 44.06% (167/379). Two hundred seventy-eight (73.35%) reported to be married and 30 (7.92%) were unmarried, 59 (15.57%) were widowed, while 12 (3.17%) were divorced. Among study participants 85 (22.43%) were employed by either government or private sector, 96(25.33%) were reported to be self-employed and 198 (52.24%) were unemployed. Christian, Muslim, Hindu, and other religions accounted for 56.99%, 41.95%, 0.53%, and 0.53% respectively. Thirty-seven (9.76%) study participants reported to have no formal education, and 41.42%, 29.29%, 19.53% were reported to have primary, secondary, and college/university education levels respectively.

Table 4.1: Socio-demographic characteristics of the participants (n=379)

Variables	Frequency (n)	Percentage (%)
Age categories (years)		
Less than 41	22	5.80
41 to 50	54	14.25
51 to 60	135	35.62
61 and above	168	44.33
Sex		
Female	212	55.94
Male	167	44.06
Religion		
Christians	216	56.99
Muslims	159	41.95
Hinduisms	2	0.53
Others	2	0.53
Marital status		
Single	30	7.92
Married	278	73.35
Divorced	12	3.17
Widowed	59	15.57
Occupation		
Employed	85	22.43
Self employed	96	25.33
Unemployed	198	52.24
Level of education		
No formal education	37	9.76
Primary	157	41.42
Secondary	111	29.29
College- University	74	19.53

**The mean age was 56.72 years with standard deviation of 8.46 years. The minimum age was 18 years and maximum was 64 years.*

4.2. Proportion of antihypertensive drug adherence among study participants

In this study, the proportion of antihypertensive drug adherence among hypertensive patients was 55.40%.

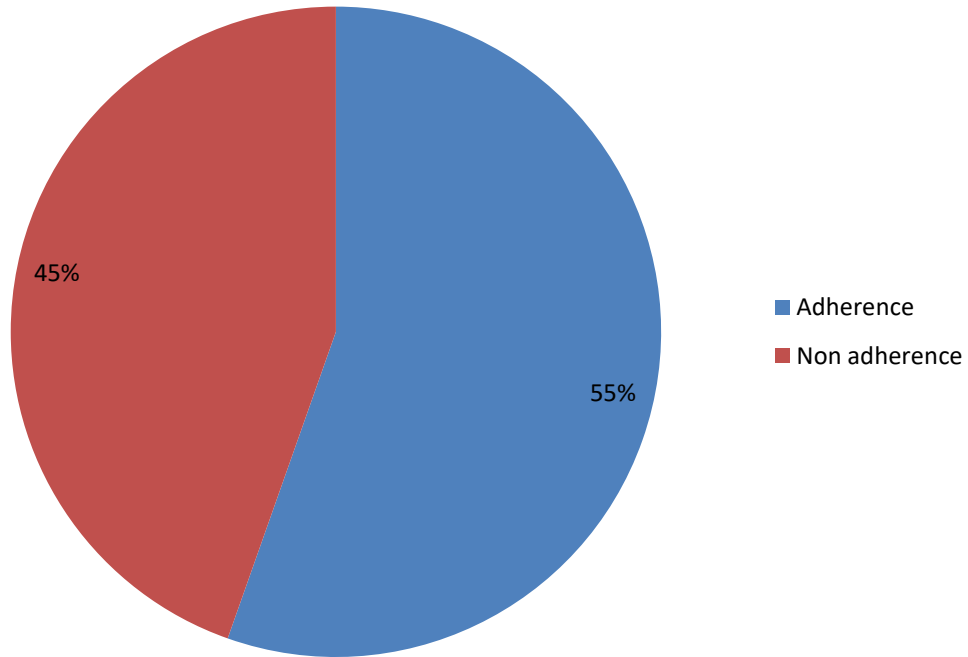


Figure 2.1: A pie chart showing the proportions of antihypertensive drugs adherence among study participants

Table 4.2: Association between socio-demographic characteristics of the participants and antihypertensive medication adherence using chi-square test

