



Relationship Between Medication Adherence And Blood Pressure Control Among Adults With Primary Hypertension Attending A Primary Care Clinic Of A Tertiary Hospital In North Western Nigeria

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Abstract

Original Research

Background: Hypertension is one of the most common risk factors for cardiovascular morbidity and mortality in both developed and developing countries.

Medication adherence is a universal factor in achieving optimal blood pressure control among people living with hypertension.

Aim: To determine the relationship between medication adherence and blood pressure control among the respondents attending the General Outpatient Clinic of Federal Medical Centre, Gusau

Methods: This hospital-based cross-sectional study included respondents attending the General Outpatient Clinic of Federal Medical Centre, Gusau.

The researchers used systematic random sampling to select 138 study participants. The researchers collected respondents' data using a pre-tested, interviewer-administered questionnaire. They also used the Morisky Medication Adherence Questionnaire (MMAS-8) to measure respondents' medication adherence.

We assessed the relationship between medication adherence and blood pressure control using a chi-square test. We set the significance level at $p < 0.05$.

Results: Most respondents had poor medication adherence (86.2%), while 19.4% had moderate adherence and 4.4% had good adherence. Similarly, most respondents (73.9%) had poor blood pressure control, while 26.1% had good blood pressure control. Bivariate analysis showed a statistically significant relationship between medication adherence and blood pressure control at $p < 0.05$.

Conclusions: Most respondents had poor blood pressure control, likely due to poor medication adherence. This relationship was statistically significant. Therefore, primary care physicians should routinely assess medication adherence among hypertensive patients to ensure optimal blood pressure control.

Keywords: Medication adherence, Hypertension, Blood pressure control, cardiovascular risk factors, Primary care.

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INTRODUCTION

Hypertension is a worldwide public health problem that contributes greatly to the significant burden of non-communicable disease.

Hypertension can be defined as systolic blood pressure (SBP) of ≥ 140 mmHg and diastolic blood pressure (DBP) of ≥ 90 mmHg.²

About 1 billion individuals are diagnosed with hypertension globally, and 7.5 million of all estimated global deaths were due to hypertension.^{1,3}

The prevalence of hypertension tends to be highest in African countries (46%), compared to the Eastern Mediterranean (41%), Southeast Asia (38%) and the Americas (35%).¹ In Nigeria, the prevalence of hypertension among men ranges between 6.2% and 48.9% and for women, the prevalence also ranges between 10% and 47.3%.⁴ About two-thirds of the people living with hypertension reside in developing countries.⁵ These countries face a transition from infectious to non-infectious disease due to sedentary lifestyle, overweight, obesity and poor dietary habits.

The World Health Organisation's global monitoring framework on hypertension aims to reduce hypertension prevalence by 25%.⁴

Achieving a 25% reduction in hypertension prevalence will help meet the WHO global monitoring framework targets.⁴ This framework aims to achieve a 25% reduction in premature mortality from non-communicable diseases like hypertension.⁶ Improvement in quality control measures, public health service delivery, low cost of medications, and increased accessibility to diagnosis are cardinal ingredients in addressing the growing epidemic of hypertension.

The risk factors of hypertension are advanced age, rapid urbanisation, sedentary lifestyle, dietary changes and mechanisation.³ The asymptomatic nature of the disease is the main reason why most of the patients with hypertension remain undiagnosed for long.¹ It is a silent killer disease; at an early stage, patients rarely present with any symptoms until hypertension-related complications develop. Among the consequences of hypertension are a decrease in

the quality of life of patients, an increase in health care expenditure and the financial burden on the affected individual.¹ This serious financial burden is associated with an increase in out-of-pocket expenditure, hospitalization, and morbidity and mortality of the patients. Cumulatively, this puts a great economic burden on individuals and the healthcare system of the country, especially in resource-constrained settings like Nigeria.

Treatment of hypertension can be by non-pharmacological or pharmacological means.

