Journal of Community Medicine and Primary Health Care. 34 (1) 38-57

https://dx.doi.org/10.4314/jcmphc.v34i1.3

JOURNAL OF COMMUNITY MEDICINE AND PRIMARY HEALTH CARE

ORIGINAL ARTICLE

Relationship between Cost of Care and Medication Adherence among Hypertensive Patients Attending a Tertiary Health Facility in Ekiti State, Nigeria

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Keywords

Cost of care;

Medication adherence;

Hypertension;

Ekiti

ABSTRACT

Background: The economic burden of care is a barrier to effective treatment of hypertension as affordability of drugs may affect medication adherence. This study assessed the cost of care and level of medication adherence among patients with hypertension attending a tertiary hospital in Ekiti State, Nigeria.

Methods: This was a descriptive cross-sectional study that used a systematic sampling technique to select eligible patients. Data was collected with an interviewer-administered questionnaire. Medication adherence was assessed with eight-item Morisky Medication Adherence Scale (MMAS-8). Data entry and analysis were done using IBM SPSS version 22.0. p-value < 0.05 was considered statistically significant.

Results: The median age (Interquartile Range) of respondents was 55.0 (20.3) years with male to female ratio of 1:1.2. The mean monthly cost of care of hypertension was ₦15,964.76 (US$44.35). Only 47 (34.1%) respondents were adherent (MMAS score of ≥8) to their medications. Medication adherence was inversely associated with total cost of admissions (p=0.024) and cost of admission drugs/consumables (p=0.028). Male gender (AOR=12.561;95%CI=2.248–70.189), middle-age (45-64years) (AOR=11.577;95%CI=1.015-131.998), being unmarried (AOR=0.006;95%CI=0.000–0.300), exercising <3days per week (AOR=0.055;95%CI=0.006–0.489), employment in informal and formal occupations (AOR=0.024,0.022; 95%CI=0.001–0.590,0.001–0.591) and living with someone (AOR=0.000;95%CI=0.000–0.086) were significant predictors of medication adherence.

Conclusion: Medication adherence was suboptimal and negatively associated with total cost of admissions and cost of admission drugs/consumables. Attention should therefore be given to developing and implementing measures such as subsidy on drugs and increasing coverage of health insurance that would limit the impact of these costs on the patients.

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INTRODUCTION

Hypertension is a chronic non-communicable disease characterized by constantly raised blood pressure in the arteries.[1] It usually does not cause symptoms but plays a part in the aetiology of stroke, visual loss, heart diseases, chronic kidney diseases and

other vascular complications.[2,3] It is the leading cause of preventable death worldwide[3] and one of the non-communicable diseases that have replaced infectious diseases as the dominant public health problems.[4] It can be controlled with lifestyle modification and by taking medications. Once the diagnosis of hypertension is made, the treatment is lifelong with relatively expensive antihypertensive medications.[5] How-ever, the financial burden imposed by medications has been a barrier to effective treatment of the disease and affordability of drugs is very important as it may affect medication adherence.[5,6]

A study conducted in Ibadan, Nigeria, found that the cost of treating hypertension was significant, requiring 10% or more of the patients' income in half of the participants.[7] A mean monthly cost of ₦2045 (US$10.2) and ₦8434 (US$42) for drugs and laboratory investigations, respectively was found in Lagos, Nigeria.[5] The costs of drugs and investigations are a burden as they accounted for over 88% of the cost of care.[8] This burden is also seen in high income countries. In the United States, the annual national spending on hypertension increased significantly from US$58.7 billion (in 2000–2001) to US$109.1 billion (in 2012–2013) (average annual percent change =8.3%, p=0.015), mainly because of the increase in the prevalence and the number of patients that were treated.[9] Apart from this healthcare cost from long term therapy, loss of income from disability would also contribute to this burden.

Many patients with hypertension are placed on antihypertensive medications, however literature revealed that many patients taking these drugs do not meet the requirement for controlled blood pressure within the defined target.[10] The main hindrance to attaining this defined blood pressure target is low medication adherence.[3] Poor adherence to medication for hypertension and other chronic diseases is a global issue and this was highlighted as a huge problem by the World Health Organization (WHO) in 2003.[11] About half of patients with hypertension tend to stop their medication during the first year of treatment.[12] In Nigeria, 1% to 35.1% of hypertensive patients reported high adherence to medications.[13–16] In Saudi Arabia and Iran, more than half (54%) of these patients

were non-adherent to their medications[10,17] while 38.9% were adherent in Pakistan geriatrics.[18] In the United States, the prevalence of high adherence was 30.1%[19] Although awareness of adherence has increased in recent years, there is still a long way to go.[6]