Adherence to antihypertensive drugs				
Variables	Non Adherence (n, %)	Adherence (n, %)	Total	P-Value
Age categories (years)				
Less than 41	14 (63.64)	8 (36.36)	22	0.033
41 to 50	30 (55.56)	24(44.44)	54	
51 to 60	61 (45.19)	74 (54.81)	135	
61 and above	64 (38.10)	104 (61.90)	168	
Sex				
Females	96 (45.28)	116 (54.72)	212	0.760
Males	73 (43.71)	94 (56.29)	167	
Marital status				
Single	16(53.33)	14(46.67)	30	0.525
Married	119(42.81)	159(57.19)	278	
Divorced	7(58.33)	5(41.67)	12	
Widowed	27(45.76)	32(54.24)	59	
Religion				
Christians	95 (43.95)	121 (54.09)	216	0.620
Muslims	73 (45.91)	86(54.09)	159	
Hinduisms	1(50)	1(50)	2	
Others	0(0)	2(100)	2	
Occupation				
Employed	48 (56.47)	37 (43.53)	85	0.030
Self employed	43 (44.79)	53(55.21)	96	
Retired/unemployed	78 (39.39)	120(60.61)	192	
Level of education				
No formal school	15 (40.54)	22 (59.46)	37	0.018
Primary	59 (37.58)	98 (62.42)	157	
Secondary	63 (56.76)	48 (43.24)	111	
College- University	32 (43.24)	42 (56.76)	74	

There were association between age, level of education and occupation and antihypertensive medication adherence with the P value of 0.033, 0.018 and 0.030 respectively. Variables with a p-value of 0.2 or less were included in the next step analysis using a bivariate model.

Table 4.3: Association between patient-related factors and antihypertensive medication adherence using chi-square test

Variables	Adherence to antihypertensive drugs		Total	P-Value
	Non Adherence (n, %)	Adherence (n, %)		
Use of traditional medicine				
NO	99 (33.22)	199 (66.78)	298	<0.001
YES	70 (86.42)	11 (13.58)	81	
Use of Alcohol				
NO	143 (41.57)	201 (58.43)	344	<0.001
YES	26 (74.29)	9 (25.71)	35	
Use of table salt				
NO	124 (40.26)	184 (59.74)	308	<0.001
YES	45 (63.38)	26 (36.62)	71	
Hypertension can be cured by Prayers				
Disagree	67 (25.80)	165 (74.20)	232	<0.001
Agree	102 (69.39)	45 (30.61)	147	

All patient-related factors showed association with antihypertensive medication adherence with the P values of less than 0.001. Variables with a p-value of 0.2 or less were included in the next step analysis using a bivariate model.

Table 4.4: Association between healthcare delivery system and antihypertensive medications adherence using chi-square test

Variables	Adherence to antihypertensive drugs		Total	P-Value
	Non Adherence (n, %)	Adherence (n, %)		
Health Insurance				
NO	10 (32.26)	21 (67.74)	31	0.149
YES	159 (45.69)	189 (54.31)	348	
Unaffordable Medication Cost				
NO	131(42.95)	174 (57.05)	212	0.192
YES	38 (51.35)	36 (48.65)	74	
Patients-Physician Communication Satisfaction				
NO	9(45)	11(55)	20	0.970
YES	160(44.57)	199(55.43)	359	
Experience Difficult during Clinic visit				
NO	140 (45.31)	169 (54.69)	309	0.556
YES	29 (41.43)	41 (58.57)	70	
Pharmacy service Satisfaction				
NO	85 (55.19)	69 (44.81)	154	0.001
YES	84 (37.33)	141 (62.67)	225	

Healthcare delivery system that showed association with antihypertensive medication adherence was pharmacy service satisfaction with a p-value of 0.001. Having health insurance, medication cost, patient-physician communication satisfaction, and experiencing difficulty during clinic visits were not associated with antihypertensive medication adherence with P values of 0.149, 0.192, 0.970, and 0.556 respectively. Finally, the variables with a p-value of 0.2 or less were included in the bivariate analysis model

Table 4.5: Bivariate and multivariate analysis of factors associated with antihypertensive medication adherence

