Research Article

Factors influencing antihypertensive medication adherence among hypertensive patients: A cross-sectional study in health facilities of Anseba region, Eritrea

Samuel Jirom Welday[1]*; Fanuel Ghebremeskel[2]; Michael Teklay[3]; Haroun Hassen[3]

[1]Department of Nursing, MoH Keren Sub-Zone, Anseba Region, Eritrea.

[2]Department of Nursing, Godaif Community Hospital, Central Region, Eritrea.

[3]Department of Public Health, Zonal Non-Communicable Disease Control Program, MoH Anseba Region, Eritrea.

*Corresponding Author: Samuel Jirom Welday
Department of Nursing, MoH Keren Sub-Zone,
Anseba Region, Eritrea.
Email: samuelweldayr26@gmail.com

Abstract

Background: Adherence to prescribed medication is an imperative issue that can be directly linked with the management of chronic diseases like hypertension. Failure to adhere can affect the effectiveness of medication as well as the efficiency of the health care system. There is scarce data regarding adherence to medications in hypertensive patients in Eritrea. Therefore, the aim of this study was to assess adherence level and its determinants for antihypertensive medications among hypertensive patients taking health care services in different health facilities of Anseba region.

Objective: The objective of this study was to assess patients' adherence level toward their antihypertensive medication in health facilities of Anseba region in 2021.

Methodology: Facility based cross-sectional study was done from September to November 2021. The systematic random sampling technique was used to recruit 317 representative respondents from 8 health facilities. The questionnaire was prepared based on WHO modules, extensive literature review, and MMAS standard form. The data were collected using an interviewer-administered questionnaire. At first, data were edited in MS Excel 2013 and then were cleaned and analysed using SPSS v.22. Data related to medication adherence were collected using a structured 8-item Morisky Medication Adherence Scale. A bivariate and multivariate analysis was done to determine independent predictors of medication adherence among hypertensive patients. Crude odds ratio (at 95% CI) and p-value < 0.05 were used to assert the effect of the independent variables.

Results: Out of 317 patients enrolled in the study, two hundred forty-four (77%) had good medication adherence and the remaining 23% had poor adherence. Fifty-one (16.1%) of the study subjects had taken the medication for more than ten years. The study found that hypertensive patients not Stopping medication due to a shortage of drugs in the health facility were 4.39 times better adhered medication than hypertensive patients Stopping medication due to shortage of drugs in the health facility [AOR (CI): 4.398 (2.524, 7.662) p value < 0.05].

Conclusion: Medication adherence among hypertensive patients was relatively high in this study. Increasing adherence counselling and

patient education about the disease and its treatment are important measures to scale up the adherence status of patients. Health facilities should have enough supply of medication.

Background

Hypertension is a major health problem in developed countries and now becoming an increasingly important cause of morbidity and mortality in developing countries. Today one in three adults has hypertension. Hypertension is a global public health challenge due to its high prevalence and the associated risk of stroke and cardiovascular diseases in adults. It is estimated to cause 7.5 million deaths worldwide and about 12.8% of the total annual deaths in SSA [1-3]. The World Health Organization (WHO) reported that hypertension is responsible for 62% of cases of cerebrovascular disease and 49% of cases of ischemic heart disease. In addition, hypertension is the topmost risk factor for death worldwide [4,5]. Successful treatment of hypertension is important in reducing morbidity and mortality, as well as in controlling healthcare costs associated with these conditions. Worldwide successful control of hypertension is poor with only 5-58% of people taking antihypertensive medications managing to achieve a BP of less than 140/90 mm Hg, in which one of the major factors in this poor control is lack of patient adherence to treatment [6]. Medication non-adherence is a critical problem in the management of hypertension. The chronic asymptomatic nature of the disease and the occasional or even frequent omission of the recommended dose appear to be without immediate consequences. Medication adherence is highly variable within the course of treatment and generally declines over time. According to the WHO, barriers and factors impacting medication adherence can be divided into the following five categories: [7]

1.   Sociodemographic: age, ethnicity, level of income and literacy, social status, and support.

2.   Healthcare system-related: patient–clinician relationship, patient-centeredness, physician's communication style, quality-based payment, therapeutic inertia.

