

Factors Associated with Adherence to Medication among Hypertensive Patients in a District Hospital, Northern Province, Rwanda

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Abstract

Background

Globally, half of cardiovascular deaths are related to hypertension. Unfortunately, sub-Saharan Africa is burdened with lower adherence to anti-hypertensive medications. Hence, to successfully control and prevent the now-increasing hypertension crisis and its complications is to ensure good adherence to anti-hypertensive medications.

Aim

The aim of this study was to assess factors associated with adherence to hypertension medications among hypertensive patients in a district hospital of Northern Province in Rwanda.

Methods

A cross-sectional analytical study was conducted on 272 hypertensive patients. Data were analyzed using SPSS version 21.0 in which bivariate and multivariable analyses were performed. The significance level was set at $p < 0.05$; and odds ratio and adjusted odds ratios with 95% confidence intervals (CI) were calculated.

Results

Self-reported adherence was 64.3%. Factors associated with adherence to hypertension medications were being a female (AOR= 4.188, 95% CI [1.555-11.281], $p=0.005$); having been diagnosed and on treatment for five years or more (AOR=33.35, 95% CI [5.016-221.2851], $p<0.001$), good belief of medication (AOR=16.867 95% CI [5.438-52.321], $p<0.001$), taking medication even when there are no symptoms (AOR: 24, 95% CI [4.831-119.281], $p<0.001$); in the past having been a smoker but stopped (AOR: 9.348, 95%CI [2.594-33.686], $p=0.001$).

Conclusion

Adherence was low, and multiple factors were associated. As a result, there is a need to develop and strengthen strategies aiming at improving medication adherence among hypertensive patients by addressing the factors associated.

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Keywords: Adherence to medication, compliance, factors associated, hypertension, risk factors, socioeconomic

Introduction

Globally, hypertension is one of the most serious health problems. affecting 22% of the adults aged 18 years and above.[1] Among 1.13 billion people diagnosed with hypertension, more than 60% are from the least developed countries.[1] Among these cases, only 20% are aware of their condition and 42% have been diagnosed and are receiving treatment.[2] Previously in Rwanda, hypertension was estimated to be 15% among those aged 15 to 64 years.[3] Northern Province where Gakenke District and its two district hospitals are located, has hypertension prevalence of 18.6% .[1]

Adherence to medication in the management and control of hypertension remains a big challenge. The global non-adherence rate to hypertension treatment is 45%, while in sub-Saharan African it is 65.2% higher than for other Africa regions.[4–6] When uncontrolled, the persistent rise of the blood pressure can lead to different cardiovascular morbidities and mortality which include stroke, heart diseases, vascular damage and death.[6] In addition to that, stroke and other cardiovascular diseases are considered to be among the diseases with high morbidity.[1]

Among the measures to control hypertension, is adherence to medications.[4] Ray et al. (2021) argued that the adherence to hypertension medication is associated with the long period between the onset of hypertension signs and symptoms; and diagnosis/initiation of treatment.[7] That is, patients who have been taking medication for a long period are aware of possible complications of skipping medications and have a higher rate of adherence to medication than the newly diagnosed/treated ones.

It has also been highlighted that patients who receive prescribed medications by a registered medical practitioner show good adherence to medications than their counterparts; this may be attributed to lack

of or inappropriate education regarding medication and the importance of adherence to the antihypertensive by the prescriber who is not well qualified.[7]

On the other hand, among the factors that can hinder the adherence to hypertension medications are being too old, living with chronic disease, and being required to take many drugs.[8,9] Furthermore, low education, unhealthy lifestyles such as smoking and alcoholism, being obese and male have also been identified as factors hindering adherence.[1,10]

Thus, this study aimed at assessing factors associated with adherence to hypertension medications among hypertensive patients in Ruli district hospital, Rwandan so as to provide the health policy developers and implementers with information necessary for intervention.

Materials and methods

Research design

This study incorporated the cross-sectional analytical design on hypertensive patients being treated at a selected Hospital from February 2023 to April 2023.

Sample size and sampling

The sample size was 272 hypertensive patients being in the NCDs registry of Ruli Hospital. The sample was calculated using the Fisher et al formula; the formula that is widely used in cross-sectional studies .[11,12]

$$n = (Z^2 P(1-P)) / d^2$$

Where, Z= 95% confidence level normal standard deviation (1.96), P= the expected prevalence of the target population (0.77) and d the acceptable degree of error (0.05).