Previous studies have shown that older age, retirement/unemployment, duration of hypertension (>10 years), a lower number of prescribed drugs were significant determinants of better adherence.[19,20] Also, the adherence of patients from western countries (Europe, United States) were significantly higher than in patients from other parts of the world.[20] Literature search showed limited studies on the relationship between cost of care and medication adherence especially among patients with hypertension. Most previous studies were in isolation focusing on cost of care only or medication adherence only.[3,5,7,13,14] This study will however assess the association between these two variables.

Poor medication adherence affects both clinical and financial outcome of the health system.[21] The causes of poor medication adherence, which may include the cost of care, too many medications, forgetfulness, fear and mistrust are multifactorial and these need to be understood before interventions can be planned.[22] Moreover, studies on medication adherence will provide more proof on these factors, as well as strategies to improve them.[21] With an understanding of these factors, proper intervention could be designed to improve the adherence of patients to their medications. This study, therefore, aimed to assess the cost of care, level of medication adherence and the association between them among patients with hypertension attending a tertiary health facility in Ekiti State, Nigeria. It is hoped that the findings of this research will help to enrich the literature and provide vital information on the relationship between cost of care and medication adherence among patients with hypertension in Ekiti State.

METHODOLOGY

This was a descriptive cross-sectional study carried out from mid-January to February 2020 in a tertiary hospital in Ekiti State, Nigeria. This tertiary hospital serves as a referral center for all other health facilities within the state and its environs. Hypertensive patients are treated and followed-up

at the specialist cardiology clinic of the hospital which runs twice a week. An average of 40 patients is seen on each clinic day. The study population were patients with hypertension accessing care in the hospital. The study included adult hypertensive patients who have been on medication for at least 3 months. This length of time would enable them to have experienced significant costs associated with treating their condition.[23] The study excluded hypertensive patients that were pregnant and too ill to respond.

The minimum sample size for this study was determined using Fisher's formula.[24] A 95% confidence interval, 5% degree of accuracy and 10% non-response was assumed. Hypertension prevalence of 9.2% from a previous study[25] was used and a sample size of 142 was arrived at, which was then rounded up to 150. Systematic random sampling technique was used to select eligible patients attending the specialist cardiology clinic. The average number of hypertensive patients typically seen in a month was obtained from the clinic records. This average monthly clinic attendance was used as the sampling frame. This sampling frame was divided by 150 to obtain the sampling interval (nth) which was used to select patients on every visit to the clinic. On each clinic day, the patients were given serial numbers according to their arrival to the clinic, the first patient was then selected by balloting, after which the subsequent patients were selected by adding the sampling interval.

Selected eligible patients were interviewed after their clinic consultation. A pre-tested inter-viewer-administered questionnaire was used to collect information from the patients. The content of the questionnaire was adapted from the study by Pavel et al,[26] World Bank Living Standard Measurement Survey (LSMS),[27,28] and eight-item Morisky Medication Adherence Scale (MMAS-8).[29] The LSMS is a World Bank study that measures welfare and other key socioeconomic indicators. Questions on socio-demographic and economic characteristics of respondents were adapted from this survey. Occupations of the respondents were grouped into three namely: Formal, informal and unemployed. Farmers, traders and artisans were grouped as informal occupation while civil servants, professionals, bankers and other similar workers were grouped as

formal occupation. The MMAS-8 is an 8-item self-reported adherence questionnaire with seven yes/no questions (with no coded as 1, indicating higher adherence), and one 5-point Likert scale question (normalized to range between 0 and 1, with higher values indicating higher adherence). The overall score for medication adherence was initially calculated for each participant and then grouped into the following two categories: those with MMAS-8 scores of ≥8 were considered to be "adherent" while those with scores of <8 were considered to be "non-adherent".

