

## **ADHERENCE TO ANTI-HYPERTENSIVE MEDICATIONS AND ASSOCIATED FACTORS AMONG PATIENTS IN A NIGERIAN FAMILY PRACTICE SETTING**

Rasaq O. Shittu<sup>\*1</sup>, Sanni A. Musa<sup>2</sup>, Odeigah O. Louis<sup>3</sup>, Abdullateef G. Sule<sup>4</sup>, Issa B. Aremu<sup>5</sup>, Okesina<sup>6</sup>, Salamat Isiaka-Lawal<sup>7</sup>& Jason E. Chukwukedu<sup>8</sup>

<sup>\*1</sup>MB,BS.MPH, FWACP, (Kwara State Specialist Hospital, Sobi Ilorin) Department of Family Medicine, Kwara State Specialist Hospital, Sobi, Ilorin, Kwara State, Nigeria

<sup>2</sup>MB,BS, FMCPATH,Department of Haematology, Kwara State Specialist Hospital, Sobi, Ilorin, Kwara State, Nigeria

<sup>3</sup>MBBS,FWACP Department of Family Medicine, University of Ilorin Teaching Hospital, Kwara State Nigeria

<sup>4</sup>MB,BS, FWACP,Department of Family Medicine, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria

<sup>5</sup>FMCR,Department of Radiology, University of Ilorin

<sup>6</sup>B.S, MB,BS, FWACS, Dept. of Obstetrics & Gynecology, Kwara State Specialist Hospital, Sobi, Ilorin, Nigeria

<sup>7</sup>MB,BS, FMCOG, FWACS, Dept. of Obstetrics & Gynecology, Kwara State Specialist Hospital, Sobi, Ilorin, Nigeria

<sup>8</sup>B.MLS, MSC (Public Health) FRSPH, Department of Pathology, Kwara Advanced Diagnostic Centre, Ilorin, Kwara State, Nigeria.

### **Abstract**

**Background:** There is mounting evidence that non-adherence is prevalent in Nigeria and is associated with adverse outcomes and higher costs of care.

**Objectives:** The purpose of this study was to evaluate the extent of non-adherence to antihypertensive medication regimens as well as associated factors responsible for it in a family practice setting in Nigeria, West African.

**Method:** This was a hospital-based, descriptive cross-sectional study carried out on four hundred patients from January 5th to March 5th, 2014 in Nigerian Family practice settings. Classification of hypertension was made according to JNC7. Morisky self-reported medication adherence questionnaire was used.

**Results:** Of the 400 hypertensive recruited, 86 (21.5%) were male while 314 (78.5%) were female. The male to female ratio was 1:3.7. Age of subjects ranged from 26 – 68 years. The mean age was  $50.70 \pm 10.55$ . Hypertension was common among age group 56 – 65 years. Majority of the hypertensive were married, in a polygamous setting. Most of them had no formal education with business as the predominant occupation. Two hundred and twenty (55.0%) of the subjects had 100% adherence, 42 (10.5%) had 75% adherence, fifty subjects (12.5%) had 50% adherence while 26 (6.5%) had 25% adherence. Overall, 262 (65.5%) adhered while 138 (34.5%) were non-adherence to anti-hypertensive medication. Moreover, those who did not receive adequate information on the uses of drug and its side effects had lesser adherence. These were statistically significant.

**Conclusion:** The prevalence of non-adherence among hypertensive patients in this study was 34.5%. Thus, indicating the need for adherence counseling. Besides, extra administrative cost on the anti-hypertensive medication should be removed to attract

purchase of anti-hypertensive from the hospital pharmacy, rather than pharmacy shops.

## INTRODUCTION

Hypertension is defined as an elevated systolic blood pressure (SBP), diastolic blood pressure (DBP) or both.<sup>1</sup> A clinical diagnosis of hypertension is based on the mean of two or more properly measured seated blood pressure measurements taken on two or more occasions. The Seventh Report of the Joint National Committee (JNC 7) on Detection, Evaluation and Treatment of High BP classifies it based on systolic and diastolic values, hence the JNC 7 classification include normal BP, pre-hypertension, stage 1 hypertension and stage 2 hypertension.

