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BAHIR DAR UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH SYSTEM MANAGEMENT AND HEALTH ECONOMICS

Medication Adherence And Associated Factors Among Hypertensive Patients At Public Hospitals

In Bahir Dar, Ethiopia

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A THESIS RESEARCH SUBMITTED TO THE DEPARTMENT OF HEALTH SYSTEM MANAGEMENT AND HEALTH ECONOMICS, SCHOOL OF PUBLIC HEALTH, COLLEGE OF MEDICINE AND HEALTH SCIENCE IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR MASTER'S DEGREE IN GENERAL PUBLIC HEALTH

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BAHIR DAR

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TITLE	MEDICATION ADHERENCE AND ASSOCIATED FACTORS AMONG HYPERTENSIVE PATIENTS AT PUBLIC HOSPITALS
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LIST OF ABBREVIATIONS

BP- ----------Blood Pressure

CVD----------cardiovascular disease

DBP----------Diastolic Blood Pressure

GOPD----------General Outpatient Department

MMAS---------- Morisky Medication Adherence Scale

SBP----------Systolic Blood Pressure

SSA---------- Sub-Saharan Africa

WHO---------- World Health Organization

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ABSTRACT

Background: Adherence to antihypertensive medications is crucial for managing blood pressure and preventing cardiovascular complications. Despite its importance, poor adherence remains a significant issue globally, with varying impacts in different regions, including Ethiopia. This study will address a critical gap in understanding medication adherence and associated factors among hypertensive patients, providing valuable insights for healthcare providers, policy makers, and public health professionals. By identifying factors influencing medication adherence, this research can guide the development of targeted interventions to improve patient outcomes.

Objective: This study aimed to assess medication adherence and associated factors among hypertensive patients at public hospitals

Methods: A facility based cross-sectional study was conducted at Bahir Dar city, public hospitals from June 24 to July18 2024. The study involved a sample size of 419 hypertensive patients, selected using a stratified random sampling. Data were collected using a structured interviewer-administered questionnaire. EPI Info version 4.7.0 was used for data cleaning, and SPSS version 25 was used for analysis, specifically utilizing binary logistic regression to fit data to investigate factors affecting adherence.

Result: In this study finding, the magnitude of medication adherent among hypertensive patients was 64.80% with [95% CI = 59.00%, 69.12%]. Thus, taking medication more than two times per day[AOR = 0.18, 95% CI: 0.07, 0.35], frequency of two or more antihypertensive medications [AOR = 0.17, 95% CI: 0.08, 0.39] and present of comorbidity [AOR = 0.33, 95% CI: 0.21, 0.88] were statistically significant variables associated with medication adherent among hypertensive patients.

Conclusion: The magnitude of adherence is low. Factors affecting medication adherence include taking medication more than two times per day, taking more than two anti-hypertensive medications and comorbidity, which all affected adherence negatively. Focusing on these factors and working on simplifying treatment regimens by reducing the frequency and number of medications, enhance patient education on the importance of adherence, particularly for those

with comorbid conditions. Implement regular follow-up and support systems to address barriers to adherence.

Key words: Hypertension, anti-hypertensive medication adherence, Bahir Dar city

1. INTRODUCTION

1.1 Background of the study

Hypertension is defined in different blood pressure measurement categories, stage 1 hypertension (130–139 systolic or 80–89 mm Hg diastolic) and stage 2 hypertension (≥140 systolic or ≥90 mm Hg diastolic). These categories should not be based on BP readings at a single point in time but rather should be confirmed by two or more readings (averaged) made on at least two separate occasions(1). High blood pressure (BP) is the most important preventable risk factor for cardiovascular disease. Usually BP levels are influenced by genetic, general environmental, and especially lifestyle factors such as diet composition, body weight, physical activity, and alcohol consumption(2). Hypertension is a public health challenge worldwide and is ranked as a leading risk factor in the global disease burden. The estimated total number of adults with hypertension in 2000 was 972 million, and this is projected to reach 1.56 billion by 2025(3). In developing countries, its morbidity and mortality are increasing from time to time due to a change in life style and sedentary life(4, 5).

Uncontrolled hypertension is a risk for the occurrence of cardiovascular diseases such as stroke, myocardial infarction, congestive heart failure, renal and eye diseases, stroke and chronic kidney disease(6). The risk of developing hypertension can be reduced by effective medication therapy management and significant lifestyle modifications. Adherence to medications, is the process by which patients take their medications as prescribed(7). Adherence to antihypertensive medications is the cornerstone for achieving hypertension control. Patients with uncontrolled blood pressure (BP) may need more than one antihypertensive medication. (8).