Respondents were asked questions on the frequency of their engagement in exercise/physical activities lasting at least 30minutes which is associated with sweating; the frequency, volume and types of alcohol consumed, and if they smoke tobacco. The volume and type of alcohol consumed was converted to grams (for example 600ml of 5% beer = 30g) and then subsequently converted to units (using 8g = 1unit).[30] The weight and height of the respondents were measured and these were used to estimate their body mass index (BMI) by dividing weight in kilograms by the square of the height in metres (kg/m^2). Obesity, overweight, normal and underweight were classified as BMI ≥30.0kg/m^2, 25.0-29.90kg/m^2, 18.5-24.90kg/m^2 and <18.50kg/m^2 respectively.[4] Each respondent was also asked their blood pressure (BP) reading during the visit which was then confirmed from case notes of patients. This was subsequently categorized into hypotension (<90/60mmHg), normal (90-139/60-89mm Hg), stage 1 hypertension (140-159/90-100mmHg) and stage 2 hypertension (≥160/100mmHg). Data on direct medical and non-medical costs, details of socio-demographic characteristics and other clinical characteristics were also collected. Data on costs were confirmed from payment receipts.

Data were entered and analyzed using IBM SPSS Statistics for Window, Version 22.0 (IBM Corp., Armonk, N.Y., USA). Descriptive statistics was used to summarize the data. Mean/standard deviation was used for cost of care, and median/ interquartile range was used for age of respondents while percentages and frequency were used to summarize medication adherence, clinical and categorical socio-demographic characteristics. Chi-square test was used

to determine statistical significance of observed differences in cross tabulated variables. Pearson correlation was used to assess the relationship between medication adherence score that was initially calculated for each participant, and the cost of care. Multivariate logistic regression analysis was used to test the significance between the level of medication adherence as a dependent variable and socio-demographic, clinical characteristics and cost of care as independent variables. Level of significance was predetermined at a p-value of less than 0.05.

Ethical approval (Protocol Number: ERC/2019/11/05/300) for this study was obtained from the Human Research and Ethics Review Committee of Federal Teaching Hospital, Ido-Ekiti, Ekiti State, Nigeria. Permission from the consultant-in-charge of the clinic was also obtained before the study was carried out. Written consent was obtained from all respondents. Anonymous questionnaires were used and the data were kept in a secure place thereafter.

RESULTS

A total of 150 questionnaires were administered, out of which only 138 were retrieved and filled appropriately giving a response rate of 92%. The median age (Interquartile Range) of respondents was 55.0 (20.3) years. There were more females 75 (54.3%) than males 63 (45.7%) with male to female ratio of 1:1.2. A large proportion of the respondents were married 98 (71.0%) and living with someone 118 (85.5%). About two-thirds of the respondents had at least secondary education, out of which 44 (31.9%) had tertiary education and 43 (31.2%) had secondary education. More participants were employed in the formal occupation 56 (40.6%) with a mean monthly income of ₦52,644.93 ± 44,906.03 (US$146.24 ± 124.74). (Table 1)

More than two-thirds of the respondents 110 (73.2%) were diagnosed <10 years ago and used between 1 to 4 medications per day 100 (72.5%). Majority 128 (92.8%) drink <14 units of alcohol per week while only one patient (0.7%) smoked a cigarette. About three-quarters 106 (76.8%) consumed <4 servings of fruits and vegetables in a day. More than half 79 (57.2%) of the

respondents exercised ≥3 days per week, had normal BMI 71 (51.5%), with normal BP readings 72 (52.2%), and rated their involvement in religious and spiritual activities moderately 70 (50.7%). (Table 2)

The mean monthly cost of care of hypertension in this study was ₦15,964.76 (US$44.35). This was 30.3% [₦15,964.76 / ₦52,644.93 *100%] of the mean monthly income of the respondents. The mean cost of drugs / consumables [₦8,323.98 (US$23.12)] accounted for more than half (52.1%) of the cost of care. Other contributors included: cost of investigations [₦3,458.70 (US$9.61)], transportation [₦1,384.78 (US$3.85)], bed / accommodation [₦1,206.52 (US$3.35)], food [₦1,057.97 (US$2.94)], and registration/consultation [₦532.81 (US$1.48)]. (Table 3)

Forty-seven (34.1%) of the respondents were adherent while 91 (65.9%) respondents were non-adherent. (Figure 1) Comparison of patient's characteristics with medication adherence revealed that the proportion of respondents who were adherent significantly reduced with a higher age group [≤44years (54.2%); 45-64 years (34.3%); ≥65 years (23.4%)] (p=0.035). The proportion of males who were adherent 33 (52.4%) were significantly higher than that of females 14 (18.7%) (p<0.001). This proportion is also higher among married 39 (39.8%) than unmarried 8 (20.0%) (p=0.026) and among those living alone 12 (60.0%) than those not living alone 35 (29.7%) (p=0.008). Additionally, occupation and tribe were significantly associated with medication adherence (p=0.037 and p=0.001, respectively) (Table 4)