Lifestyle modifications, including the DASH diet, regular exercise for at least 30 minutes three times a week for five days, low-salt diet, cessation of cigarette smoking, and avoidance of alcohol consumption, are important lifestyle modifications for achieving the optimal blood pressure control.

Failure to achieve target blood pressure control with this lifestyle modification strategies will lead to the addition of antihypertensive medication for optimal blood pressure control. About 36.9% of the total number of global hypertensive populations are on antihypertensive medications, out of which only 13.8% of them achieved good blood pressure control due to poor medication adherence.¹

Good blood pressure control has been reported to reduce the incidence of myocardial infarction by 20-25%, stroke by 30-45%, and heart failure by about 50%.⁷

To take effective preventive measures, identifying high blood pressure risk factors is essential for disease prevention.

Interventions such as increased physical activity, weight loss, increased fruit and vegetable intake, avoidance ingestion of tobacco and alcohol consumption also support disease prevention.

Early diagnosis and treatment of hypertension help in the prevention of cardiovascular morbidity and mortality.

Despite increased awareness, poor adherence to treatments for chronic diseases like hypertension remains a global and critical problem in the management of hypertension. Antihypertensive

medication adherence is the extent to which a person's medication-taking behaviour aligns with the physician's recommendations.⁸

Medication adherence is a fundamental factor for the treatment success of hypertension. In contrast, poor medication adherence and lack of awareness of hypertension are among the main reasons for poor blood pressure control.⁹

Poor antihypertensive medication adherence constitutes an enormous public health problem and is an important risk factor for hypertension-related morbidity and mortality.¹⁰

This problem is a global challenge and a major obstacle to achieving optimal blood pressure control among hypertensives.¹⁰ Achieving optimal blood pressure control is important for preventing hypertension-related complications. Hence, identification of people with predictive factors of hypertension and those who are likely to have poor medication adherence is an important strategy in reducing the burden of the disease.⁷

Good medication adherence plays a significant role in achieving optimal blood pressure control, and reducing hypertension-related complications. Good medication adherence is essential in maintaining the health and well-being of people living with chronic diseases like hypertension.¹

A cross-sectional study of 400 participants attending a family medicine clinic at the University of Port Harcourt in South south Nigeria found that respondents with good medication adherence had good blood pressure control. In contrast, those with poor medication adherence had poor blood pressure control. Hence, medication adherence was significantly associated with blood pressure control among the respondents.⁵ Similarly, a cross-sectional study conducted in a tertiary hospital in Southwest Nigeria among 300 hypertensive patients attending a family medicine clinic in a tertiary hospital shows that study participants with good medication adherence had good blood pressure control, and those with poor medication adherence had poor blood pressure control. Medication adherence was significantly associated with blood pressure control among respondents.¹¹

Several studies have examined factors affecting medication adherence among hypertensives. However, few studies have examined the relationship between medication adherence and blood pressure control among their respondents.

Therefore, this study examined the relationship between medication adherence and blood pressure control among hypertensive patients attending the General Outpatient Cmm linic of Federal Medical Centre, Gusau. This knowledge will help raise awareness among health care workers about the importance of medication adherence in achieving blood pressure control.

2.0 MATERIALS AND METHODS

2.1 Study Area

The study was conducted at the General Outpatient Clinic, Department of Family Medicine, Federal Medical Centre, Gusau. Gusau is the capital of Zamfara State in northwestern Nigeria and was created in 1996 during General Sani Abacha's era. The state has 14 Local Government Areas. The predominant tribe in Gusau is Hausa, with some Fulani, Yoruba, Igbo, and other ethnic groups. Islam is the state's major religion, followed by Christianity; the people's main economic activities are business, farming, and civil service.

Federal Medical Centre Gusau is a 467-bed hospital that operates 24 hours a day, every day of the week.

2.2 Study Design

This was a hospital-based cross-sectional study design.