Therefore,

$$n = \frac{1.96^2 * 0.77(1 - 0.77)}{0.05^2} = 272$$

Data collection method

Data was collected using the questionnaire adopted to fit the study from WHO STEP-wise approach to non communicable disease, the adherence to medication scale of eight items and belief about medications [13–15]. The instrument collected sociodemographic, lifestyle, and medical and family history factors as it was structured in a conceptual framework. The instrument also measured adherence to hypertension medications using a scale adopted from the Morisky adherence scale-eight points [14]. Data was collected through face to face interviewer-participant interview, with the interviewer reading each question to participant and then recording response accordingly.

Data analysis

After data collection, a daily check up of filled questionnaires was carried out, to anticipate errors or falsely recorded information. Data was entered using the Excel sheet then imported in IBM® Statistical Package of Social Sciences (SPSS) version 21 software in which data cleaning, text writing, and statistical analysis were conducted. Adherence to hypertension medications was measured using an adopted medication scale from Morisky Medication Adherence Scale of Eight items. This scale is composed by eight questions; the first seven have dichotomous answers; with 'yes' standing for adherence and scored '1'; and 'no' for non-adherence and scored 0; the last question has 5 possible answers reflecting the frequency of forgetting medication, score '1' would be given to non-forgetfulness and '0' to others. The possible adherence score ranges between 0 and 8. The score of ≤ 6 would be classified as non adherence and score of >6 i.e 7 and 8, would be classified as adherence.

Descriptive statistics were used in results presentation. Bivariate and multivariate Binary Logistic regression was performed. Variables whose p value is less than 0.05 were declared to be statistically significant predictors of adherence to hypertension medications. The association between the independent variables and the adherence to hypertension

medications was described using the odds ratios (OR) with the 95% confidence Interval (CI) and the level of significance of p less than 0.05. Multivariable logistic regression analysis model was performed to get adjusted odds ratios (AOR) with 95% Confidence Interval (CI).

Ethical consideration

This study was cleared to go on by the Mount Kenya University, ethical Review Board (Reference Number: MKU/ETHICS/045/2023) and the hospital has provided the permission for the study to be carried out. Study participants have been provided with explanations on the study, its objectives and anticipated possible benefits and participants have provided the signed consent to participate. The confidentiality of participants was ensured and their responses were handled anonymously. All questionnaires used were kept in a closed cupboard which were accessed only by the researcher.

Results

Sociodemographic factors

Table 1 represents the sociodemographic characteristics of the respondent. These are age, sex, residence, education, religion, marital status, employment, social category, and possession of the health insurance. Regarding the age, 12.1% were under 40 years old, 33.1% between 40 and 60 years and 54.8% were above 60 years. For sex, male were 37.9% while female were 62.1%. 23.2% were urban resident while 76.8% lived in rural area. 53.5% had no formal education and 46.7% had a formal education, that is Primary education and above. The 71.7% of the study participants were catholic and 28.3% were protestant. There were 77.9% married, 9.2% widows and 12.9% single participants. Regarding the occupation, 92.3% were unemployed which includes home keepers and those who do casual work when available, and 7.7% full time employees in different institutions. Regarding their social categories, there were 43.4% in social category II and 56.6% in social category III. All of them (100%) had health insurance.

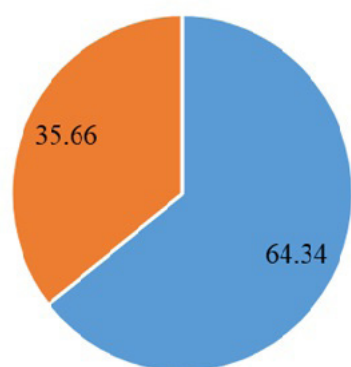
Table 1. Socio-demographic characteristics of the respondents

Socio-demographic characteristic	Frequency	Percent (%)	
Age	Under 40	33	12.1
	40-60	90	33.1
	Above 60	149	54.8
Sex	male	103	37.9
	female	169	62.1
Residence	urban	63	23.2
	rural	209	76.8
Education	no formal education	145	53.5
	Primary education and above	127	46.7
Religion	catholic	195	71.7
	protestant	77	28.3
Marital status	single	35	12.9
	married	212	77.9
Employment	widow(er)	25	9.2
	Unemployed	251	92.3
Social category	Employed	21	7.7
	cat 2	118	43.4
Health Insurance	cat 3	154	56.6
	Insurance	272	100
	No Insurance	0	0

Adherence to medication

Using the Adherence scale of eight items; among 272 repondents, 172 (64.3%) have got the score of >6 out of 8 i.e they were ‘adherent’, and 97 (35.6%) have got the score of ≤6 out of 8 i.e they were ‘non adherent’. The adherence to medication among hypertensinve patients at ruli hospital was 64.3%. That is 64 people out 100 hypertensive patients are adherent.