Furthermore, the proportion of the respondents who were adherent was higher among those with duration of diagnosis <10 years 40 (39.6%) than those with duration of diagnosis ≥10 years 7 (18.9%) (p=0.023), respondents taking 1 to 4 medications 40 (40.0%) than those taking ≥5 medications 7 (18.4%) (p=0.017) and respondents exercising ≥3 days per week 34 (43.0%) than those exercising <3 days per week 13 (22.0%) (p=0.010). Lastly, BP classification and involvement in religious and spiritual activities were significantly associated with medication adherence (p=0.030 and p=0.041, respectively). (Table 5) There was no significant relationship between medication adherence and total cost of care of hypertension (p=0.105). However, the

total cost of admissions and the cost of admissions drugs/consumables were inversely related to medication adherence (r=-0.19, p=0.024 and r=-0.19, p=0.028, respectively). (Table 6)

Only six variables were statistically significant at multivariate level of analysis using binary logistic regression. Participants in their middle age (45-64years) were approximately 12 times more likely to adhere to their medication than elderly participants (≥65years) (AOR=11.577; 95% CI=1.015-131.998). Male respondents were about 13 times more likely to adhere to their medications than females (AOR=12.561; 95% CI=2.248–70.189). Furthermore, unmarried respondents were about 99% less likely to adhere to their medications than married respondents (AOR= 0.006; 95% CI= 0.000 – 0.300). Similarly, respondents exercising < 3days per week than those who exercise ≥ 3 days per week (AOR=0.055; 95% CI=0.006–0.489), employed in informal occupations and in the formal occupations than those who are unemployed (AOR=0.024, 0.022; 95% CI=0.001–0.590, 0.001–0.591) and respondents living with someone than those living alone (AOR=0.000; 95% CI=0.000–0.086) are less likely to adhere to their medication. Other factors were not significant predictors of medication adherence in this study. (Table 7)

DISCUSSION

This study aimed at assessing the relationship between cost of care and medication adherence among patients with hypertension attending a tertiary health facility. It was found that the average monthly cost of care of hypertension was ₦15,964.76 (US$44.35) representing 30.3% of the average monthly income of the respondents. This revealed that a significant proportion of the patients' income goes into the care of hypertension. This huge healthcare expenditure, especially among the low-income earners, could result in an inability to afford and consume other basic needs such as food and shelter. Although, this cost is lower than that of studies conducted within and outside the country[9,23] it is however, higher than the cost of providing medical primary preventive interventions for cardiovascular diseases,[31]

Table 1: Socio-demographic characteristics of respondents

Variable	Frequency (n=138)	Percent
Age group (years)		
≤44	24	17.4
45-64	67	48.6
≥65	47	34.0
Median (Interquartile Range)	*55.0(20.3)*	
Sex		
Male	63	45.7
Female	75	54.3
Level of education		
No formal	26	18.8
Primary	25	18.1
Secondary	43	31.2
Tertiary	44	31.9
Marital status		
Unmarried	40	29.0
Married	98	71.0
Tribe		
Yoruba	109	79.0
Igbo	18	13.0
Hausa	4	2.9
Others	7	5.1
Living arrangement		
Living alone	20	14.5
Not Living alone	118	85.5
Occupation		
Formal	56	40.6
Informal	46	33.3
Unemployed	36	26.1
Monthly income (₦)		
<20,000	40	29.0
≥20,000	98	71.0
Mean ± SD	*52,644.93 ± 44,906.03*	

which may further confirm that prevention is better and cheaper than cure. The cost of drugs / consumables was ₦8,323.98 (US$23.12) accounting for 52% of the total cost of care. Cost of drugs for treating hypertension reported in a study conducted in Lagos State, Nigeria in 2016 estimated a lower average cost of antihy-pertensive medications of ₦2045 (US$10.2).[5] This difference may be partly due to the consumables which were combined with the cost of drug in this study. Inflation in the prices of goods may also play a role in the observed difference as the latter study was conducted three years ago. Another reason may be due to the conversion rate of the local currency (₦) to a dollar (US$) which has sky rocketed by about a triple fold in the last three years before the study.