Hypertension is the most common cardiovascular disease and causes of heart failure, stroke, chronic renal disease and spontaneous sudden death.<sup>2</sup> Whilst the prevalence of hypertension in the Western countries has decreased during the past decade, those in Black Africans has been reported to be on the increase.

The main goal of treatment of hypertension is to bring hypertension under control permanently. This involves the use of antihypertensive drugs when lifestyle modifications do not normalize blood pressure. These drugs include; diuretics,  $\beta$  – blockers, calcium channel blockers, angiotension converting enzymes (ACE) inhibitors, angiotension 11 receptor blockers, adrenergic inhibitors, alpha one ( $\alpha 1$ ) receptor blockers and vasodilators.

Adherence has been defined as the “active, voluntary, and collaborative involvement of the patient in a mutually acceptable course of behavior to produce a therapeutic result”<sup>3,4</sup> in this regard, the patient has a choice and that both patients and providers mutually establish treatment goals and the medical regimen.<sup>5</sup> In order word, adherence is the degree to which the patient conforms to medical advice about lifestyle and dietary changes as well as keeping appointments for follow up and taking treatment as prescribed. It can be expressed quantitatively as the percentage of prescribed doses that have been taken. Adherence can be evaluated in several ways.<sup>6</sup> This include pharmacological, clinical and physical measures. Although, there is no gold standard allowing precise measurement of adherence,<sup>7</sup> the electronic pill counter of MEMS (Medication Event Monitoring System) may be considered as the best existing system for measurement of adherence.<sup>8</sup> Pharmacological methods also have a higher sensitivity and specificity<sup>8</sup> but remain difficult to use in standard practices.

Adherence is important in the treatment of hypertension. An early study<sup>9</sup> showed that adequate control of hypertension was associated with taking at least 80% of a prescribed regimen. Non adherence rates for patients with hypertension are reported to be 50% after 1 year and 85% after 5 years.<sup>10</sup> Furthermore, the beta-Blocker Heart Attack Trial reported a 1-year mortality rate of 5.4% in non-adherent patients (i.e. took  $\leq 75\%$  of prescribed medication) compared with 2.2% among those who took 75% or more of their prescribed medication.<sup>11</sup> It takes more than one type of intervention to achieve long-term adherence. Multiple interventions, combining educational and behavioral approaches, are more successful.<sup>12</sup>

Non-adherence involve failure to refill prescription, taking an incorrect dose, taking a medication at the wrong time, forgetting to take doses, or stopping therapy too soon. It also involves taking foods or other medications that will alter bioavailability.

Many physicians face the problem of non-adherence among their hypertensive patient. During the first year of treatment 16 – 50% of patients stop taking their anti-hypertensive medication.<sup>13</sup> In general, it is estimated that only about 30% - 50% of patients with hypertension adhere precisely to their hypertensive regimens.<sup>14</sup>

Col and co-workers<sup>15</sup> reported 11% non-adherence among elderly persons admitted to an acute care hospital; 28% were drug-related with 11% of these due to non-adherence. Studies have also linked non-adherence to an increase risk of hospital admissions for chronic heart failure (CHF). The extent and direct cost of hospitalization due to non-

adherence was estimated by Sullivan et al<sup>16</sup> in 1990 to be 5.5% of hospital admissions representing approximately \$8.5 billion as unnecessary hospital expenditures.