3.   Therapy-related: choice of complex regimens, frequent treatment changes, adverse effects, lack of refill frequency, and consolidation.

4.   Condition-related: multiple comorbidities including depression, psychoses, drug or alcohol abuse, dementia, and major disability.

5.   Patient-related: patient's misunderstanding or lack of knowledge, poor perception of illness and treatment efficacy, denial of diagnosis, fear of dependence or adverse effects, lost to follow-up.

Studies conducted in Eritrea on this subject are scarce and very limited. One national survey conducted in 2006 with a total of 2,352 participants reported that the prevalence of hypertension among adults aged 15 to 64 years was 15.9% in the general population [8]. A study conducted in Hazhaz and Halibet Hospitals in 2018 in Eritrea revealed that 69.2% of the hypertensive patients had good adherence to medication. Those patients who were females had a family history of hypertension, better economic status, longer duration of hypertension, comorbid diseases, controlled blood pressure, and taking only one pill per day had significantly higher adherence levels. [9]. Another report on analysis of data from the Health Information Management System (HIMS) highlighted an increasing burden of non-communicable diseases (NCDs) in Eritrea, with the incidence of hypertension doubling in 6 years [10]. With the increasing burden of hypertension cases, medication non-adherence could lead to substantial worsening of disease, death, and increased health care costs [1-3]. This study was therefore aimed to assess patients' adherence level towards antihypertensive medication and the factors associated among diagnosed hypertensive patients in Anseba Region, Eritrea.

Methods

Study design: The study was a health facility-based cross-sectional quantitative study.

Study setting: The study was conducted in Health centers, Community Hospitals, and Zonal Referral Hospital of Anseba region, a totally 8 health facilities from September to November 2021. These health facilities were keren zonal referral Hospital, Elabered CH, Hamelmalo HC, Habero HC, Adi-Tekelezan CH, Asmat HC, Hagaz CH, and Halhal HC. These 8 health facilities found in Anseba region are the only hospitals providing follow-up care for hypertensive patients. These health facilities have NCD Clinic, which provides service by screening, treating and giving health education for hypertensive patients routinely.

Study population and sampling procedures: The target population was known hypertensive patients who were registered and had taken antihypertensive medication for more than six months. There were 2479 registered hypertensive patients in health facilities of Anseba region taking antihypertensive medication. The sample of the study was calculated using the Krejcie & Morgan formula and it was 317 [11]. The sample size for the selected health facilities of Anseba region was allocated as per proportion of the population of each health facility. After this participant's sampling frame was developed from the register of selected health facilities. Out of these, 317 patients were selected using random sampling by calculating every nth patient. The first hypertensive patient was taken by lottery method. Pregnancy induced hypertension, mentally ill patients, health facilities that didn't have hypertension patients register, and anti-hypertension medication, hypertensive patients who were unregistered in health facilities of Anseba region, health professionals under antihypertensive therapy and patients diagnosed with hypertension for less than six months were not included.

Variables: Dependent variable: Patients' adherence to their

antihypertensive medication was the outcome variable. The independent variables include: Patient socio demographic characteristics (age, sex, religion, occupation, monthly income and marital status) and Blood pressure and medication characteristics (current BP, number of drugs, hospitalization history, comorbid disease, duration of disease, dosage and number of pills per day).

Data collection tool: The data collection tool was developed by the researchers after doing a thorough literature review. A well-reviewed, pretested, and structured questionnaire which consisted of three sections was used to collect the data. The first section covered the socio-demographic data of the study participants. The second section was comprised of clinical and medication characteristics, and the third section addressed questions about medication adherence. Medication adherence was measured using the structured 8-item Morisky Medication Adherence Scale (MMAS-8) [12-14]. This validated questionnaire was used to assess patient's adherence levels toward antihypertensive medication. The MMAS-8 has been demonstrated to have good concurrent and predictive validity and might function as a screening tool in outpatient settings as has been widely used in various other studies to measure medication adherence [14,15]. Hence, MMAS-8 was used in this study for its validity, quick, and easy to complete.