Table 2: Clinical and other characteristics of respondents

Variable	Frequency (n=138)	Percent
Duration of diagnosis (years)		
<10	101	73.2
≥10	37	26.8
Number of medications		
1-4	100	72.5
≥5	38	27.5
Exercise (days per week)		
<3	59	42.8
≥3	79	57.2
Alcohol use (units per week)		
<14	128	92.8
≥14	10	7.2
Tobacco smoking		
Not smoking	137	99.3
Smoking	1	0.7
Intake of fruits and vegetable (servings per day)		
<4	106	76.8
≥4	32	23.2
BMI (kg/m^2)		
Underweight	9	6.5
Normal	71	51.5
Overweight	37	26.8
Obesity	21	15.2
BP classification		
Hypotension	4	2.9
Normal	72	52.2
Stage 1 hypertension	49	35.5
Stage 2 hypertension	13	9.4
Religiosity and spirituality		
Not at all	2	1.4
Slightly	10	7.3
Moderately	70	50.7
Completely	56	40.6

BP: Blood Pressure, BMI: Body Mass Index

This study assessed the level of medication adherence of participants and it was found that a third of them were adherent while most were non-adherent to their medications. The rate of medication adherence found in this study was consistent with the findings recorded in Pakistan and United States.[18,19] It is also similar to what was found in a study in Ibadan, Nigeria which found an adherent rate of 35.1% (MMAS-8 scores=8).[15] In contrary to these findings, higher medication adherence rates were reported in a study conducted in Ethiopia (75.1%) and a systemic review by Uchmanowicz *et al* with a pooled adherence rate of

Table 3: Monthly cost of care of hypertension among respondents

Variable	Mean (₦)	SD (₦)	Proportion of Total Cost (%)
Cost of Clinics Attendance			
Registration/Consultation	250.20	209.72	1.6
Drugs/Consumables	5,506.59	7,576.99	34.5
Investigations	2,113.62	7,044.80	13.2
Transportation	1,211.59	1,328.77	7.6
Food	236.96	314.51	1.5
Total Cost of Clinics Attendance	***9,318.96***	***13,326.18***	***58.4***
Cost of Admissions			
Registration/Consultation	282.61	1,299.86	1.8
Drugs/Consumables	2,817.39	10,832.88	17.6
Investigations	1,345.08	5,453.17	8.4
Bed/Accommodation	1,206.52	4,872.73	7.6
Transportation	173.19	594.81	1.1
Food	821.01	2,822.91	5.1
Total Cost of Admissions	***6,645.80***	***24,973.48***	***41.6***
Cost of Clinics and Admissions			
Registration/Consultation	532.81	1,315.93	3.4
Drugs/Consumables	8,323.98	13,528.83	52.1
Investigations	3,458.70	9,069.08	21.6
Bed/Accommodation	1,206.52	4,872.73	7.6
Transportation	1,384.78	1,456.49	8.7
Food	1,057.97	2,822.75	6.6
Total Cost of Care	***15,964.76***	***28,834.15***	***100.0***

n=138, SD: Standard Deviation

68.86% among hypertensive patients aged ≥60 years.[20]

Lower rates have also been reported in different studies conducted among hypertensive patients in other parts of Nigeria.[13,14,16] The diverse population being studied, different definitions and absence of general guidelines for clinicians and researchers to choose the appropriate method and tools for measuring adherence could account for the broad range of adherence rates seen in studies.[21,32] For example, this study used a cut off of 8 on the MMAS-8 scale to classify participants into adherent or non-adherent, which is higher than the cut of ≥6 used by Uchmanowicz *et al* in their systemic review[20] hence resulting in some of the difference observed in adherent rate. Adherence to medication among the respondents in this study is low and could lead to poor clinical outcomes, an increase in morbidity and death rates, and unnecessary healthcare costs.[21]