While a lot of factors can lead to non-adherence, no single factor has been found to reliably predict patient's non-adherence. Studies have however eliminated factors such as level of intelligence, memory, personality traits, age, and level of education as contributing substantially to non-adherence.<sup>13</sup> Patient factors involve; forgetfulness, lack of belief in the value of the medication, adverse effects of drugs, lack of understanding or recall, social isolation, perceived lack of efficacy of drug, and loss of cognitive, or psychomotor skills associated with older age or disability. Disease factors may be presence of few symptoms, perceived seriousness of disease change, chronic conditions and psychiatric diagnosis. Medications-related factors include; complexity of regimen such as number of drugs prescribed, frequency of daily doses, unpleasant taste or smell, occurrence and severity of adverse effects, compatibility of daily activities or lifestyle and increased duration of treatment. Disease factors includes; cost of medication, use of multiple pharmacies, use of multiple physicians, dissatisfaction with their healthcare provider and long waiting time or other inconveniences.<sup>12</sup>

There is paucity of data on adherence to antihypertensive and associated factor in North Central Nigeria. Hence, the need for this study.

## METHODS

This study was carried out at the Family Medicine Department of the Kwara State Specialist Hospital, from 5<sup>th</sup> January to 5<sup>th</sup> March, 2014. The sample selection<sup>17</sup> was done over a period of eight weeks with 30 patients selected by simple random sampling form a listing on each of the clinic days until 400 subjects was obtained. The inclusion criteria were patients presenting with history of hypertension for at least six months duration and were on medication during the period. Diabetic hypertensive's were part of the study. The exclusion criteria were pregnancy induced hypertension, patients' diagnosed hypertensive but less than six months duration, as well as hypertensive patients on admission. The questionnaire was pretested on 40 patients selected from the facility. Institutional ethical approval was obtained. The rights of respondents during the interviews were respected.

Two or more blood pressure measurement separated by a two-minute interval, with the patient either supine or seated, and after standing for at least 2 minutes. Verification in the contra lateral arm was done. The JNC classification was used thus;

Normal <u>&lt;120</u>	Pre-hypertensive <u>120 – 139</u>	Stage 1 <u>140 – 159</u>	Stage 2 <u>&gt;160</u>
<80	80 – 89	90 - 99	100

Morisky self-reported medication adherence questionnaire was used.<sup>10</sup> The Morisky Medication-Taking Adherence Scale (MMAS) consists of four items with a scoring scheme of "Yes" = 0 and "No" = 1. The items are summed to give a range of scores from 0 to 4. A, NO answer was allocated a score of 1, and a Yes a score of 0. Thus a patient answering NO to all questions had a maximum score of 4 corresponding to 100% adherence, three NO is equal to 75%; two NO is 50% and one NO is 25% adherence. Patients who answered Yes to all the questions score 0% adherence i.e. they are non-adherent. Patients score of 75% or more were considered as adherent and patients with score less than 75% were described as non-adherent.

The result generated were analyzed using Statistical Package for Social Sciences (SPSS) version 16.0 (Microsoft, Chicago, IL, United States of America (USA)) for calculation of percentages for categorical variables and means for continuous data. Means with standard deviations of continuous variables were generated where appropriate. Percentages and frequencies were compared by chi-square analysis and the student's t-test served to compare means. The level of statistical significance was set at p < 0.05.

## RESULTS

Of the respondents, 314 (78.5%) were female while 86 (21.5%) were male. The male to female ratio was 0:3.7. Age of subject ranged from 29 – 88 years. The mean age was  $50.70 \pm 10.55$ .

Table 1, shows that there was 314 (78.5%), female preponderance among the hypertensive. Hypertension was common among age group 56 – 65 years. Majority of the hypertensive were married in a polygamous setting. Most of them had no formal education with business as the predominant occupation. Forty (10.0%) agreed to alcohol intake while 6 (1.5%) were current cigarette smokers.