Data collection procedures: The questionnaire was translated from English to Tigrinya (native language) and then back to English by another translator to ensure its consistency. To recognize the weakness, strength and consistency of the questionnaire, the questions were first piloted in Keren Regional referral hospital at the hypertension clinic on 32 hypertensive patients selected randomly. After ensuring that the questionnaire was consistent, clear in language, and comprehensible, data was collected by the researchers using face to face interview method. The pilot study participants were excluded from this study.

Data analysis: Data analysis was performed using SPSS (Statistical Package for Social Sciences) version 22. Descriptive statistics of the demographic and other clinical variables were described using frequencies and percentages. Pearson chi-square test was used to analyse p-value. As illustrated in Table 2, the MMAS-8 questionnaire contains eight questions with seven questions having "Yes" or "No" responses, and for each positive answer the score was 1 and for negative answer the score was 0. The eighth question had three responses: 'none of the day', 'Sometimes', and 'Often'. The response 'none of the day' was considered as positive response and scored as "1", and 'Sometimes' or 'Often' responses were considered as negative responses and scored "0". Hence, the scores range from 0 to 8. A score less than 6 is associated with poor antihypertensive medication adherence [13]. Hence, medication adherence was classified as a 'Good Adherent' for those who scored 6 and above from the 8 questions. Whereas those who scored five and below were categorized as 'Poorly Adherent'. Bivariate analysis was done to find out the strength of the associations of each independent variable with the rate of medication adherence. Significant variables at the bivariate level were further analysed using multivariate analysis to adjust the confounding effect. A p-value of < 0.05 was considered significant during the analysis.

Ethical approval: Approval of the study was obtained from the "Research and Ethical Committee" of the Ministry of Health. Each study participant was informed about the purpose, method, and anticipated benefit of the study by the data collectors.

Verbal and written consent was obtained from study participants and anonymity was maintained to ensure confidentiality. The responders' right to refuse or withdraw from the study was fully respected.

Results

Socio-demographic characteristics: A total of 317 patients participated in the study. The age of the respondents ranged from 35 to 95 years old. Around half of (47%) of the subjects were 66-95 years old. More than two- thirds (67.8%) of the respondents were females. The majority of the participants (63.7%) were married and 80% of the respondents had a monthly income below a thousand Nakfa. Illiterate and unemployed respondents accounted for 55.2% and 66.6% of the participants respectively. Medication adherence was reported higher among respondents, who were females (77.7%), having ≥ 1000 nakfa monthly income (80.6%), Christian (81.1%), unemployed (79.6%) and reached secondary school and above (93.8%) (Table 1).

Two hundred forty-four (77%) of the respondents had good medication adherence and the remaining 23% had poor adherence (Figure 1).

Medication adherence using the MMAS-8 questionnaire

As per the MMAS, 27.4% of the participants forgot to take their medicines, seventeen (5.4%) were stopping medication on feeling worse, thirty-three (10.4%) were stopped to take their medication when they perceived their blood pressure was under control, and 18.3% forgot to take their medication while travelling or leaving home (See Table 2).

Medication and clinical variables: About one-fifth of the respondents (21.8%) had a history of hospitalization due to hypertension and 16.4% had comorbid disease. The majority of the respondents (54.3%) had uncontrolled blood pressure readings ≥140/90. One hundred fifty-nine (50.5%) of the study subjects had taken the medication for more than five years. More than a third (31.9%) had a family history of hypertension. Good adherence was reported higher among patients who took more than five years of hypertension treatment (72.3%) and had a family history (78%). (Table 3).

Predictors of Medication Adherence: Factors related to not stopping medication although a shortage of drugs in the health facility was found to have a significant association with medication adherence. Hypertensive patients not Stopping medication due to shortage of drugs in the health facility was 4.39 times better adhered to medication than hypertensive patients Stopping medication due to shortage of drugs in the health facility [AOR (CI): 4.398 (2.524, 7.662) p value< 0.05]. Factors related to the health facility, religion, educational level, residence, ethnicity, and dosage and frequency of drugs and hospitalization history, didn't have a significant influence on medication adherence (Table 4).