Medication adherence status (%)



■ Good Adherence (7-8) ■ Low adherence (6-0)

Figure 1. Medication Adherence status

Bivariate Analysis

Bivariate analysis of factors associated with adherence to hypertension are presented in Table 2 has revealed the following: On sociodemographic factors, there was a statistical significance on association between the adherence to hypertension medication and the age ($p < 0.001$), sex ($p < 0.001$), education ($p = 0.001$) and marital status ($p = 0.004$). However there was no statistical significance on association between adherence to hypertension medication with residence ($p = 0.457$), religion ($p = 0.399$), employment ($p = 0.816$) social categories ($p = 1$) and the time it takes to reach the hospital ($p = 0.895$).

On the medication related factors, taking other medications other than the hypertension medication ($p = 0.037$), the time that patient have been on medication ($p = 0.003$), and believing that taking medication even when no symp-toms is importnant ($p = 0.027$), were also found associated with adherence to hypertension medications. While on the lifestyle factors, being once once a smoker but have quitted it ($p = 0.007$),

drinking alcohol (p=0.031), performing moderate activities for 10 minutes or more (p=0.004) and doing regular physical exercises (p=0.002) were also

associated with adherence to hypertension medications. The other factors which are not described have been statistically found not associated with adherence.

Table 2. Bivariate analysis of the factors associated with adherence to Hypertension medications

Variable	N	Adherence to medication		P value	
		Poor adherence	Good adherence		
Age	Under 40	33	27 (81.8)	6(18.2)	<0.001
	40-60	90	27(30)	63(70)	
	Above 60	149	43(28.9)	106(71.1)	
Sex	Male	103	51(49.5)	52(50.5)	<0.001
	Female	169	46(27.2)	123 (72.8)	
Residence	Urban	63	25(39.7)	38(60.3)	0.457
	Rural	209	72(34.4)	137(65.6)	
Education	No education	145	38(26.2)	107(73.8)	0.001
	Primary and above	127	59(46.5)	68(53.5%)	
Religion	Catholic	195	73(37.4)	122(62.6)	0.399
	Protestant	77	24 (31.2)	53(68.8)	
Marital status	Single	35	21(60)	14(40)	0.004
	Married	212	70(33)	142(67)	
	Widower	25	6(24)	19(76)	
Employment	Unemployed	251	89(35.5)	162(64.5)	0.816
	Employed	21	8(38.1)	13(61.9)	
Social categories	Category I	118	42(35.6)	76(64.4)	1
	Category II	154	55(35.7)	99(64.3)	
Time it takes to reach hospital	Below 1 hr	176	62(35.2)	114(64.8)	0.895
	1hr above	96	35(36.5)	61(63.5)	
Taking other medications	No	169	52(30.8)	117(69.2)	0.037
	Yes	103	45(43.7)	58(56.3)	
Number of Tablets	One Tab	57	20 (35.1)	37(64.9)	0.612
	Two Tabs	135	45(33.3)	90(66.7)	
	Three and more	80	32(40)	48(60)	
Number of ATH Meds types	One	35	13(37.1)	22(62.9)	0.979
	Two	122	43(35.2)	79(64.8)	
	Three and more	115	41(35.7)	74(64.4)	
Time with Hypertension meds	Less than 5 yrs	176	74(42%)	102(58%)	0.003
	More than 5 yrs	96	23(24%)	73(76%)	
ATH Dose	BID	128	48(37.5)	80(62.5)	0.612
	TID	144	49(34)	95(66)	
Important to take Meds even when no symptoms	No	107	47(43.9)	60(56.1)	0.027
	Yes	165	50(30.3)	115(69.7)	
Ever smoked	No	164	69(42.1)	95(57.9)	0.007
	Yes	108	28(25.9)	80(74.1)	
Currently Alcoholic	No	188	58(30.9)	130(69.1)	0.031
	Yes	52	25(48.1)	27(51.9)	
Moderate activity for 10' or more	No	104	26(25)	78(75)	0.004
	Yes	168	71(42.3)	97(57.7)	
Physical exercise	No	250	82(32.8)	168(67.2)	0.002
	Yes	22	15(68.2)	7(31.8)	
Fruit eating frequency	2 days or less	167	52(31.1)	115(68.9)	0.052
	3 days or more	105	45(42.9)	60(57.1)	

Multivariable Analysis

The Variables whose p values were statistically significant were further analysed using multivariable logistic regression and the results are presented in the Table 3. Multivariate logistic regression analysis revealed that female were more likely adherent than males (AOR: 4.188, 95% CI [1.555-11.281], p=0.005); Patients who have been di-agnosed with hypertension and have been on medication for a period of 5 years or more were more likely to adhere to medication that those who were taking medication for a period less than 5 years (AOR: 33.35, 95%CI [5.016-221.2851], p<0.001).