Non adherence to medication is a growing concern and is associated with adverse outcomes. Maintaining medication adherence to multiple medications is a complex issue in patients with chronic diseases. Consequently, because of non-adherence, nearly 3-quarters of the hypertensive patients do not achieve optimal BP control(9). Adherence is highly variable within the course of treatment and generally declines as the number of medications increases and as the complexity of the dosing regimen increases(5). The World Health Organization (WHO) identifies poor

adherence as the most significant cause of uncontrolled BP and estimates that 50–70% of people do not take their antihypertensive medication as prescribed(10).

Therefore, addressing medication adherence is crucial in the management of hypertension, as it plays a key role in achieving blood pressure control and preventing complications. Given the increasing global burden of hypertension and the challenge of non-adherence, especially in patients with complex treatment regimens, it is essential to explore factors influencing adherence and implement strategies to improve it. This is particularly important in developing countries, where lifestyle changes and limited resources exacerbate the problem, leading to increased morbidity and mortality.

Heavy alcohol intake increases the risk of hypertension(11). The association between elevations in blood pressure and alcohol consumption provides a strong rationale for why patients with hypertension should be counselled on being careful with alcohol(12). Alcohol use has been associated with unhealthy diet and smoking, particularly among adults with hypertension. Recent work has shown alcohol use to be associated with antihypertensive medication non-adherence(13).

1.2. Statement of the problem

Non adherence to antihypertensive treatment affects 10 to 80% of hypertensive patients and is one of the key drivers of suboptimal blood pressure control(14). One of the significant challenges in managing hypertension is poor adherence to pharmacotherapy, which varies depending on the patient's condition and the healthcare setting. Understanding the adherence patterns and behaviors of hypertensive patients can inform health-directed policies and improve hypertension management (15).

Non-adherence to medication and lifestyle modifications is a complex issue that negatively impacts patient health, increases healthcare costs, and strains resources. In contrast, adherence to antihypertensive treatment has been linked to better blood pressure control, reduced hospitalization rates, and lower medical care costs(16).

Poor adherence to antihypertensive medication can lead to inadequate blood pressure control, resulting in further medical and psychosocial complications, a decline in quality of life, and inefficient use of healthcare resources, all of which burden the healthcare system(17).

Additionally, comorbid conditions and a history of substance use have been significantly associated with poor medication adherence (18).

Despite the existing knowledge, there remains a critical gap in understanding the relationship between medication adherence and its associated factors among hypertensive patient in a population where non-adherence is a significant concern. This study aims to address this gap by investigating the association between medication adherence and related factors among hypertensive patients at public hospitals in Bahir Dar, Ethiopia.

In Ethiopia, hypertension is a growing public health challenge, yet studies addressing medication adherence remain limited. The burden of non-adherence among hypertensive patients at public hospitals in Bahir Dar, Ethiopia, has not been well documented, making it difficult to develop effective interventions. If this issue remains unresolved, it could lead to a rise in preventable complications, increased healthcare costs, and strain on already limited healthcare resources. Understanding who is most affected by poor adherence, how frequently it occurs, and the associated factors is crucial for improving hypertension management in the region.

This study seeks to address this gap by investigating the magnitude of medication adherence and its associated factors among hypertensive patients at public hospitals in Bahir Dar, Ethiopia. findings will contribute to health-directed policies aimed at improving blood pressure control and reducing the adverse effects of non-adherence.

2. METHODS AND MATERIALS

2.1 Study design and period

The institution-based cross-sectional study was conducted among hypertensive patients at public hospitals in Bahir Dar from June 18 to July 24, 2024.

2.2. Study setting and period

This study was conducted from June 18 to July 24, 2024, in two hospitals under the Amhara Regional Health Bureau in the Amhara region of Ethiopia: Adiss Alem Primary Hospital and Felege Hiwot Comprehensive Specialized Hospital, both located in Bahir Dar.

Adiss Alem Primary Hospital serves a population of about 182,000 people, with 182 health professionals and 1,200 hypertensive patients receiving follow-up care annually.

Felege Hiwot Comprehensive Specialized Hospital serves around 10 million people, staffed by 1,400 health professionals, providing follow-up care for 400 hypertensive patients monthly. These hospitals were selected due to their large patient populations and significant roles in Bahir Dar's healthcare system.

2.3. Source population

All hypertensive patients on anti-hypertensive medication attending the chronic outpatient department at the study hospitals/settings were the source population.

2.4. Study population

All selected hypertensive patients on anti-hypertensive medication attending the chronic outpatient department during the study period at the study hospitals/settings were the study population. ,

2.4.1 Inclusion criteria

All hypertensive patients on anti-hypertensive medication attending the chronic outpatient department during the study period at the study hospitals/settings were included.