Variables	Bivariate		Multivariate	
Categories	COR (95% CI)	P Value	AOR (95% CI)	P value
Age categories (years)				
61 and above	1		1	
51 to 60	0.35 (0.14-0.88)	0.026	0.64 (0.16-2.54)	0.531
41 to 50	0.49 (0.26-0.92)	0.025	0.76 (0.30-1.94)	0.574
Less than 41	0.75 (0.47-1.18)	0.213	1.09 (0.56-2.16)	0.788
Level of education				
Secondary	1	1	1	1
No formal	1.92 (0.90-4.10)	0.090	2.47 (0.87-6.97)	0.088
Primary	2.18 (1.33-3.58)	0.002	2.08 (1.08-4.03)	0.029
College- University	1.72 (0.95-3.12)	0.073	3.11 (1.38-7.00)	0.006
Occupation				
Retired/unemployed	1	1	1	1
Employed	0.50 (0.30-0.84)	0.009	0.67 (0.28-1.59)	0.362
Self employed	0.80 (0.49-1.31)	0.378	0.74 (0.37-1.48)	0.392
Use of Table salt				
NO	1	1	1	1
YES	0.39 (0.23-0.66)	0.001	0.68 (0.33-1.38)	0.284
Use of traditional Medicine				
NO				1
YES	0.09 (0.04-0.18)	<0.001	0.08(0.04-0.18)	<0.001
Use of Alcohol				
NO	1	1	1	1
YES	0.24 (0.11-0.28)	<0.001	0.40 (0.15-1.10)	0.077
Hypertension can be cured by Prayers				
Disagree	1	1	1	1
Agree	0.17 (0.11-0.28)	<0.001	0.15 (0.09-0.27)	<0.001
Health Insurance				
YES	1		1	1
NO	1.77 (0.81-3.86)	0.154	2.97 (1.07-8.30)	0.037
Unaffordable Medication Cost				
NO	1	1	1	1
YES	0.71 (0.43-1.19)	0.193	0.88 (0.44-1.74)	0.713
Pharmacy service Satisfaction				
YES	1	1	1	1
NO	0.48 (0.32-0.73)	0.00	0.57 (0.33-0.98)	0.04
		1		2

The findings from the bivariate logistic regression model showed that factors such as age, level of education, occupation, use of table salt, use of traditional medicine, use of alcohol, having a belief that hypertension can be cured by prayers, medication cost, and pharmacy service satisfaction had associations with antihypertensive medication adherence. Hypertensive patients aged between 51 to 60 years and 41 to 50 years were 35% and 49% respectively less likely to adhere to antihypertensive medications than hypertensive patients aged 61 and above. Hypertensive patients who had primary education were 2 times more likely to be adherent to antihypertensive medications than hypertensive patients who had secondary education and hypertensive patients who had college/university education were 1.7 times more likely to be adherent than hypertensive patients who had secondary education. Employed hypertensive patients were 50% less likely to adhere to antihypertensive medications than retired/unemployed patients. Also, hypertensive patients who were reported to use table salt, traditional medicine, and alcohol were 39%, 9%, and 24% respectively less likely to adhere to antihypertensive medications than their counterparts with a P-value of 0.001, <0.001, and <0.001 respectively. Having the belief that hypertension can be cured by prayers was associated with 17% less likelihood to adhere to antihypertensive medications than the patients who don't believe with a P-value of <0.001. The odds of hypertensive patients who were not satisfied with pharmacy service were 48% less likely to adhere to antihypertensive medication than the patients who were satisfied with pharmacy service. Bivariate analysis variables with a p-value of 0.2 or less were included in multivariate analysis using the stepwise elimination method.

Multivariate analysis model revealed that use of traditional medicine (AOR=0.08, 95% CI=0.04-0.18), having a belief that prayers can cure hypertension (AOR=0.15, 95% CI= 0.09-0.27), having health insurance (AOR=2.97, 95 %CI=1.07-8.30) and unsatisfactory interactions with pharmacy service (AOR=0.57, 95 %CI= 0.33-0.98) were significantly associated with adherence to antihypertensive medications. Respondents who reported the use of traditional medicines were 8% less likely to adhere to antihypertensive medications than respondents who were not reported to use traditional medicine. Having the belief that hypertension can be cured by prayers was associated with 15% less likelihood of adherence to antihypertensive

medications than their counterparts. The odds of adherence to antihypertensive medications were 57% less among the patients who were reported to be unsatisfied with pharmacy service than the odds of adherence to antihypertensive medications among patients who were reported to be satisfied with pharmacy services. The odds of adherence to antihypertensive medication were 2.97 times more among the patients who reported to lack health insurance than the odds of adherence to patients who were reported to have health insurance. Also, levels of education had statistically significant associations with medication adherence, respondents who had primary education (AOR= 2.08, 95%CI=1.08-4.03) and college/university (AOR=3.11, 95%CI= 1.38-7.00) had greater adherence than respondents who had secondary education.