Participants who reported that ‘it is important to take medication even when no symptoms’ and those who had a good belief about medications were more likely to adhere than those who said no to the statement and also those who had low belief respectively (AOR: 24, 95%CI [4.831-119.281], p<0.001 and AOR:16.867 95%CI [5.438-52.321], p<0.001 respectively). People who were once smoker but quitted it after realiz-ing that thy have Hypertension were more likely adherent that those who did not smoke (AOR: 9.348, 95%CI [2.594-33.686], p=0.001).

Table 3. Multivariable analysis of the factors associated to adherence to medications

Variables Label	Categories	COR	AOR	95% CI		P value
				Lower	Upper	
Age	Below 40	Ref	Ref			
	40-60	10.50	4.596	0.839	25.162	0.079
	Above 60	11.09	2.954	0.317	27.562	0.342
Sex	Male	Ref	Ref			
	Female	2.62	4.188	1.555	11.281	0.005
Marital status	Single	Ref	Ref			
	Married	3.04	2.591	0.162	41.364	0.501
	Divorced	4.75	45.883	0.606	3475.001	0.083
Education	No formal education	2.44	1.431	0.345	5.943	0.622
	Formal education	Ref	Ref			
Taking other medication	No	1.74	1.828	0.775	4.310	0.168
	Yes	Ref	Ref			
Important to take medication even when no signs	No	Ref	Ref			
	Yes	1.8	24.006	4.831	119.281	<0.001
Belief about ATH medication	Good	4.29	16.867	5.438	52.321	<0.001
	Low	Ref	Ref			
Time with Hypertension meds	Less than 5 yrs	Ref	Ref			
	More than 5 yrs	2.3	33.359	5.016	221.851	<0.001
Ever smoked	yes	2.07	9.348	2.594	33.686	0.001
	No	Ref	Ref			
Currently drinking alcohol	Yes	Ref	Ref			
	No	2.07	0.383	0.096	1.527	0.174
Moderate activity lasting 10	Yes	0.45	0.528	0.151	1.842	0.317
	No	Ref	Ref			
Physical exercises	Yes	0.22	0.163	0.019	1.373	0.095
	No	Ref	Ref			

Discussion

The findings of this study have revealed that the level of adherence is 64%. This is higher than that 50% found by a systematic review conducted in 22 middle and lower income countries of Asia.[16] The discordancy might be attributed to the fact that this study recruited only patients who were already in the NCDs registry, being followed up for hypertension, and hence already had increased level of awareness about the disease.

However, in the sub-Saharan region, a lower adherence to hypertension medication of 54.2% was obtained in a meta-analysis conducted by Abegaz et al.,[8] attributing it to the limited education opportunities, and poor access to finance compared to the developed world, among others.[17,18] On the other hand, in Rwanda, a study conducted in four district hospitals reported 77% adherence to hypertensive medications, higher than what this study found.[19] This difference might be explained by the way the two studies were conducted. Firstly, this study recruited only patients who were being followed up by the NCDs department of the selected district hospital while the other study incorporated all hypertensive patients being treated at 4 hospitals in the Southern province .[19]

Secondly, topographically the Southern Province differs from and Northern Province specifically Gakenke District whereby in this district all the hospital catchment areas do not have easy access to public transport. With the rising prevalence of newly identified cases of hypertension, suboptimal adherence rates to treatment and the significant obstacles rural areas face in accessing adequate healthcare services, there is an urgent need for proactive interventions. These interventions should originate from policymakers and implementers, involve healthcare providers, and hypertensive patients so as to effectively address the hypertension burden and to mitigate its effects on communities, families, and individuals.

On the socio-demographic factors age was not found to be associated with adherence contrary to other studies asserting that younger people are less adherent than old ones.[17–20] Nevertheless, although not statistically significant, participants with the age 60 years and above were 2.9 times more likely to be adherent and people in the age range of 40-60 are 4.5 times more likely to be adherent than people younger than 40 years. That tendency was explained by the fact that younger people may not be as concerned of their health as old ones, and thus are inclined to ignore medical advice and prescriptions.[17,20] The inconclusive findings of this study on age may be due to the limited number of hypertensive patients (33) under the age of 40 compared to the other age groups. Nonetheless, drawing from similar studies, there is a clear need for targeted interventions across all age groups, with a particular emphasis on younger individuals, to enhance their self-awareness and susceptibility to hypertension.