**Table 1: Socio-demographic characteristics of the respondents**

Variables	Frequency	(%)
<b>Sex</b>		
Male	86	(21.5)
Female	314	(78.5)
<b>Total</b>	<b>400</b>	(100.0)
<b>Age</b>		
26-35	6	(1.5)
36-45	44	(11)
46-55	122	(3.5)
56-65	158	(37.5)
>65	70	(17.5)
<b>Total</b>	<b>400</b>	(100.0)
<b>Ethnicity</b>		
Hausa	10	(2.53)
Yoruba	385	(96.2)
Igbo	5	(1.2)
<b>Total</b>	<b>400</b>	(100.0)
<b>Religion</b>		
Christianity	44	(11.0)
Islam	347	(86.8)
Traditional	6	(1.5)
Other (Specify)	3	(.8)
<b>Total</b>	<b>400</b>	(100.0)
<b>Marital Status</b>		
Married	230	(57.5)
Divorced	48	(12.0)
Separated	32	(8.0)
Widow	56	(14.0)
Widower	34	(8.5)
<b>Total</b>	<b>400</b>	(100.0)
<b>Type of Marriage</b>		
Monogamy	116	(29.0)
Polygamy	284	(71.0)
<b>Total</b>	<b>400</b>	(100.0)
<b>Level of Education</b>		
Non formal	328	(82.0)
Primary	26	(6.5)
Secondary	16	(4.0)
Tertiary	30	(7.5)
<b>Total</b>	<b>400</b>	(100.0)

<b>Occupation</b>		
Business Person	220	(55.0)
Civil Servant	48	(12.0)
Retired Workers	42	(10.5)
Farmers	18	(4.5)
House Wives	40	(10.0)
Unemployed	28	(7.0)
Student	4	(1.0)
<b>Total</b>	<b>400</b>	<b>(100.0)</b>
<b>Cigarette Smoking Status</b>		
None	362	(90.5)
Current	6	(1.5)
Ex-smoker	32	(8.0)
<b>Total</b>	<b>400</b>	<b>(100.0)</b>
<b>Alcoholic Intake</b>		
Yes	40	(10.0)
No	360	(90.0)
<b>Total</b>	<b>400</b>	<b>(100.0)</b>

Figure 1 shows that 22 (5.5%) of the subjects had normal blood pressure, while 82 (20.5%) were in the pre-hypertensive stage. Of the hypertensive, 218 (54.5%) were in stage 1 while 76 (19.5%) were in stage 2.

**Fig 1: Stages of hypertension among the subjects**

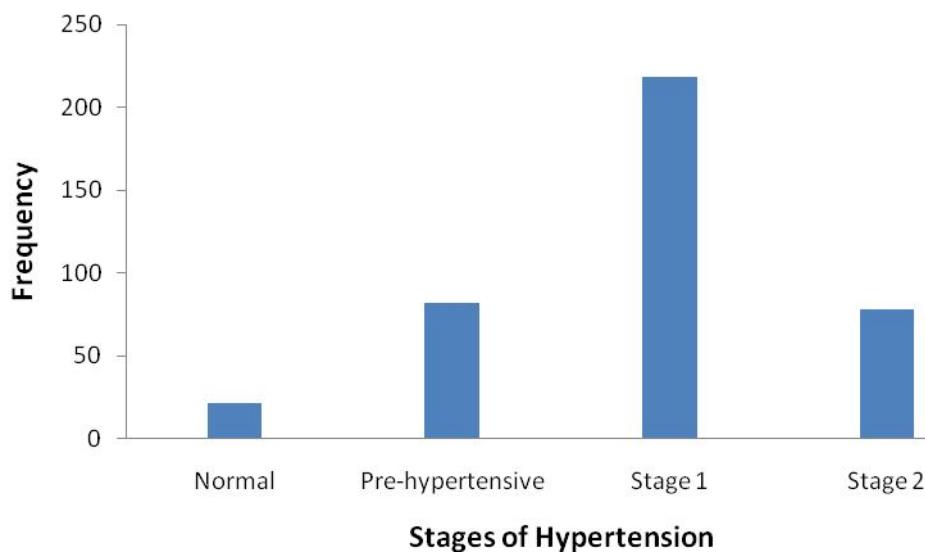


Figure 2 shows that 220 (55.0%) of the subject had 100% adherence while 42 (10.5%) had 75% adherence. Fifty (12.5%) had 50% adherence, 26 (6.5%) had 25% adherence. Overall, 262 (65.5%) adhered while 138 (34.5%) were non-adherence to anti-hypertensive medication.