Discussion

Medication adherence is an important tool that can increase treatment effectiveness; however, literature has shown that the rate of adherence in chronic diseases like hypertension is very low and thus it is the main problem in the management of diseases that require long-term treatment like hypertension. Poor adherence to medication and lifestyle modification are the main reasons for uncontrolled hypertension, serious complications,

Table 1: Socio-demographic characteristics and medication adherence rate, Anseba Region, Eritrea, 2021 (N=317).

Variables	Categories	Medication adherence level		p-value	COR (95% CI)
		Poor	Good		
Age	<50	8 (25.8%)	23 (74.2%)		1.000
	50-65	28 (20.6%)	108 (79.4%)	0.525	1.342
	>66	36 (24.2%)	113 (75.8%)	0.846	1.092
Sex	Female	48 (22.3%)	167 (77.7%)		1.000
	Male	24 (23.8%)	77 (76.2%)	0.776	0.992
Religion	Christian	33 (18.9%)	143 (81.1%)		1.000
	Muslim	39 (27.7%)	102 (72.3%)	0.065	0.065
Educational level	No formal education	47 (26.9%)	128 (73.1%)		1.000
	Primary	13 (20.6%)	50 (79.4%)	0.331	1.412
	Middle school	10 (21.7%)	36 (78.3%)	0.481	1.322
	Secondary & above	2 (6.3%)	30 (93.8%)	0.023	5.508
Occupation	Unemployed	43 (20.4%)	168 (79.6%)		1.000
	Employed	29 (27.6%)	76 (72.4%)	0.150	0.150
Monthly income	No income	42 (22.8%)	142 (77.2%)		1.000
	1-1000 NKF	18 (25.7%)	52 (74.3%)	0.628	0.854
	>1000NKF	12 (19.4%)	50 (80.6%)	0.568	1.232
Marital status	Single	3 (23.1%)	10 (76.9%)		1.000
	Married	48 (23.9%)	153 (76.1%)	0.947	0.956
	Divorced	6 (28.6%)	15 (71.4%)	0.725	0.750
	Widowed	14 (17.5%)	66 (82.5%)	0.631	1.414
	Other	1 (100%)	0 (0%)	1.000	0.000
Ethnicity	Tigre	27 (26.5%)	75 (73.5%)		1.000
	Tigrigna	27 (18.4%)	120 (81.6%)	0.129	1.600
	Blien	17 (27.9%)	44 (72.1%)	0.846	0.932
	Others	1 (16.7%)	5 (83.3%)	0.599	1.800
Current residence	Rural	13 (31.7%)	28 (68.3%)		1.000
	Semi- urban	17 (37%)	29 (63%)	0.607	0.792
	Urban	42 (18.3%)	187 (81.7%)	0.054	2.067
Duration of stay with hypertension	6months – 2years	16 (19.8%)	65 (80.2%)		1.000
	3-6 years	26 (22.8%)	88 (77.2%)	0.609	0.833
	≥ 7 years	30 (25%)	90 (75%)	0.386	0.738

Table 2: Medication adherence using MMAS-8 validated questionnaire (n=317).

| Variables	Categories	Frequency	Percentage
Do you sometimes forget to take your high blood pressure pills?	Yes	87	27.4
	No	230	72.6
Over the past one month, were there any days when you did not take your high blood pressure medicine?	Yes	87	27.4
	No	230	72.6
Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?	Yes	17	5.4
	No	300	94.6
When you travel or leave home, do you sometimes forget to bring along your medications?	Yes	58	18.3
	No	259	81.7
Did you take your high blood pressure medicine yesterday?	Yes	273	86.1
	No	44	13.9
When you feel like your blood pressure is under control, do you sometimes stop taking your medicine?	Yes	33	10.4
	No	284	89.6
Do you ever feel hopeless about sticking to your blood pressure treatment plan?	Yes	38	12.0
	No	279	88.0
How often do you have difficulty remembering to take all your blood pressure medication?	Yes	63	19.9
	No	254	80.1

Table 3: Medication and clinical variables about medication adherence, Anseba Region, Eritrea, 2021 (N=317).