This study also revealed that females are 4 times as adherent as males; in consonance with a study conducted in Taiwan.[21] This may be attributed to the fact that males are the ones who travel so much and engage in activities obliging them to stay away from home, contributing to poor adherence than females. However, these findings are not consistent with the others in which females were less adherent than males,[22] or no association was established.[18,23,24]

In this study, despite the crude odds ratio suggesting that married and divorced people are more likely to be adherent than single ones, the adjusted odds ratios did not show any statistical significance. These findings are not in line with what was found elsewhere, where it was attributed to social support from their relatives and friends making them more adherent than the single ones.[25] Having been married enables the person to create a social network which result in social support, and increased adherence.[17]

Although previous works have suggested that education can positively affect the adherence to hypertension medications,[22,26] this study findings did not establish any association despite that crude odds ratio suggested that non-educated participants were more likely to be adherent than the formally educated. This is contrary to what people should expect that education is associated with good compliance to medication. Ezeala-Adikaibe et al., argues that educated people may resist reliance on the health care provider's advice, whilst non educated people would have an undivided trust toward them resulting in increased adherence than for educated ones.[17] Similar to the findings of this study, other studies have not found a significant association between adherence to hypertension medication and the level of education.[20,27] This variability in association between adherence to hypertension medications and educational attainment suggests that formal education is not enough to expect optimal adherence. Strategies to address hypertension and improving adherence must therefore encompass all individuals regardless their educational level.

Concerning medication related factors, it was revealed that being diagnosed for HTN and being on treatment for a period of 5 years and above were positively associated with adherence compared to being diagnosed and on treatment for a period of less than 5 years. This is consistent with similar studies which revealed the longer the time on medication, the more the patients become used to it and aware of susceptibility, resulting in increased adherence to medication increases.[17, 28]

The patient who agreed to whether 'it is important to take medication even when no symptoms' and those who had a good belief about medications were more likely to adhere than those who stated the converse. This is similar findings of other studies suggesting that having a good belief on medications is a sign of increased self-awareness and perceived susceptibility, both of which are essential

for improved adherence to medication. [29] Therefore, a key strategy to improve adherence to hypertension medications is to ensure that patients receive personalized information about their condition, potential complications of non-adherence, and the benefits of complying with prescribed treatments.

About the lifestyle factors it was found that patients who have ever smoked are more likely to adhere than those who have never. The findings seem to be different from other few studies that indicate a negative association between adherence and smoking, implying that smoking is associated with poor adherence.[25,30] Although the findings contradict the past studies, it may be due to the fact that the participants who responded as having been smokers, had all stopped after knowing their condition and there was no active smoker participants. We may therefore presume that, since they all quit smoking for their health concern, they were probably having good health belief and perceived susceptibility hence became more adherent.

Limitations

The study limitations include the time vis à vis the study participants availability, the methodology used, and the study setting, that constrain the study findings from being generalized to the entire Rwandan population.

Conclusion

The level of adherence (64.3%) to hypertension medication among patients attending one district hospital, Northern Province in Rwanda is relatively low compared to other similar study findings. Factors associated with adherence to medication among hypertensive patients in Ruli District Hospital are sex, the length of the time patient have known their diagnosis and have been on treatment, good belief on the importance of taking hypertension medication even when no symptoms, and perception of susceptibility.

Females, who have been diagnosed with Hypertension and have been on medication for five years or above, those who agreed on the statement “it is important to take medication even when no symptoms”, and those who were once smokers but have quit it were more adherent than their counterparts. Hence, there is a need to emphasize health education on hypertension and adherence to medication among hypertensive patients so as to increase the health literacy of the condition among the patients and the belief about medication.

Further studies on a large scale with different study design are encouraged in order to provide the broad-based status of adherence to hypertension medication and associated factors so as to facilitate their generalization to the entire population.

Authors contribution

AD has designed the study, collected, analyzed, interpreted the data, wrote the manuscript. RO and MH supervised the whole process up to publication. They contributed the design of the study, the analysis and the manuscript review while SN contributed largely to the manuscript review and publication process.

Declaration of conflict of interest

The author declares no conflict of interest with regards to this research and the authorship of this article.

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Availability of data and materials

The data associated with this study can be available on reasonable request.

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