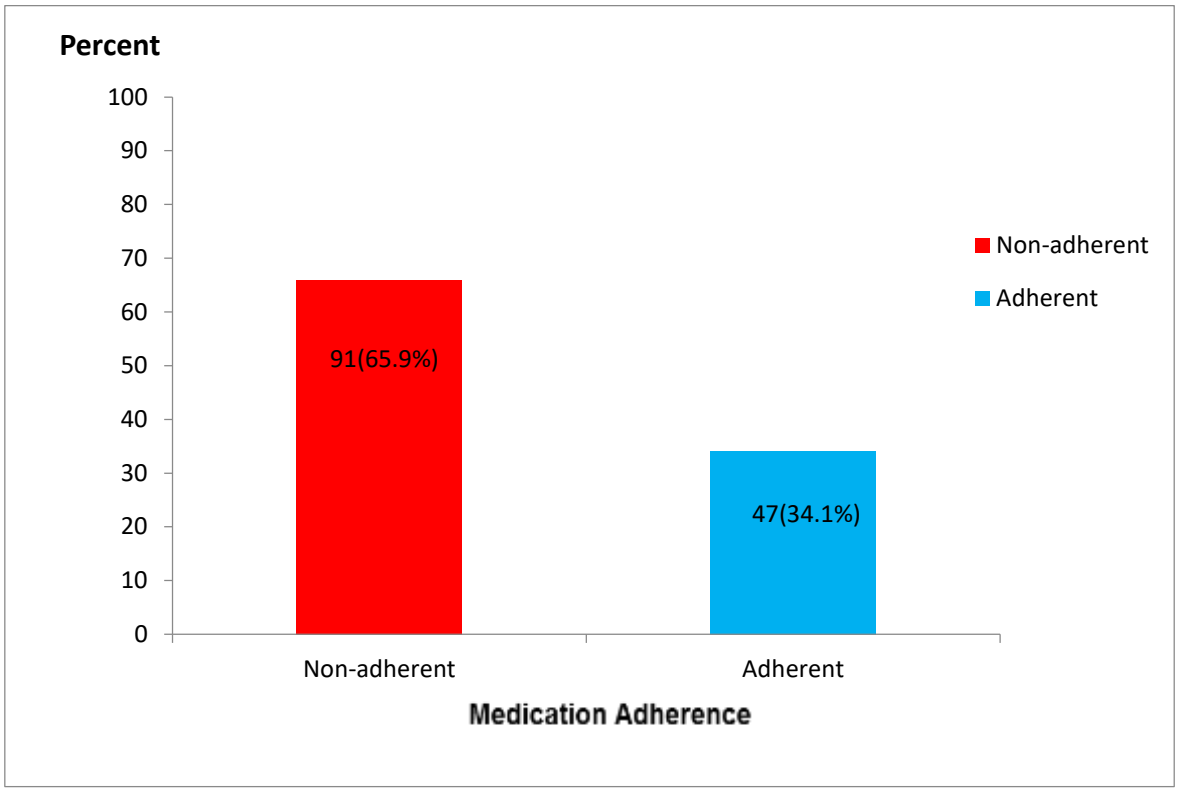

Figure 1: Medication adherence among the respondents

Improving medication adherence is therefore crucial in averting these detrimental outcomes.

Many factors have been identified to affect medication adherence. In this study, respondent's age was inversely associated with medication adherence. Respondents in their middle age were about 12 times more likely to adhere to their medication than elderly respondents. This result is similar to the study by Cingil *et al* [33] but in contrast to studies that found better medication adherence among older patients.[3,17,19,20] Lower rate of adherent among the elderly in this study may be due to the higher tendency of forgetfulness resulting from senile dementia and other diseases prevalent among them compared with the younger age groups.

Higher adherent rates among males have been reported in other studies.[17,34] Similarly, results from this study predicted that males were about 13 times more likely to adhere to their antihypertensive medications compared with females. The higher level of adherence among males in this study may be because, in this environment, men have autonomy of decision including health and finance, unlike most women that seek

Table 4: Association between Socio-demographic characteristics and Medication Adherence

Variables	Medication Adherence		Total (n=138)	X^2	*p-value*
	Adherent (n=47) (%)	Non-adherent (n=91) (%)			
Age group (years)					
≤44	13 (54.2)	11 (45.8)	24	6.70	**0.035**
45-64	23 (34.3)	44 (65.7)	67		
≥65	11 (23.4)	36 (76.6)	47		
Sex					
Male	33 (52.4)	30 (47.6)	63	17.33	**<0.001**
Female	14 (18.7)	61 (81.3)	75		
Level of education					
No formal	8 (30.8)	18 (69.2)	26	1.37	0.713
Primary	11 (44.0)	14(56.0)	25		
Secondary	14 (32.6)	29 (67.4)	43		
Tertiary	14 (31.8)	30 (68.2)	44		
Marital status					
Unmarried	8 (20.0)	32 (80.0)	40	4.96	**0.026**
Married	39 (39.8)	59 (60.2)	98		
Tribe					
Yoruba	44 (40.4)	65 (59.6)	109	13.95[F]	**0.001**
Igbo	0(0.0)	18(100.0)	18		
Hausa	1 (25.0)	3 (75.0)	4		
Others	2 (28.6)	5 (71.4)	7		
Living arrangement					
Living alone	12 (60.0)	8 (40.0)	20	7.01	**0.008**
Not living alone	35 (29.7)	83 (70.3)	118		
Occupation					
Formal	24 (42.9)	32 (57.1)	56	6.61	**0.037**
Informal	9(19.6)	37(80.4)	46		
Unemployed	14 (38.9)	22 (61.1)	36		
Monthly income (₦)					
<20,000	18 (45.0)	22 (55.0)	40	3.00	0.083
≥20,000	29 (29.6)	69 (70.4)	98		