2.4.2. Exclusion criteria

All patients who are unable to provide informed consent, patients like severe cognitive impairments, patients who have severe mental health conditions that could impair their ability to understand and respond to the research questions. Patients who have been diagnosed with

hypertension with in the last three months, as they may not have established a consistent medication adherence pattern yet are excluded.

2.6. Operational definition

Medication adherence is defined based on Morisky's Medication Adherence Scale (MMAS8). Each question is scored as 1 point for a "yes" response and 0 points for a "no" response. The total score ranges from 1 to 8, score of 8 high adherence, score of 6-7 medium adherence and score of < 6 means low adherence(19). Patients with Morisky's ≥6 are considered as adherent and < 6 are considered non adherent for this study(20).

Alcohol use is defined based on AUDIT-C score. The responses are scored from 0-4 for each question, with a maximum total score of 12. 0-3 is low risk, 4-6 are at risk, 7 and more are possible alcohol use disorder(21). For this study score ≤ 6 are non-users and > 6 user.

Chronic disease: Chronic diseases are defined broadly as conditions that last 1 year or more and require ongoing medical attention or limit activities of daily living or both.

2.7. Measurement or tools of the study

A structured questionnaire and checklists were developed after a review of relevant works of literature. Several questions that can address the objective of this study were constructed including the independent variables like socio-demographic characteristics (Age, sex, educational status, occupational, marital status, religion, and residence, clinical characteristics (duration of hypertension, comorbidity, number of antihypertensive drugs) and the dependent variable like antihypertensive medication adherence using Moriskey scale-8.

For linguistic validation, questions were translated into Amharic.

The tool was amended after a pre-test was done on 5% (21) of patients having follow-up for hypertension at Tibeb Ghion hospital. The data was collected by nurses who were giving free service at the public hospitals.

2.10. Data collection

Primarily, the questions were prepared in English and then translated into the local language (Amharic). Data were collected through a structured, validated, and pretested face-to-face

interviewer-administered questionnaire. A pretest was conducted at Tibebe Ghion Specialized Hospital, including 5% of the sample size.

Two data collectors at Adiss Alem Hospital and one at Felege Hiwot Comprehensive Hospital, all of whom were nurses, were recruited, along with one BSc nurse supervisor for each hospital. The data collectors and supervisors received one day of training on extracting the needed information, completing the structured questionnaire, the ethical aspects of approaching participants politely and respectfully, the aim of the study, and the contents of the instruments. The supervisors monitored the data collection process daily, addressing any issues or contacting the principal investigator as needed.

2.11. Data quality assurance

Data collectors and supervisors were trained for one day on the data collection approach of the study. The questionnaire was translated back into English to check for consistency and meaning, and data were collected using the Amharic version of the questionnaire. Continuous follow-up and supervision were conducted by the supervisor and principal investigator throughout the data collection period. Collected data were reviewed and checked daily for completeness and consistency on the spot during the data collection time.

2.12. Data processing and management

The collected data was manually checked for completeness, accuracy, and clarity before leaving the actual data collection site. Then it was entered to Epidata version 4.7.0 and exported to SPSS version 25 for analysis.

2.13. Data analysis

Descriptive statistics, including frequencies, percentages, ranges, means, and standard deviations, were presented using tables, figures, and texts. Data were fitted in to binary logistic regression to show the association between antihypertensive medication adherence and various factors. The magnitude of the association between independent and dependent variables was measured using odds ratios at a 95% confidence interval (CI) with a significance level (p-value < 0.05).

2.14. Ethical considerations

After the approval of the proposal, the Institutional Review Board of the College of Medicine and Health Sciences at Bahir Dar University provided the ethical clearance. Ethical clearance and a formal letter were subsequently obtained from Bahir Dar University and APHI. The executive directors of each hospital were contacted, and permission to conduct the study was granted. Verbal informed consent was obtained from the study participants after the purpose of the study was explained to them. Participants were assured that their participation was completely voluntary, their names would not be stated, data would be kept confidential and anonymous, and it would be used only for research purposes.