CHAPTER FIVE

DISCUSSION

Ensuring patient adherence to antihypertensive medication is essential in the treatment and control of hypertension. Poor adherence to antihypertensive medications has remained a major challenge in achieving controllable blood pressure in many developing countries. The identification of factors that are associated with adherence to antihypertensive medications among hypertensive patients is important in improving adherence to antihypertensive medications. Healthcare delivery factors and patient-related factors are some of the factors which continue to negatively impact antihypertensive medication adherence behavior (Ambaw et al., 2012; Inkster, 2006).

Proportion of antihypertensive medications adherence among the study participants was low. This finding is in line with previous studies; including the study conducted in three districts, Temeke, Ilala, and Kinondoni of Dar Es Salaam and from north India in District Ambala (Joho, 2012; Nazir et al., 2020). However, the finding is lower than what was found in Gondar Town and in Debre Markos Town in Northwest Ethiopia (Ambaw et al., 2012; Mekonnen et al., 2017). This might be due to differences in socio-demographic characteristics and care improvement programs for hypertensive patients in northwest Ethiopia which resulted in over half of the study participants receiving medications for free. A possible explanation for greater adherence in the Korean study population is the well-developed national health care system and better access to health care services. On the other hand, the finding of this study is higher than that of Teaching hospital Janna in Northern Sri Lanka, Nedjo General Hospital and Nedjo town in West Ethiopia (Berisa & Dedefo, 2018; Pirasath et al., 2017). This difference could be due to small sample sizes in West Ethiopia and differences in sampling methods in Sri Lanka. This study used simple random sampling but in a study done in Sri Lanka, the eligible participants were selected by systematic randomized controlled sampling method and also might be due to the fact that patients participating in the Sri Lankan study were unaware that control of high blood pressure is important they identified that doctors did not emphasize the significance of uncontrolled hypertension, while in this study the majority of study

participants reported being educated by their physician on the importance of managing their hypertension. This observation implies that if the ministry of health could make interventions on developing and strengthening of national health care system and better access to health care services can help to improve adherence to antihypertensive medications.

This study identified that the use of traditional medicine was among a barrier in antihypertensive medication adherence; hypertensive patients who reported the use of traditional medicine were less likely to be adherent to their antihypertensive medications. This finding is supported by a study done in twelve low and middle economic countries in Sub-Saharan Africa (Macquart et al., 2019). Since hypertension has no cure, patients use prescribed antihypertensive drugs to control hypertensive only and not to be cured; due to this, some patients find traditional medicine as an alternative way to seek a cure for hypertension. This misconception leads to poor adherence to antihypertensive medication. These results suggest that interventions aimed at providing health education about hypertension and the importance of good antihypertensive medication adherence can help good adherence.

Unsatisfactory pharmacy service was also significantly associated with poor adherence to antihypertensive medications in this study. This study revealed that poor hospital pharmacy service was significantly associated with adherence behavior. Patients who were reported to be unsatisfied with pharmacy service were less likely to adhere to antihypertensive medications than patients who were reported to be satisfied with hospital pharmacy service. Long waiting times are a problem that was frequently identified by patients. Patients reported spending more than three hours waiting to collect their drugs from the hospital pharmacy. Patient dissatisfaction with pharmacy service and efficiency is directly related to waiting times; excessive waiting time can lead to poor compliance with prescribed drug use (Afolabi & Φ, 2003). In this study, some patients also complained about receiving fewer doses of the prescribed tablet from hospital pharmacies compared to what had been ordered by their doctors. The smaller number of dispensed tablets is likely to reduce adherence to antihypertensive medication. These results propose that interventions aimed at improving pharmacy services for hypertensive outpatient patients can increase the adherence rate.

Having a belief that hypertension can be cured by prayers was a significant independent factor associated with poor adherence to antihypertensive medications. This finding is comparable with a study done in Saudi Arabia (Alsolami et al., 2012). This study identified that hypertensive patients who had a belief that hypertension can be cured by prayers were less likely to adhere to antihypertensive medications than those who had no such belief. Religious belief has long contributed to drug adherence practices; Christians believe that God is omnipotent and healer; he can heal all their diseases including hypertension. Some Muslim patients do not take antihypertensive medications because they believe that their sickness is predetermined by Allah (God) and therefore are not required to be treated with medication (Griffiths et al., 2005). These results imply that interventions projected at providing health education about hypertension and the importance of good antihypertensive medication adherence while understanding patient beliefs can help good adherence.