Variables	Categories	Frequency (%)	Medication Adherence Poor N (%)	Medication Adherence Good N (%)	COR (95% CI)	p-value
Blood pressure	<140/90	145 (45.7)	33 (22.7)	112 (77.3)	1.000	
	≥140/90	172 (54.3)	39 (22.7)	133 (77.3)	1.014	0.959
Family history of hypertension	Yes	101 (31.9)	22 (22)	78 (78)	1.000	
	No	216 (68.1)	50 (23.1)	166 (76.9)	0.936	0.821
Having comorbid disease	Yes	52 (16.4)	14 (26.9)	38 (73.1)	1.000	
	No	265 (83.6)	58 (22)	206 (78)	1.309	0.437
Duration of hypertension treatment	**< 5 years**	157 (49.5)	28 (17.8)	129 (82.2)	1.000	
	>5 years	159 (50.5)	44 (27.7)	115 (72.3)	1.164	0.037
Chronic diseases pills per day	One	262 (82.6)	61 (23.3)	201 (76.7)	1.000	
	Two or more	54 (17.4)	11 (20.4)	43 (79.6)	0.151	0.642
Hypertension pills per day	One	274 (86.4)	63 (23)	211 (77)	1.000	
	Two	42 (13.6)	9 (21.4)	33 (78.6)	1.194	0.822
Have you ever stopped medication due to shortage of drugs in the health facility?	Yes	116 (36.6)	46 (39.7)	70 (60.3)	1.000	
	No	201 (63.4)	26 (13)	174 (87)	4.398	<0.001
Do you receive proper counselling regarding medication?	Yes	241 (76)	57 (23.7)	184 (76.3)	1.000	
	No	76 (24)	15 (20)	60 (80)	1.239	0.511
Hospitalization history	Yes	69 (21.8)	21 (30.4)	48 (69.6)	1.000	
	No	248 (78.2)	51 (20.6)	196 (79.4)	1.681	0.089

Table 4: Medication Adherence using MMAS-8 Validated questionnaire, Anseba Region, Eritrea, 2021 (N=317).

Characteristics	Good adherence N (%)	COR (95% CI)	AOR (95% CI)
Muslim religion	102 (72.3)	0.60 (0.35, 1.03)**	
Secondary and above education	30 (93.8)	5.50 (1.26, 23.95) **	
Urban residence	187 (81.7)	2.067 (0.98, 4.32) **	
>5 years of hypertension treatment	115 (72.3)	1.164 (0.582, 1.746) **	
Have you ever stopped medication due to shortage of drugs in the health facility? [C307]		4.398 (2.524, 7.662) ***	4.398 (2.524, 7.662) ***

**, ***: P- value < 0.05, P-value < 0.001; BP: Blood Pressure; COR: Crude Odds Ratio; CI: Confidence Interval.
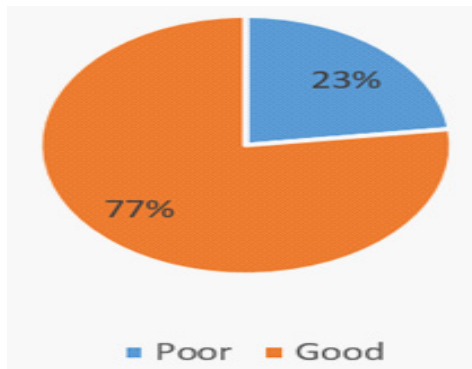
Figure 1: Medication adherence level, Anseba Region, Eritrea, 2021, (N=317).

and wastage of health care resources. A total of 317 patients participated in this study. The age of the respondents ranged from 35 to 95 years old. About half (47%) the subjects were 66-95 years old. More than two-thirds (67.8%) of the respondents were females. The majority of the participants (63.7%) were married and 80% of the respondents had monthly income below thousand Nakfa. Illiterate and unemployed respondents accounted for 55.2% and 66.6% of the participants respectively. Medication adherence was reported higher among females (77.7%), having ≥ 1000 nakfa monthly income (80.6%),