3. RESULTS

3.1 Socio-demographic characteristics

A total of 419 respondents in the Hospital gave their consent to participate in this study. The mean age of the respondents was 60.69 years with a standard deviation of ±11.95. Regarding the study respondents 311(74.20%) were male. The majority 283(67.54%) of study participants were married. Additionally, regarding education level, 213(50.83%) study participants had educational level of secondary school and above. More than two-third 328 (78.28 %) study participants were Orthodox Christian followers [Table **Error! Reference source not found.**

Table 1: Socio-demographic characteristics of participants among hypertensive patients at Adiss Alem primary hospital and Felege Hiwot comprehensive specialized hospital,2024 (N=419)

Variables	**Categories**	**Frequency**	**Percent**
Age (In years)	18-40	41	9.79
	41-60	177	42.24
	>60	201	47.97
Sex	Male	311	74.20%
	Female	108	25.80%
Education level	No formal education	85	20.30%
	Primary school	121	28.87%
	Secondary school and above	213	50.83 %
	Single	10	2.39 %
Marital status	Married	283	67.54 %
	Widowed	93	22.20 %
	Divorced	33	7.88 %
	Orthodox Christian	328	78.28 %
Religion	Muslim	77	18.38 %
	Protestant	14	3.34%

Residence	Urban	313	7 74.70%
	Rural	106	25.30%
Occupation	Farmer	156	37.23 %
	Housewife	59	14.08 %
	Government employed	84	20.05 %
	Merchant	120	28.64 %
Income	Poor	129	30.79
	Medium	158	37.71
	Rich	132	31.50
Hospital type	Comprehensive Hospital	201	48.00%
	Primary Hospital	218	52.00%

3.2 Medication and health-related characteristics

The magnitude of medication adherent among hypertensive patients was 64.80% with [95% CI = 59.00%, 69.12%]. Two hundred ten 210 (50.12%%) of the respondents had different kinds of co-morbidities. Regarding duration of diagnosed with HTN 163(38.90%) of the respondents had duration 2-5 years. In addition, more than half 218 (52.03%) of participants were on greater than or equal to two number of medications (Table 3).

Table 2: Medication, and health-related characteristics of participants among hypertensive patients at Adiss Alem primary hospital and Felege Hiwot comprehensive specialized hospital, 2024 (N=419)

Variables	**Categories**	**Frequency**	**Percent**
Duration of diagnosed with	< 2 years	130	31.03%
HTN	2-5 years	163	38.90%
	> 6 years	126	30.07%
Number of medications	< 2	201	47.97%
	≥2	218	52.03%
Frequency of medications	Daily	197	47.02 %
	Two times per day	134	31.98%
	> Two times per day	88	21.00%

Diagnosed with another disease (Comorbidity)	Yes	210	50.12%
	No	209	49.88%
If yes, do you start medication?	Yes	100	47.60%
	No	110	52.40%
Alcohol use	User	58	13.84%
	Non-user	361	86.15%
Medication adherent	Adherent	271	64.90%

3.3 Factors associated medication adherence

In this model, the following variables were included in the multivariable analysis because their overall p-value in the bi-variable analysis was < 0.25 (Table 4). In this analysis, age, residence, sex, education level, occupation, duration of hypertension diagnosis, frequency of medication, duration of medication, number of antihypertensive medications and comorbidity were included. Our study showed that study participants who took medication more than two times per day had 82% decreased odds of adhering to their medication [AOR = 0.18, 95% CI: 0.07, 0.35] . Those who took two or more antihypertensive medications had 83% decreased odds of adhering to their medication [AOR = 0.17, 95% CI: 0.08, 0.39] . In addition, participants with a comorbidity had 67% decreased odds of adhering to their medication [AOR = 0.33, 95% CI: 0.21, 0.88] .

Table 3: Factors associated medication adherence among hypertensive patients at Adiss Alem primary hospital and Felege Hiwot comprehensive specialized hospital, 2024 (N=419)

Variables	**Categories**	**Medication adherent**		**COR [95% CI]**	**AOR [95% CI]**	**P- Value**
		Adherent	**Non-adherent**			
Age (In year)	18-40	33	8	1.00	1.00	
	41-60	123	54	0.55[0.23,1.27]	0.50[0.40, 3.78]	0.52
	>60	115	86	**0.32[0.14, 0.73]**	1.07[0.27,3.13]	0.92

				**		
Sex	Male	223	88	1.00	1.00	
	Female	48	60	**0.32[0.20, 0.59]**	0.24[0.19, 1.04]	0.27
Residence	Urban	235	78	1.00	1.00	
	Rural	36	70	**0.17[0.11, 0,37]**	0.18(0.35,2.82]	0.60
Education Level	No formal education	28	57	1.00	1.00	
	Primary school (1-8)	73	48	3.09[0.30,6.52]	2.03[0.90,4.5]	0.08
	Secondary school & above	170	43	6.77[0.92, 9.34]	4.07[0.98,6.24]	
Occupation	Farmer	92	64	1.00	1.00	
	Housewife	19	40	**0.33[0.18,0.62]**	0.35[0.19, 1.55]	0.26
	Government employee	64	20	**2.22[1.23,4.03]**	0.32[0.10,2.99]	0.09
	Merchant	96	24	2.78[0.61,4.82]	0.64[0.26,3.58]	0.34
Duration on medication	< 2 years	62	68	1.00	1.00	
	2-5 years	130	33	**4.32[2.58,7.22]**	1.70[0.74,6.01]	0.20
	> 6years	79	47	1.84[0.12,3.03]	1.17[0.78,4.05]	0.16