2.3 Study Population

The study included all hypertensive patients aged 18 years and above who attended the General Outpatient Clinic of Federal Medical Centre Gusau for at least three months and met the inclusion criteria.

2.4 Operational Definition of Variables.

i. Anti-hypertensive medication adherence: This is the ability of hypertensive patients to adhere to anti-hypertensive medication as prescribed by the physician. The Morisky Medication Adherence Scale (MMAS-8) was used to assess medication adherence among study participants.

A score of 8 indicates good medication adherence, while a score of 6-7 indicates moderate medication adherence, and a score of 0-5 indicates poor medication adherence.

ii. Blood pressure control: Good blood pressure control can be defined as blood pressure < 140/90mmHg while poor blood pressure control is defined as blood pressure $\geq$ 140/90mmHg.

2.5 Inclusion Criteria.

1. All consented hypertensive patients ≥ 18 years of age.
2. All hypertensive patients who were on at least one antihypertensive medication for at least 3 months.

2.6 Exclusion Criteria.

1. All critically ill hypertensive patients who required urgent care.
2. All hypertensive patients with comorbid conditions.

2.7 Duration of the Study.

The study lasted 16 weeks.

2.8 Sample Size Determination.

The minimum sample size was determined using the following formula.

$$n = Z^2 pq / d^2.$$

n = minimum sample size.

z = standard deviation for a 95% confidence level.

p = estimated prevalence rate of good

antihypertensive medication adherence from a previous study was 8.9%.⁷

$$P=0.089$$

q = 1 – p (complementary probability).

$$q = 0.911$$

d = degree of accuracy (0.05).

$$n = (1.96)^2 \times 0.089 \times 0.911 / (0.05)^2$$

$$n = 125$$

To account for unforeseen circumstances, 10%(12.5) was added to the sample size.

The final sample size become $125 + 12.5 = 138$

2.9 Sampling Technique

Systematic random sampling was used to recruit 138 participants who met the study's eligibility criteria. According to the hospital records, an average of 10 patients with hypertension are seen daily. In one week (5-working days), 50 patients will be seen, and over the 16-week study period, 800 patients will be seen.

The study population N = 800.

The sampling interval: $800/138 = 5$

Hence, every fifth individual on the list will be selected. The first participant was selected from the first five patients who arrived at the clinic by simple balloting. Five empty scrolled papers with one Yes and four No written on them were presented to the 5 participants. The participant who picked Yes was taken as the first participant for the day. Subsequent participants were selected at 5-participant intervals. The selected participants' files were marked with a sticker at the end of each clinic to avoid repetition. In the event a selected participant declined consent, the next eligible participant would be recruited. This was continued until the desired sample size was attained.

3.0 Study Protocol.

The study took place at the General Outpatient Clinic of Federal Medical Centre, Gusau. Participation in the study took an average of 30 minutes. The

questionnaires were pretested at the General Outpatient Clinic of Yariman Bakura Specialist Hospital, Gusau, among 14 hypertensive patients (10% of the sample).

Two research assistants collected relevant information from participants during the study.

The participants' blood pressure was measured using the Accoson brand of sphygmomanometer with an appropriate-size cuff and Littmann's stethoscope.

The research assistant positioned the sphygmomanometer at the participant's heart level. The research assistant calibrated the sphygmomanometer at eye level to avoid parallax error. The participant's left arm was placed horizontally at the mid-sternum level. The participant's brachial artery was located about 2cm from the cubital fossa, and the radial artery pulsation was located on the distal radius, just above the lateral side of the wrist joint.

The sphygmomanometer cuff was applied to the participant's right arm after locating the brachial and radial artery pulsations. The sphygmomanometer cuff was inflated, and the radial artery pulsation was palpated; the cuff was then inflated until no radial pulsation was felt. The cuff was gradually deflated while observing the radial pulse; the first radial pulse felt during deflation was the estimated systolic blood pressure. The cuff was inflated 20 mmHg above the estimated systolic blood pressure. The stethoscope was placed over the brachial artery, and the cuff pressure was reduced at 2 mmHg per second. The first Korotkoff sound indicated systolic blood pressure, and the final loss of the Korotkoff sounds indicated diastolic blood pressure.