Having health insurance was a statistically significant independent factor associated with poor adherence to antihypertensive medications. This finding is incomparable with the study done in Mwanza by (Maginga et al., 2016) which showed that health insurance is insignificantly associated with poor adherence to antihypertensive medication. Also is not in line with the other studies which were done in Nova Scotia which revealed that lack of health insurance can affect adherence to antihypertensive medication (Natarajan et al., 2013; Vawter et al., 2008). A possible explanation for the difference might be due to the fact that in this study patients who reported to lack health insurance were very few and among them, only 10 showed to be non-adherence to antihypertensive medication.

This study identified a complex but statistically significant association between varying education levels and antihypertensive medication adherence; patients with primary education showed good adherence compared to patients with secondary education and patients with college/university education showed to be more adherent to antihypertensive medications compared to patients with secondary education. A study done in Kintampo Municipal Hospital, Ghana showed that patients with high education levels were significantly less likely to be non-adherent with their antihypertensive medication (Obirikorang et al., 2018), which is

a similar finding to the study done in Ambala India (Nazir et al., 2020) and in Nedjo town Ethiopia (Berisa & Dedefo, 2018). Conversely, previous studies conducted in Dar Es Salaam at three districts, Temeke, Ilala, and Kinondoni showed that patients who had high levels of education were less likely to adhere to antihypertensive patients than patients who had no formal education (Joho, 2012) which is a similar result to the in the study done in United Kingdom(Jin et al., 2008). So the association between education level and adherence to antihypertensive medication is inconclusive in this study. The findings suggest that this may be an area for future study.

5.1. Limitation of the study

First, this study has used a self-reporting method as the measure of medication adherence; this method is subjected to recall bias from respondents hence can lead to overestimation of adherence rate. Second, participants who were diagnosed with hypertension and prescribed one or more antihypertensive medications for at least one month were included in the study, sometimes this can lead to overestimation of adherence rate because just a month maybe not be enough to determine if the patient is real adhering to antihypertensive medication because taking hypertensive drugs is lifelong for hypertensive patients.

5.2. Strength of the study

This study was conducted at a national referral hospital specializing in cardiovascular conditions which receive patients from different parts of Tanzania; this allowed a greater diversity of patients to be investigated than in a regional or local center, which may allow the findings to be more confidently applied to hypertensive patients throughout Tanzania.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

In this study, antihypertensive medication adherence among hypertensive patients was observed to be low. Factors such as the use of traditional medicine, having individual beliefs that prayer can cure hypertension, having health insurance, level of education, and unsatisfactory experiences with pharmacy service were associated with adherence behavior regarding the use of antihypertensive medications among hypertensive patients. The level of education has an unclear association with antihypertensive medication adherence. Use of traditional medicine use, having the individual belief that prayer can cure hypertension, unsatisfactory experience with pharmacy service, and having health insurance were associated with poor adherence to antihypertensive medication.

Insufficient studies have been done in Tanzania to determine the proportion of adherence to antihypertensive medication and its determinants. Therefore this study provides some additional information that will serve to stimulate further inquiry in this field.

6.2. Recommendations

6.2.1. Recommendation to the Hospital administration

Hospital administration should make sure that patients satisfy with pharmacy service by increasing medication dispensing; improved interactions and efficiency in its performance to meet the needs of the outpatient clients with hypertension.

6.2.2. Recommendation to the Policy makers

The Ministry of health should come up with a plan and strategies to improve antihypertensive medication adherence by increasing and improving education campaigns about the importance of antihypertensive medication adherence through media such radio and television as well as through social networks such as Instagram and Facebook.

6.2.3. Recommendation to the health care providers

Doctors and nurses should take more time to educate the patients about the importance of good adherence to antihypertensive medication and the consequences of poor adherence to antihypertensive medication.

6.2.4. Recommendation to the Patients

Patients should understand that hypertension is a chronic disease so need to adhere to antihypertensive drugs for a lifelong.

Patients should visit the hypertensive clinic at least every month to make a follow-up, getting education and counseling about the disease and the importance of good adherence to antihypertensive patients.

6.2.5. Recommendation on further research

Future research should be done to find out the clear association between different levels of education and antihypertensive medication adherence, especially in Tanzania.