Frequency of medication	Daily	169	28	1.00	1.00	
	Two times per day	74	60	**0.20[0.12, 0.44] ** **	0.19[0.07,1.09]	0.024
	> 2 times per day	28	60	**0.07[0.04,0.14] ** **	**0.18[0.07,0.35] * **	**0.01**
Number of HTN medication	< 2	184	17	1.00	1.00	
	≥ 2	87	131	**0.06[0.03,0.10] ** **	**0.17[0.08,0.39] * **	**0.01**
Alcohol	Non-user	255	106	1.00	1.00	0.06
	User	16	42	0.16[0.10,2.72]	0.05[0.02,1.36]	
Comorbidity	No	172	37	1.00	1.00	No
	Yes	99	111	**0.19[0.10, 0.39] ** **	**0.33[0.21, 0.88] * **	**0.02**

Key: **= P<0.25, *= p-value <0.05, COR= Crude Odd Ratio, AOR: Adjusted Odd Ratio, CI=Confidence Interval &1.00= Reference

4. DISCUSSION

This study was aimed at identifying factors influencing adherence to anti-hypertensive medication among hypertensive patients attending at Feleg-Hiwot Comprehensive and Addis Alem Primary Hospital. Our findings showed that, the magnitude of adherent medication among hypertensive patients was 64.80% with [95% CI = 59.00%, 69.12%] which is lower compared to similar studies conducted in, in Addis Ababa, adherence rates at Yekatit 12 and Menelik II hospitals were reported at 72.5% (22). These variations could be attributed to several factors including socioeconomic disparities, healthcare infrastructure, and population characteristics. Addis Ababa, as an urban center,

Our study's adherence rates were more closely aligned with local studies conducted in Shashemene, Ethiopia, where adherence was reported at 63.6% (23), and Jimma, Ethiopia, with a rate of 61.8% (24). These similarities might be due to analogous study settings and economic statuses of the participants. It is essential to consider that economic constraints, limited access to healthcare facilities, and educational disparities significantly impact medication adherence in these regions.

In a study conducted in Ghana, adherence rates were found to be as high as 89.2% in two district hospitals (25). This difference may be because of socioeconomic, infrastructure or health seeking behavior of the people the area.

Participants who took medication more than two times per day had 82% decreased odds of adhering to their medication [AOR = 0.18, 95% CI: 0.07, 0.45] compared to those with a fewer daily frequency of medication. A study conducted in Bejing is in line with our finding where people who took medication two times or more had decreased odds of adhering(26).

Furthermore, those taking two or more antihypertensive medications had 83% decreased odds of adhering to their medication [AOR = 0.17, 95% CI: 0.08, 0.39] compared to those taking fewer than two medications, this is in line with a study done in London(27), a study conducted in southern Taiwan also showed the same finding, where patients with more antihypertensive medication tend to be non adherent(28). Our study, however is in contrast with a study done in Nigeria, where people taking more than two medication where three times more likely to adhere

to their medication(29) and a study conducted in India where there was no significant association(30).

Moreover, our study found that the presence of comorbidities significantly influences medication adherence among hypertensive patients. Participants with additional chronic illnesses were less likely to adhere to their anti-hypertensive medications compared to those without comorbidities. This finding underscores the complexity of managing multiple chronic conditions simultaneously, which often requires adherence to multiple medication regimens and lifestyle modifications. The burden of managing multiple conditions can overwhelm patients, leading to non-adherence and poorer health outcomes. This is in line with a systematic review and meta-analysis done in Ethiopia(31). A study done in Ras Desta Damtewu Hospital, Addis Ababa showed that individuals with another chronic illness had an increased probability of being non-adherent(32). This indicates that healthcare providers need to consider the overall health burden on patients when designing adherence interventions.

Overall, our study highlights the multifaceted nature of medication adherence among hypertensive patients. Factors such as residence, education level, livelihood, number of medication and frequency, and comorbidities all played significant roles in determining adherence rates. Addressing these factors through targeted interventions could improve adherence and, consequently, health outcomes for hypertensive patients.

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