The study recorded respondents' systolic and diastolic blood pressure.

3.2 Data Analysis

Data were analysed using the International Business Machines Statistical Package for the Social Sciences (IBM SPSS) Statistics version 27 software. We presented the sociodemographic data and clinical characteristics of the study participants as frequencies and percentages. Descriptive statistics summarised the participants' demographic and clinical characteristics. We presented continuous variables as means and standard deviations (SD), while categorical variables were presented as frequencies and percentages.

We assessed the relationship between medication adherence and blood pressure control using the chi-square test. The level of significance was set at $p < 0.05$.

The Medical Research and Ethics Committee of Federal Medical Centre Gusau approved the study. The study protocol was presented to the volunteer participants, and written informed consent was obtained. Participants were informed that all information obtained during the study would remain confidential and that they could withdraw from the research at any time.

Sociodemographic and Clinical characteristics of the respondents

Table 1 below displays the sociodemographic characteristics of the respondents, and their mean age was 53.1 ± 10.8 years. The most common age group was 50-60 years, representing 37% ($n = 51$) of respondents. More than two-thirds of respondents 98 (70%) were male, and the majority 103 (74.5%) were Hausa by tribe. Most respondents 126 (91.3%) were married, and half 70 (50.7%) had a family history of hypertension; other details are shown below.

RESULTS

Table 1: Sociodemographic and Clinical characteristics of the respondents

Variables	Frequency (n = 138)	Per cent (%)
Age groups (in years)		
< 40	16	11.6
41 – 50	41	29.7
51 – 60	51	37.0
> 60	30	21.7
Sex		
Male	98	71.0
Female	40	29.0
Tribe		
Hausa	103	74.5
Fulani	10	7.2
Yoruba	14	10.1
Igbo	10	7.2
Others	1	0.7
Religion		
Islam	123	89.1
Christianity	15	10.9
Marital status		
Married	126	91.3
Divorced	4	2.9
Widowed	8	5.8
Employment status		
Civil servant	70	50.7
Business	38	27.5
Farming	5	3.6
Unemployed	25	18.2
Average monthly income		
< 100,000	34	24.6
100,000 – 199,000	24	17.4

200,000 – 299,000	32	23.2
≥ 300,000	48	34.8
Family history of hypertension		
Yes	70	50.7
No	68	49.3
Number of antihypertensives taken daily		
One	23	16.7
Two	83	60.1
More than two	32	23.2
Mean age (Mean ± Standard Deviation = 53.1 ± 10.8)		

Level of Medication Adherence of the Respondents

Figure 1 shows the pattern of medication adherence among respondents, of the 138 respondents, only 6

(4.4%) had good medication adherence, 13 (9.4%) had moderate adherence, and the majority, 119 (86.2%), had poor adherence to their antihypertensive medications.