**Fig. 2: Adherence rate of the respondents**

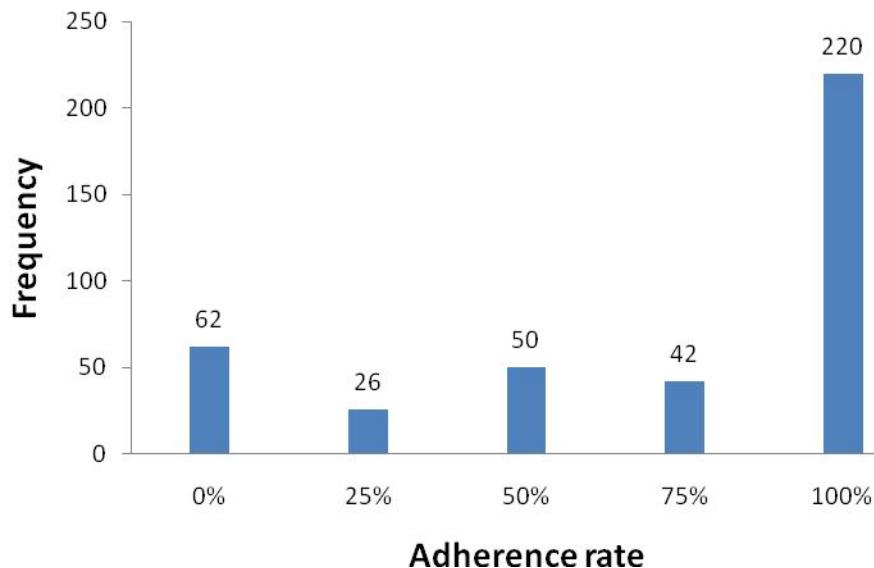


Table 2 shows the association between demographic factors and blood pressure. Twenty two (13.8%) of the respondents had normal blood pressure. There were more female 172 (54.8%) hypertensive than male 46 (53.5%). Age group, marital status, level of education and occupation were statistically significant, whereas sex was not.