Christian (81.1%), unemployed (79.6%), and reached secondary school and above (93.8%), but without significant association. Generally, medication adherence varies from 20 to 80 percent in hypertensive patients [16]. In this study, the adherence rate of the respondents to their medication was 77%. It is higher than studies conducted in Eritrea (69.2%) [9], Ethiopia (64.6%) [17], Malaysia (53.4%) [18], and Iran 43.6%) [15]. However, it is lower than the medication adherence rate reported in Sunderland (79%) [19]. Among the study subjects, females had a higher adherence rate to medication than males. This finding was in line with the study in Ethiopia showing that men were found to be less adherent when compared to women. Comparing the age groups, 50-65 years old had good adherence. Contrastingly, some studies showed that the majority of the younger age group had higher adherence rate [19]. As per the MMAS, 27.4% of the participants forgot to take their medicines, seventeen (5.4%) were stopping medication on feeling worse, thirty-three (10.4%) were stopped to take their medication when they perceived their blood pressure was under control, and 18.3% forgot to take their medication while travelling or leaving home. About one-fifth of the respondents (21.8%) had a history of hospitalization due to hypertension and 16.4% had comorbid disease. Majority of the respondents (54.3%) had uncontrolled blood pressure readings ≥140/90. Fifty-one (16.1%) of the study subjects had taken the medication for more than

ten years. More than a third (31.9%) had family history of hypertension. This finding is less consistent with a study done in Eritrea, only 19.2% of the respondents had history of hospitalization and 42.5% had comorbid disease. Majority of the respondents (56%) had a controlled blood pressure. More than one-third of the participants (35.6%) had family history of hypertension [8]. Good adherence was reported higher among patients who took more than five years of hypertension treatment (72.3%) and had family history (78%). Patients who had an experience of hypertension therapy for more than five years had the highest rate of medication adherence. Consistent to our findings, similar studies confirmed that prolonged history of hypertension was effective in medication adherence [15,20]. Better medication adherence among those with long history of hypertension might be due to high awareness and experience about the disease. Good medication adherence among experienced hypertensive patients can also be due to proper relationship between the physician and the patient, and high confidence in the doctor's advice [21]. The study also revealed that, factors related to not stopping medication although shortage of drugs in the health facility was found to have significant association with medication adherence. Hypertensive patients not stopping medication due to shortage of drugs in the health facility was 4.39 times better adhered medication than hypertensive patients stopping medication due to shortage of drugs in the health facility [AOR (CI): 4.398 (2.524, 7.662) p value< 0.05]. Factors related to health facility, religion, educational level, residence, ethnicity and dosage and frequency of drugs and hospitalization history, didn't had significant influence on medication adherence.

Limitations of the Study: *First:* The participants knew that the researchers were healthcare providers, so the results could be affected. *Second:* The results might be subjected to recall bias and there may be the denial of poor practices from the respondents, which affects the results of the study. To fill the gaps, researchers have tried their top best to build a rapport with the patients to collect sincere data from the respondents. This study didn't address the main barriers of adherence, therefore further study may be of value to explore the gap further. Since the study was conducted in Anseba region only, it was difficult to extrapolate the results to the country.

Conclusion

The study participants had relatively good medication adherence. Factors related to stopping medication due to shortage of drugs in the health facility was found to have significant association with medication non-adherence. Increasing adherence counseling and patient education about the disease and its treatment are important measures to scale-up adherence status of patients. Health facilities should have enough supply of medication.

Declarations

Abbreviations: BP: Blood Pressure; SD: Standard deviation; COR: Crude odds ratio; CI: Confidence interval; SPSS: Statistical Package for Social Sciences.

Authors' contributions: All authors participated in all phases of the study including topic selection, design, data collection, data analysis and interpretation. Samuel Jirom contributed in critical revision of the manuscript. All the authors read and approved the manuscript.

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