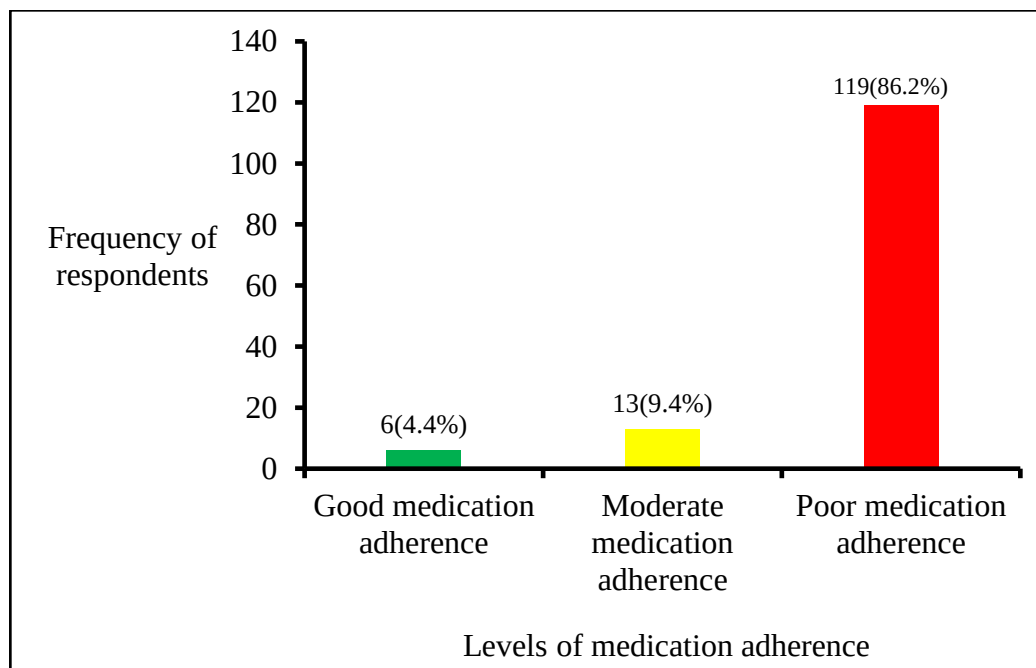


Figure 1: Pattern of medication adherence among respondents

Level of Blood Pressure Control of the Respondents

Figure 2 shows the respondents' blood pressure

control pattern. Out of the 138 respondents 36(26.1%) of them had good blood pressure control while 102(73.9%) of them had poor blood pressure control