X^2: Pearson Chi Square, [Y]: Continuity Correction, [F]: Fisher's Exact Test

permission or cooperation of their spouses which may not be readily granted. Another reason for the lower rate of adherent among females may be because women with chronic diseases are less likely to follow standard treatments and monitoring in clinical protocols.[17]

Furthermore, being unmarried, not exercising adequately (<3days per week), being employed in an informal job and not living alone were negative predictors of medication adherence in this study. This is consistent with findings from previous studies where unemployment and being married

Table 5: Association between Clinical and other characteristics and Medication Adherence

Variables	Medication Adherence				
	Adherent (n=47) (%)	Non-adherent (n=91) (%)	Total (n=138)	X^2	*p-value*
Duration of diagnosis (years)					
<10	40 (39.6)	61 (60.4)	101	5.16	**0.023**
≥10	7 (18.9)	30 (81.1)	37		
Number of medications					
1-4	40 (40.0)	60 (60.0)	100	5.71	**0.017**
≥5	7 (18.4)	31 (81.6)	38		
Exercise (days per week)					
<3	13 (22.0)	46 (78.0)	59	6.64	**0.010**
≥3	34 (43.0)	45 (57.0)	79		
Alcohol use (units per week)					
<14	44 (34.4)	84 (65.6)	128	<0.00[Y]	0.999
≥14	3 (30.0)	7 (70.0)	10		
Tobacco smoking					
Not smoking	46 (33.6)	91 (66.4)	137	0.11[Y]	0.736
Smoking	1 (100.0)	0 (0.0)	1		
Intake of fruits and vegetable (Servings per day)					
<4	36 (34.0)	70 (66.0)	106	<0.01	0.966
≥4	11 (34.4)	21 (65.6)	32		
BMI (kg/m²)					
Underweight	0 (0.0)	9 (100.0)	9	6.01[F]	0.108
Normal	27 (38.0)	44 (62.0)	71		
Overweight	14 (37.8)	23 (62.2)	37		
Obesity	6 (28.6)	15 (71.4)	21		
BP classification					
Hypotension	0 (0.0)	4 (100.0)	4	8.53[F]	**0.030**
Normal	31 (43.1)	41 (56.9)	72		
Stage 1 HTN	15 (30.6)	34 (69.4)	49		
Stage 2 HTN	1 (7.7)	12 (92.3)	13		
Religiosity and spirituality					
Not at all	2 (100.0)	0 (0.0)	2	7.44[F]	**0.041**
Slightly	6 (60.0)	4 (40.0)	10		
Moderately	24 (34.3)	46 (65.7)	70		
Completely	15 (26.8)	41 (73.2)	56		

BP: Blood Pressure, BMI: Body Mass Index, X^2: Pearson Chi Square, [Y]: Continuity Correction, [F]: Fisher's Exact Test

Table 6: Relationship between Medication Adherence and Cost of Care

Variable	Correlation coefficient (r)	p-value
Cost of Clinics Attendance		
Drug/Consumables	0.103	0.227
Total Cost of Clinics	0.059	0.489
Cost of Admissions		
Drug/Consumables	-0.188	**0.028**
Total Cost of Admissions	-0.192	**0.024**
Cost of Clinics and Admissions		
Drug/Consumables	-0.092	0.282
Total Cost of Care	-0.139	0.105