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APPENDICES

Appendix I: Informed Consent (English version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)



DIRECTORATE OF RESEARCH AND PUBLICATIONS

MUHAS INFORMED CONSENT FORM

ID NO: HD/MUH/T.519/2019

Consent to participate in a study: Title: factors associated with adherence to antihypertensive medications patients attending JKCI hospital, Dares salaam.

NAME: ANDREW MAKIWA MAGELEWANYA

Purpose of the Study

The purpose of the study is to identify factors associating with adherence to antihypertensive medications among adults attending a tertiary health service in Dar es Salaam.

What Participation Involves

If you agree to join the study, you will be given a questionnaire to fill to answer a series of questions prepared for the study.

Confidentiality

Real names will not be used instead identification numbers will be used, and all data collected will be for research purposes. The information you share with the researcher will be treated as confidential.

Risks

For this study, we do not expect any risk, because the participants will be required to fill prepared questionnaires only, not more than 30minutes.

Rights to Withdraw and Alternatives

Participants are free either to participate in this study or not. Participants are free to stop participating in this study at any time even if they have already given their consent. Refusal to participate or withdrawal from the study will not affect the services you receive at the hospital.

Benefits

No direct benefit but participating in this study will influence policies about hypertension treatment for the better outcome of all patients with hypertension.

Compensation

There will be no compensation for participants.

Whom to contact:

In case of any question concerning this study, contact the principal investigator **Andrew Makiwa Magelewanya** Muhimbili University of Health and Allied Sciences School of Nursing P.O. Box. 65004 Darsalaam, through **Mobile +255 714 738706/757864750** or research supervisor **Dr. Menti Ndile**, Muhimbili University of Health and Allied Sciences School of Nursing P.O. Box. 65004 Dar es Salaam, **Mobile Number +255 714890015**.

In case you have questions about your right as a participant, you may contact the Director of Research and Publications Committee **Dr. Bruno Sunguya** Muhimbili University of Health and Allied Sciences P.O. Box 65001 Dar es Salaam **Tel Tel + 255 222150302 -6/ 2152489**

Do you agree?

Participant agrees.....Participant does not agree.....

I..... have read the content in this form. My questions have been answered. I agree to participate in this study.

Signature of participant

Signature of principal investigator

Date of signed consent.....

Appendix II: Questionnaire

A study on factors associated with adherence to antihypertensive medications among patients attending an antihypertensive clinic at JKCI Dares salaam.

Respondent identification code:

Section A: Demographic information

- 1) Age in years.....
- 2) Gender: 1. Female 2. Male
- 3) What is your religion? 1. Christian 2. Islamic 3. Hinduism 4. Others
- 4) What is the highest level of education you have completed?
 1. No formal education
 2. Primary school
 3. Ordinary secondary school
 4. College-University
- 5) What is your occupation?
 1. Employed
 2. Self – employed
 3. Not employed
- 6) What is your estimated monthly income?
 1. Below 100,000
 2. 100,000-300,000
 3. 400,000-600000
 4. 700,000- Above
- 7) What is your marital status?
 1. Single
 2. Married
 3. Divorced
 4. Widowed

Section B. Measure of Medication Adherence

	YES/NO	YES	NO
1	Do you sometimes forget to take your antihypertensive pills?		
2	People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past 2 weeks, were there any days when you did not take your antihypertensive medicine?		
3	Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?		
4	When you travel or leave home, do you sometimes forget to bring along your antihypertensive medication?		
5	Did you take your antihypertensive medicine yesterday?		
6	When you feel like your antihypertensive is under control, do you sometimes stop taking your medicine?		
7	Taking medication everyday is a real inconvenience for some people. Do you ever feel hassled about sticking to your antihypertensive treatment plan?		
8	How often do you have difficulty remembering to take all your medications? (A)Never/rarely (B) once in a while (C)sometimes (D)usually		

Section C. Patient-related factors

- 1) How often do you use traditional medicine as a treatment for your hypertension disease? 1.Never [] 2.Rarely [] 3.Sometimes [] 4.Always[]
- 2) Do you use table salt when you are eating? 1. Never [] 2.Rarely [] 3.Sometimes [] 4.Always []
- 3) How often do you drink alcohol? 1. Never [] 2.Rarely [] 3.Sometimes [] 4.Always[]
- 4) To what extent do you agree or disagree with the benefits of adherence to antihypertensive medication? 1.Strong disagree [] 2.Disagree [] 3.Agree [] 4.Strong agree []
- 5) To what extent do you agree or disagree that hypertension can be healed by prayers? 1.Strong disagree [] 2.Disagree [] 3.Agree [] 4.Strong agree []
- 6)