**Table 2: Association between blood pressure and socio-demographical factors**

Variables	Stage of Blood Pressure			Total	Chi-square
	Normal	Pre hypertensive	Stage 1		
<b>Sex</b>					
Male	8 (9.3)	14 (16.3)	46 (53.5)	18 (20.9)	<b>86 (100.0)</b> <b>0.265</b>
Female	14 (4.5)	68 (21.7)	172 (54.8)	60 (19.1)	<b>314 (100.0)</b>
<b>Total</b>	<b>22</b>	<b>82</b>	<b>218</b>	<b>78</b>	<b>400</b>
<b>Age Groups</b>					
26-35	0 (0.0)	0 (0.0)	6 (100.0)	0 (0.0)	<b>6 (100.0)</b> <b>0.000</b>
36-45	10 (22.7)	8 (18.2)	26 (59.1)	0 (0.0)	<b>44 (100.0)</b>
46-55	4 (3.3)	26 (21.3)	54 (44.3)	38 (31.1)	<b>122 (100.0)</b>
56-65	8 (5.1)	20 (12.7)	108 (68.4)	22 (13.9)	<b>158 (100.0)</b>
>65	0 (0)	28 (40.0)	24 (34.3)	18 (25.7)	<b>70 (100.0)</b>
<b>Total</b>	<b>22</b>	<b>82</b>	<b>218</b>	<b>78</b>	<b>400</b>
<b>Marital Status</b>					
Married	14 (6.1)	56 (24.3)	114 (49.6)	46 (20.0)	<b>230 (100.0)</b> <b>0.000</b>
Divorced	0 (0)	14 (29.2)	26 (54.2)	8 (16.7)	<b>48 (100.0)</b>
Separated	0 (0)	8 (25.0)	24 (75.0)	0 (0)	<b>32 (100.0)</b>
Widow	8 (14.3)	4 (7.1)	24 (42.9)	20 (35.7)	<b>56 (100.0)</b>
Widower	0 (0.0)	0 (0)	30 (88.2)	4 (11.8)	<b>34 (100.0)</b>
<b>Total</b>	<b>22</b>	<b>82</b>	<b>218</b>	<b>78</b>	<b>400</b>
<b>Type of Marriage</b>					
Monogamy	6 (5.2)	20 (17.2)	60 (51.7)	30 (25.9)	<b>116 (100.0)</b> <b>0.212</b>
Polygamy	16 (5.6)	62 (21.8)	58 (55.6)	48 (16.9)	<b>284 (100.0)</b>
<b>Total</b>	<b>22</b>	<b>82</b>	<b>218</b>	<b>78</b>	<b>400</b>
<b>Level of Education</b>					
Non Formal	12 (3.7)	72 (22.0)	180 (54.9)	64 (19.5)	<b>328 (100.0)</b> <b>0.011</b>
Primary	4 (15.4)	6 (23.1)	8 (30.8)	8 (30.8)	<b>26 (100.0)</b>
Secondary	2 (12.5)	2 (12.5)	10 (62.5)	2 (12.5)	<b>16 (100.0)</b>
Tertiary	4 (13.3)	2 (6.7)	20 (66.7)	4 (13.3)	<b>30 (100.0)</b>
<b>Total</b>	<b>22</b>	<b>82</b>	<b>218</b>	<b>78</b>	<b>400</b>
<b>Occupation</b>					
Business Person	6 (2.7)	48 (21.8)	128 (58.2)	38 (17.3)	<b>220 (100.0)</b> <b>0.000</b>
Civil Servant	8 (16.7)	4 (8.3)	22 (45.8)	14 (29.2)	<b>48 (100.0)</b>
Retired Workers	0 (0)	8 (19.0)	24 (57.1)	10 (23.8)	<b>42 (100.0)</b>
Farmers	0 (0.0)	0 (0)	14 (77.8)	4 (22.2)	<b>18 (100.0)</b>
House Wives	4 (10.0)	16 (40.0)	16 (40.0)	4 (10.0)	<b>40 (100.0)</b>
Unemployed	4 (14.3)	6 (21.4)	14 (50.0)	4 (14.3)	<b>28 (100.0)</b>
Student	0 (0.0)	0 (0)	0 (0.0)	4 (100.0)	<b>4 (100.0)</b>
<b>Total</b>	<b>22</b>	<b>82</b>	<b>218</b>	<b>78</b>	<b>400</b>

Table 3 shows that 58 (34.0%) spent more than ₦4000 and constituted the highest number of the non-adherence. Besides, those who purchased antihypertensive from pharmacy shop, 142 (62.3%) were more adherence than those who purchased their anti-hypertensive from hospital pharmacies. Moreover, those who did not receive adequate information 74 (26.1%) on the uses of anti-hypertensive drug and its side effects had lesser adherence. Subjects on calcium channel blocker and beta blockers 104 (75.4%) had better adherence than other drug combinations. These were statistically significant.

**Table 3: Association between adherence and cost of hypertension**

<b>Cost of Anti-hypertensive (₦)</b>	<b>Adherence</b>		<b>P – Value</b>
	<b>Non-Adherence</b>	<b>Adherence</b>	
< 200	6 (42.9)	8 (57.1)	<b>14</b>
200-500	6 (21.4)	22 (78.6)	<b>28</b>
501-1000	10 (62.5)	6 (37.5)	<b>16</b>
1001-2000	18 (37.5)	30 (62.5)	<b>48</b>
2001-4000	22 (26.8)	60 (73.2)	<b>82</b>
>4000	68 (34.0)	132 (66.0)	
Unknown	8 (66.7)	4 (33.3)	<b>12</b>

<b>Place of Purchase of Anti-hypertensive</b>	<b>Non-Adherence</b>	<b>Adherence</b>	<b>Total</b>	<b>P – Value</b>
Hospital Pharmacies	10 (7.2)	50 (83.3)	<b>60</b>	<b>0.016</b>
Pharmacy Shop	86 (62.3)	142 (62.3)	<b>228</b>	
Patent Medicine Stores	8 (5.8)	10 (55.5)	<b>18</b>	
Hospital pharmacies & Pharmacy shop	34 (24.7)	60 (63.8)	<b>94</b>	