Table 7: Predictors of Medication Adherence

Variable	B	P value	AOR	95% Confidence Interval	
				Lower	Upper
Age group (years)					
≤44	1.828	0.161	6.223	0.484	80.020
45-64	2.449	**0.049**	11.577	1.015	131.998
≥65 (Ref)			1.000		
Sex					
Male	2.531	**0.004**	12.561	2.248	70.189
Female (Ref)			1.000		
Marital status					
Unmarried	-5.134	**0.010**	0.006	<0.001	0.300
Married (Ref)			1.000		
Tribe					
Yoruba	-0.386	0.837	0.680	0.017	26.987
Igbo	-20.319	0.998	0.000	<0.001	1.100
Hausa	-1.739	0.421	0.176	0.003	12.156
Others (Ref)			1.000		
Living arrangement					
Living with someone	-7.787	**0.004**	0.000	<0.001	0.086
Living alone (Ref)			1.000		
Occupation					
Formal	-3.795	**0.023**	0.022	0.001	0.591
Informal	-3.747	**0.023**	0.024	0.001	0.590
Unemployed (Ref)			1.000		
Duration of diagnosis (years)					
<10	2.389	0.053	10.901	0.966	123.011
≥10 (Ref)			1.000		
Number of medications					
1-4	1.869	0.065	6.479	0.892	47.038
≥5 (Ref)			1.000		
Exercise (days per week)					
<3	-2.896	**0.009**	0.055	0.006	0.489
≥3 (Ref)			1.000		
BP classification					
Hypotension (Ref)			1.000		
Normal	-124.594	1.000	0.000	<0.001	1.100
Stage 1 hypertension	-125.901	1.000	0.000	<0.001	1.100
Stage 2 hypertension	-130.344	1.000	0.000	<0.001	1.100
Religiosity and spirituality			1.000		
Not at all (Ref)	-21.841	0.999	0.000	<0.001	1.100
Slightly	-31.387	0.999	0.000	<0.001	1.100
Moderately	-32.418	0.999	0.000	<0.001	1.100
Completely					
Cost of Admissions	-0.006	1.000	0.994	<0.001	4.3e10
Drug/Consumables	0.002	1.000	1.002	<0.001	5009.739
Total Cost of Admissions					

Ref: Reference category, B: Coefficient of regression, AOR: Adjusted Odd Ratio

were significant determinants of better medication adherence.[17,20] Unemployed patients medication adherence may be better than that of informally employed patients because, an informally employed patient might be affected by busy work schedule and activities.[20] Also, Saqlain *et al* found dependence on doing daily living activities as a significant predictor of non-adherence.[18] This may explain why respondents who live with someone may less likely adhere to their medication. In other studies, lower number of prescribed drugs, longer duration of the disease, reduced alcohol consumption, higher level of education, religiosity and spirituality were found to predict medication adherence.[3,19,20,35] Although, this study was able to establish an association between number of medication, duration of disease, involvement in religious and spiritual activity, and medication adherence in the bivariate analysis but not as a predictor at the level of multivariate logistic regression analysis. The study, however, found no significant association between alcohol use, level of education and adherence to medication at any level of analysis.

A significant negative relationship was found between cost of admission and medication adherence as well as cost of admission drugs/consumables and medication adherence. It is recognized that payment for medication has some impact on drug adherence but does not stop non-adherence.[6] When the cost of a commodity is high, it generally reduces it affordability and demand especially for people in the middle class which form majority of the respondents in this study with an average income of ₦52,644.93. Cost and patients' financial ability to procure drugs affects drug initiation and continuation, as patients who cannot afford the medications would not purchase them and use them leading to poor adherence. This relationship could be a chain reaction with poor adherence to antihyper-tensive medication resulting in increased morbidity as well as poor clinical outcome which would require more healthcare resources including that of medications further affecting adherence.[6]

The limitation of this study is that, it was limited to the cardiology clinic of the hospital, where majority of the hospital's hypertensive patients are treated. However, there are also other

patients whose primary complaints may not be high blood pressure, and are therefore managed in other clinics during their visits which may not be captured during the period of this study.

In conclusion, the study found that the average monthly cost of care was about one-third of the average monthly income and the cost of drugs/consumables accounted for more than half of this total care expenditure. Medication adherence was also low and could result in poor clinical outcomes, increase in morbidity and mortality and increase healthcare expenditure. A negative relationship between cost of admissions as well as cost of admissions drugs/consumables and level of medication adherence was found. These cost components were however unable to predict adherence to medication. Age, sex, marital status, living arrangement, occupation, and exercise were identified as independent predictors of adherence to antihypertensive medications. Based on these findings, it is therefore recommended that policies such as subsidy on drugs and increasing the coverage of the National Health Insurance Scheme to limit the impact of cost of drugs and consumables should be advocated. Also, lifestyle modifications most especially adequate exercising should be encouraged among patients with hypertension.

Acknowledgement: Nil

Conflicts of interest: The authors declare no conflict of interest in conducting this study

Source of funding: Nil

Authors' contributions: Study conceptualization and design, literature search, data collection and analysis as well as interpretation of results were performed by ITM. Manuscript preparation, editing and review were carried out by ITM, AOL and DKA. All authors read and approved the final draft.

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