Section D. Healthcare delivery system factors

- 1) Do you have health insurance? Yes [] No []
- 2) Some medications are expensive. Did you ever skip taking your treatment for financial reasons? Yes [] No []
- 3) Are satisfied with how information is communicated concerning your health problem and its treatment? Yes [] No []
- 4) In case you already noticed or in case you would notice side effects related to my medicines, do you talk to your doctor as soon as possible? Yes [] No []
- 5) Do you feel any difficulty seeing a doctor during a clinic visit? Yes [] No []
- 6) Do you satisfy with hospital pharmacy services? Yes [] No []

Appendix III: Dodoso

Utafiti juu ya sababu zinazohusiana na uzingatiaji wa dawa za kupunguza shinikizo la juu la damu kati ya wagonjwa wanao hudhuria kliniki ya shinikizo la damu Dar es salaam.

Nambari ya kitambulisho.....

Sehemu A: Taarifa binafsi

1) Umri

2) Jinsia: 1. Mwanamke 2. Mwanaume []

3) Dini yako ni ipi? 1. Mkristo 2. Muislam 3. Hindu 4. Nyinginezo [].

4) Je! Ni kiwango gani cha juu cha elimu uliyomaliza?

1. Sikusoma

2. Elimu ya msingi []

3. Elimu ya Sekondari

4. Chuo

5) Kazi yako ni nini?

1. Nimeajiriwa

2. Nimejajiri []

3. Sina ajira

6) Je! Mapato yako ya kila mwezi yana kadiriwa kuwa kiasi gani?

1. Chiniya 100,000

2. 100,000-300,000 []

3. 400,000-600000

4. 700,000- Juu

7) Je! Hali yako ya ndoa ni ipi?

1. Sijaoa.

2. Nimeoa []

3. Tumeachana

4. Nimefiwa

SEHEMU B. Matumizi ya dawa**Weka alama ya veme(TIKI) kwenye ndio au hapana**

	NDIO/HAPANA	NDIO	HAPANA
8	Je! Wakati mwingine huwa unasahau kumeza dawa zako za shinikizo la damu?		
9	Wakati mwingine mtu anaweza kushindwa kutumia dawa zake kwa sababu zingine mbali na kusahau. Fikiria wiki 2 zilizopita, je! Kuna siku yoyote hukutumia dawa zako za shinikizo la damu?		
10	Je! Umewahi kupunguza au kuacha kumeza dawa zako bila kumwambia daktari wako, kwa sababu ulihisi zinakuletea madhara?		
11	Unaposafiri au kutoka nyumbani, je! Wakati mwingine husahau kumeza dawa zako za shinikizo la damu?		
12	Je! Ulimeza dawa zako za kupunguza shinikizo la damu jana?		
13	Kutumia dawa kila siku ni usumbufu kwa watu wengi. Je! Umewahi hisi kuchoka kuendelea kutumia dawa zako za shinikizo la damu?		
14	Huwa una acha kumeza dawa pale unapo ona shinikizo lako la damu limekaa sawa?		
15	Ni mara ngapi umepata shida kukumbuka kumeza dawa zako zote za shinikizo la damu? (A) Kamwe -1 (B) mara moja kwa wakati -2 (C) Wakati mwingine-3 (D) Kawaida-4		

SEHEMU C. Sababu zinazohusiana na mgonjwa

16) Je! Mara ngapi huwa unatumia dawa za asili kama matibabu ya ugonjwa wako wa shinikizo la damu? 1. Haijatokea [] 2. Mara chache [] 3. Wakati mwingine [] 4. Kilamara []

17) Je! Unatumia chumvi ya pembeni/ kuongeza chumvi kwenye chakula wakati wa kula? 1. Haijatokea [] 2. Mara chache [] 3. Wakati mwingine [] 4. Kilamara []

18) Unakunywa pombe mara ngapi? 1. Sijawahi [] 2. Mara chache [] 3. Wakati mwingine [] 4. Mara Kwa mara []