<b>Adequacy of information on use of the anti-hypertensive</b>	<b>Non-Adherence</b>	<b>Adherence</b>	<b>Total</b>	<b>P – Value</b>
No	74 (26.1)	210 (73.9)	<b>284</b>	<b>0.000</b>
Yes	64 (55.2)	52 (44.8)	<b>116</b>	

<b>Drug combination</b>	<b>Non-Adherence</b>	<b>Adherence</b>	<b>Total</b>	<b>P – Value</b>
D + BB	26 (68.4)	12 (31.6)	<b>38</b>	<b>0.000</b>
D + ACEI/ARB	36 (30.5)	82 (69.5)	<b>118</b>	
CCB + BB	34 (24.6)	104 (75.4)	<b>138</b>	
CCB + ACEI/ARB	26 (37.1)	44 (62.9)	<b>70</b>	
D + CCB	16 (44.4)	20 (55.6)	<b>36</b>	

## DISCUSSION

A total of 400 hypertensive patients were examined. There was female preponderance with male to female ratio of 1:3.7. This was in agreement with the studies in Sagamu<sup>18</sup>, Ekiti<sup>19</sup> in south western Nigeria respectively, but contrary to the study of Kabir and co-workers in Kano, Nigeria where there were equal number of men and women in the study.<sup>20</sup>

The mean age was  $50.70 \pm 10.55$ . This was similar to  $49.29 \pm 1.04$  in the study by Roland and co-workers in tertiary hospital in Nigeria.<sup>21</sup> The mean age obtained in this study was also in line with that obtained in a study conducted in Karachi, Pakistan<sup>22</sup> and Ekiti, south western Nigeria<sup>19</sup>, but contrary to those obtained in Sagamu and Ibadan<sup>23</sup> both in south western Nigeria<sup>18</sup>. This was not in concord with the report from Ibadan<sup>15</sup> where the peak age-categories were 46 – 55 years and no significant association existed. In this study, most patients presented with a mean BP consistent with grade 2 hypertension, this was similar to previous study done in Ilorin, Nigeria.<sup>24</sup>

The finding that CCB was most commonly prescribed drug in this study agrees with some other reports.<sup>25,26</sup> which was done outside Nigeria. This was not the case in a study done in Ibadan, Nigeria,<sup>27</sup> where thiazide was the most commonly prescribed antihypertensive. The Ibadan study was probably influenced by the volume dependency of black hypertensive and the ALLHAT study.<sup>28</sup>

In this study, the adherence to antihypertensive as measured by MMAS-4 was 65.5%. This was similar to the studies in Jos<sup>29</sup> (67.7%), Lagos<sup>30</sup> (65.8%) and Port Harcourt<sup>31</sup> (60%). A study in the United Kingdom<sup>32</sup> reported an adherence level of 74.1%. A higher value was also reported in Sagamu<sup>18</sup> (78.7%) and Nsukka<sup>33</sup>, (70.7%). The value obtained is also lower than previous studies done in Kuwait 88.6%, India 73% and Turkey 72%. This might be due to better access and care to patients in these countries. This could also be related to low level of education and low level of awareness related to risk of hypertension complications.<sup>34,35,36</sup> On the contrary, lower values were reported in Kano where Kabir and co workers reported 54.2%<sup>20</sup> and 44.7% by Ebenezer and co workers in Nigeria at a tertiary hospital. Similar lower values were reported in Sokoto<sup>37</sup>, Ibadan<sup>23</sup>, and Iran<sup>38</sup>.

In our study, poor adherence could be attributed to the cost of the antihypertensive. Most of the subjects spent more than four thousand naira (₦4000) on antihypertensive in situation where majority were retired workers, full house wives, and unemployed. Cost is a crucial issue in patient's adherence especially for patients with chronic diseases as the treatment period could be life-long.<sup>39,40</sup> A number of studies found that patients who had no insurance cover<sup>41,42</sup>, were more likely to be non-adherent to treatment.