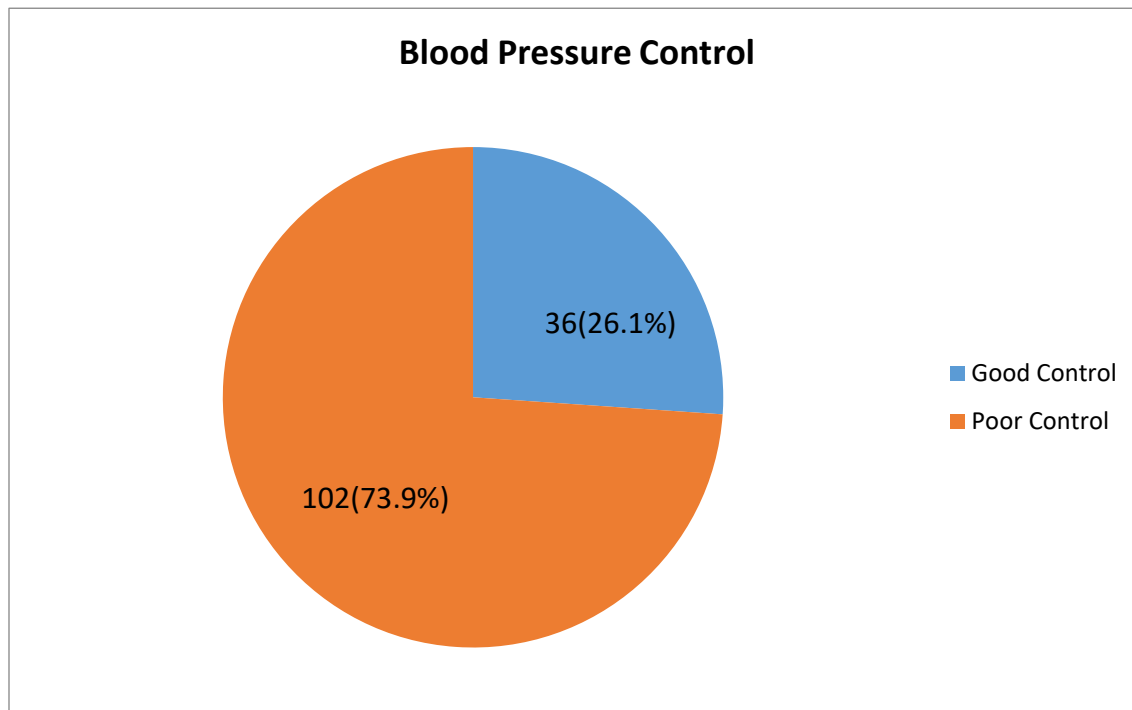


Figure 2: Pattern of Blood Pressure Control among Respondents

Relationship between Medication Adherence and Blood Pressure Control

Table 2 below shows the relationship between medication adherence and blood pressure control among the respondents. Respondents with moderate medication adherence had the highest proportion of good blood pressure control (53%), compared with those with good medication adherence (50%). Recognising how adherence affects blood pressure control can inspire healthcare professionals to the

better support of the patients.

Similarly, 93(78.2%) of the respondents with poor medication adherence had poor blood pressure control, and only 26 (21.8%) of them with poor medication adherence had good blood pressure control.

The relationship between medication adherence and blood pressure control among respondents was statistically significant (Fisher's exact test, $p = 0.017$). Other details are seen in the table below.

Variables	Blood Pressure Control		Test statistic p-value
	Good control (n= 36) n (%)	Poor control (n= 102) n (%)	
Medication adherence			
Good	3 (50.0)	3 (50.0)	FE = 7.720
Moderate	7 (53.8)	6 (46.2)	p = 0.017
Poor	26 (21.8)	93 (78.2)	

FE = Fisher's Exact test

Table 2. Shows the relationship between medication adherence and blood pressure control

DISCUSSIONS

Adherence to antihypertensive medication is an important factor in achieving blood pressure control among hypertensive patients. According to the World Health Organisation, poor medication adherence in patients with chronic diseases like hypertension is around 50% in developed countries; this figure is higher in developing countries like Nigeria.¹² The most probable reasons for poor medication adherence in low-resource settings are usually due to disparity in access to health care services, limited health resources resulting in more out-of-pocket expenditure in the purchase of medications. Most of the respondents were aged 51 to 60 years, with a mean age of 53.1 ± 10.8 . The predominant respondents were Male; this is similar to Sunuade et al. in Ghana, where most of the respondents were male rather than female.¹³

Furthermore, most respondents in this study had poor medication adherence 119 (86.2%), 13(9.4%) of them had moderate medication adherence, and 6(4.3%) of them had good medication adherence.

This is similar to Adesida et al.'s findings in a cross-sectional study conducted in Sokoto State, North-western Nigeria, where most respondents (91.1%) had poor medication adherence and only a few (8.9%) had good medication adherence.⁷ The reasons

for the similarities between this study and the findings of Adesida et al. were that both studies were conducted in North-western Nigeria and had a similar cross-sectional design.

This sub-optimal medication adherence is similar to Lillian et al. in South-South Nigeria, where 71.2% of their respondents had poor medication adherence and 28.8% had good medication adherence.⁵ This similarity is partly because both studies were conducted in primary care settings. They also share a similar cross-sectional design.

Similarly, Iyoriobhe et al. in South-South Nigeria found that 89 (70.6%) respondents had poor medication adherence and 37 (29.4%) had good antihypertensive medication adherence.¹⁴ Both studies share a cross-sectional design and a similar study setting.

In contrast to the low level of medication adherence found in this study, several studies have found a high level of medication adherence among their hypertensive respondents. The findings of Sunita et al. in a tertiary hospital in Kathmandu, Nepal, show that 61% of their hypertensive respondents had good medication adherence while 31% of them had poor medication adherence.¹⁵

Also, Ayodapo et al. in southwestern Nigeria found

that 61.2% of respondents had good medication adherence, while 38.8% had poor medication adherence.¹⁶ Despite the similar cross-sectional design of the two studies, the disparity in the tool for assessment of medication adherence and the study setting accounts for the differences in the studies.