19) Je ni kwa kiasi gani unakubaliana au kutokukubalia na namanufaa au faida ya kufuata masharti ya kuzingatia matumizi sahihi ya dawa? 1. Nakubali kabisa [] 2. Nakubali [] 3. Sikuba [] 4. Sikubali kabisa []

20) Je! Ni kwa kiasi gani unakubaliana au kutokukubaliana kwamba ni mzigo kutumia dawa zako kupunguza shinikizo la damu kwa maisha yako yote? 1. Sikubali kabisa [] 2. Sikubali [] 3. Nakubali [] 4. Nakubali kabisa []

21) Je! Ni kwa kiasi gani unakubali au haukubaliani kwamba shinikizo la damu linaweza kuponywa na maombi? 1. Sikubali kabisa [] 2. Sikubali [] 3. Nakubali [] 4. Nakubali kabisa []

SEHEMU D. Sababu zinazohusiana na mfumo wa utoaji huduma za afya**Weka alama ya veme (TIKI) kwenye kisanduku**

22) Je! Unabima ya afya? Ndio [] Hapana []

23) Dawa zingine ni ghali. Je! Umewahi kuruka kuchukua dawa zako kwasababu za kifedha? Ndio [] Hapana []


24) Je! Unaridhika na jinsi taarifa zinavyowasilishwa kwako na mtoa huduma juu ya shida yako ya kiafya na matibabu yake kwa ujumla? Ndio [] Hapana []

25) Ikiwa tayari umegundua au ikiwa utagundua athari zinazohusiana na dawa zako za shinikizo la damu, je! Unazungumza na daktari wako haraka iwezekanavyo? Ndio [] Hapana []


26) Je! Ukishafika hospitali huwa kuna ugumu wowote kuonana na daktari wakati unakuja kliniki kwa ajili ya matibabu ? Ndio [] Hapana []

27) Je! Unaridhika na huduma inayotolewa na duka la dawa la hospitali ? Ndio [] Hapana []

Appendix IV: Ethical clearance from MUHAS IRB



UNITED REPUBLIC OF TANZANIA
 MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
 MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES



OFFICE OF THE DIRECTOR - RESEARCH AND PUBLICATIONS

Ref. No.DA.282/298/01.C/ Date: 07/05/2021

MUHAS-REC-05-2021-589
 Andrew Makiwa Magelewanya,
 MSc. in Critical Care and Trauma,
 School of Nursing
MUHAS

**RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED:
 FACTORS ASSOCIATED WITH POOR ADHERENCE TO ANTHYPERTENSIVE MEDICATIONS AMONG PATIENTS ATTENDING HYPERTENSIVE CLINIC AT JAKAYA KIKWETE CARDIAC INSTITUTE, DARESSALAAM.**

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 07/05/2021
 EXPIRATION DATE OF APPROVAL: 06/05/2022

STUDY DESCRIPTION:
Purpose:
 The purpose of this cross section descriptive quantitative study is to identify factors associated with poor adherence to antihypertensive medication among the patients with hypertension in Jakaya Kikwete Cardiac Institute.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: <https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%20566.pdf> and in the MUHAS archives.

Appendix V: Permission later to conduct a study at JKCI



UNITED REPUBLIC OF TANZANIA
MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT,
GENDER, ELDERLY AND CHILDREN

JAKAYA KIKWETE CARDIAC INSTITUTE (JKCI)



In reply, please quote; Ref: AB.123/307/01D/58

Date: 10/05/2021

Andrew Makiwa
Msc. Nursing Critical Care
MUHAS

RE: PERMISSION TO CONDUCT RESEARCH

Reference is made to your letter. Your request to conduct a study titled, "Factors Associated with Poor Adherence to Antihypertensive Medications among Patients Attending Hypertensive clinic at Jakaya Cardiac Institute Dar es Salaam" Has been granted institutional permission.

This letter serves as an official document that permits you to collect your data at JKCI for the prescribed duration as per your ethical clearance. It is our sincere hope that you will abide to the rules and regulations of good clinical practice and the declaration of Helsinki. We wish you the very best and hope that your stay at JKCI will be fruitful.

You are required to provide a copy of your final project upon completion and submit it to Department of Research and Training JKCI.

In addition, your local contact person at JKCI will be Sr. Salma Wibonela, (lease with her before you start your data collection).

Best Regards,

Dr. Naizihijwa, MAJANI
Head of Research Training & Consultancy
CC: DIRECTOR NURSING SERVICES