The medication adherence in this study is contrary to the findings of Habtamu et al. in Ethiopia, where 66.2% of their respondents had good medication adherence, and 33.8% of them had poor medication adherence.¹⁷ Similarly, Sito et al. in Southwestern Nigeria also found dissimilar findings from the author, where (61.0%) of their respondents had good medication adherence, and 39% of them had poor medication adherence.¹⁸ The differences and contrasts between this study and the aforementioned studies were due to differences in study settings and sociodemographic characteristics of their respondents. Poor medication adherence is associated with increased cardiovascular morbidity and mortality, increased hospitalizations, and out-of-pocket health care expenditure.¹³ It is important to educate patients about the importance of medication adherence and the consequences of poor medication adherence. Barriers to medication adherence should also be explored among hypertensive patients attending primary care settings in Nigeria. Without optimising medication use through patient-health care provider partnership, respondents are unlikely to achieve desired clinical outcomes of the disease.

It has been estimated that up to 75% of hypertensive patients do not achieve target blood pressure control due to suboptimal medication adherence.¹²

In this study, 73.9% of respondents had poor blood pressure control, aligning with findings from South-South Nigeria where 77.2% experienced poor control, indicating consistent challenges across regions.

Blood pressure control in this study is also similar to Rotinder et al.'s findings in India, where 70.5% of respondents had poor blood pressure control, and 29.5% had good blood pressure control.¹² Both studies used a similar cross-sectional design.

Respondents' blood pressure control in this study is similar to that of Ibrahim et al. in South Western

Nigeria, where 53.3% had poor blood pressure control, and 46.7% had good blood pressure control.¹² Both studies had a similar cross-sectional study design.

Mutalub et al. in North Eastern Nigeria found that more than half (59.2%) of their respondents had poor blood pressure control, and 40.8% had good blood pressure control.¹⁹ Both studies had similarities in study setting and sociodemographic characteristics.

Similarly, blood pressure control in this study agrees with the findings of Illo and Osegun et al. in South East and South West Nigeria, where good and poor blood pressure control were 59% and 41%, respectively.^{20,21}

Furthermore, the level of blood pressure control in this study is similar to the findings of Hibatamu et al. in Ethiopia, Achieng et al. in Kenya, and Adebolu et al. in South Africa, where the majority of respondents had good blood pressure control 58.5%, 46.4%, and 58.1%, respectively.^{17,22,23}

The level of blood pressure control in this study contrasts with Ibrahim et al. in Southwestern Nigeria, where 60.6% of respondents had good blood pressure control and 39.4% had poor blood pressure control.¹⁸ The differences in study settings and sociodemographic characteristics of the respondents account for the dissimilarities in both studies.

This study has demonstrated a statistically significant relationship between medication adherence and blood pressure control among the respondents. These findings align with those of Rotinder et al. in India and Sarah et al. in Saudi Arabia, where a significant statistical relationship between medication adherence and blood pressure control was observed.^{12,24} Similar studies in Nigeria have shown a statistical relationship between medication adherence and blood pressure control among hypertensive respondents.^{5,20}

Conclusion

There is an alarmingly poor medication adherence among hypertensive patients attending a primary care clinic in a Tertiary hospital in Northern Nigeria. Hence, educating patients on medication adherence

significantly improves blood pressure control among respondents.

RECOMMENDATION

Measures to improve patient medication adherence need to be given a priority to ensure that patients with hypertension gain full benefit of their available medications for good clinical outcomes of the disease.

Limitation

This hospital-based cross-sectional study examined the relationship between medication adherence and blood pressure control among respondents, but such did not establish causality.

Acknowledgement

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Conflicts of Interest

All the authors declared no conflict of interest

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