Moreover, those who purchase anti-hypertensive's from pharmacy shops adhered better than those from hospital pharmacy. This study shows that the costlier the drug the less adherence the subjects were. In general, antihypertensive purchased from pharmacy shops were cheaper than the hospital pharmacy, thereby adding to the yolk of the subjects. This could be attributed to the extra administrative cost added to the cost of antihypertensive drug in the Nigerian hospital set-up, making drugs at the pharmacy shop relatively cheaper than those in the hospital pharmacy. Hence, there is need to reduce the cost of anti-hypertensive in our hospital to match those at the pharmacy shop by removing the extra administratively cost.

In this study, it was observed that, those who did not receive adequate information on the uses of drug and its side effects had lesser adherence. This could be overcome by educating the subjects on the various anti-hypertensive's, side effects and the advantages of the medication. Moreover, majority of those who did not adhere, were those without adequate information on the uses of the hypertensive and its side effects.<sup>43</sup>

Health professionals must educate hypertensive patients about their disease with specific emphasis on its causes, the severity of the disease, their medications and the consequences of non-adherence with treatment. They need to stress the importance of adherence. Therefore, this is urgent need to encourage health promotion in the population as means of primary prevention.

## CONCLUSION

The respondents in the study were non-adherent to the antihypertensive medication. The low socio-economic factors and the relatively costly drug could be responsible. It is therefore recommended that medication selection, bearing in mind the cost of medication should be addressed. The Federal Government of Nigeria should endeavour to extend the scope of National Health Insurance Scheme (NHIS) to the grass root and the informal sector of the scheme, in order to cushion the medication cost burden on these patients.

## LIMITATIONS OF THE STUDY

MMAS-4 which was used has the disadvantages of recall bias and eliciting socially acceptable responses, hence, has the tendency to overestimate adherence level. Besides, this study was hospital based, hence, making generalization difficult. More sophisticated methods, may have helped in accurate assessment of adherence, however, this was not feasible within the context of this study. Also, the sample size for the study was relatively small, but was more than

the minimum estimated sample size for the study. Nonetheless, the study provides useful data, in the important area of adherence to therapy for hypertensive patients.

### **ACKNOWLEDGEMENT**

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### **APPENDIX 1: SOCIO DEMOGRAPHIC VARIABLES**

1. Age:
2. Sex: Male  Female
3. Ethnicity: Hausa  Yoruba  Igbo  Others (specify)
4. Religion: Christianity  Islam  Traditional  Other (specify)
5. Marital Status: Married  Single  Divorced  Separated  Widower  Window
6. Type of marriage; Monogamy  Polygamy
7. Level of Education: Non Formal  Primary  Secondary  Tertiary
8. Occupation: Business person  Civil servant  Retired workers  Farmers  House Wives   
Unemployed  Student
9. Estimated monthly income (Specify): \_\_\_\_\_
10. Cigarette smoking status; None,  Current,  Ex-smoker
11. Alcohol Intake YES  NO   
IF YES
  - a. Have you ever felt that you ought to Cut down on your drinking?
  - b. Have people Annoyed by criticizing your drinking?
  - c. Have you ever felt bad or Guilty about your drinking?
  - d. Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover (Eye-opener)?

### **APPENDIX 2: MORISKY MEDICATION-TAKING ADHERENCE SCALE-MMAS (4-ITEM)**

	Yes	No
a. Do you ever forget to take your (name of health condition) medicine?	<input type="checkbox"/>	<input type="checkbox"/>
b. Do you ever have problems remembering to take your (name of health condition) medication?	<input type="checkbox"/>	<input type="checkbox"/>
c. When you feel better, do you sometimes stop taking your (name of health condition) medicine?	<input type="checkbox"/>	<input type="checkbox"/>
d. Sometimes if you feel worse when you take your (name of health condition) medicine, do you stop taking it?	<input type="checkbox"/>	<input type="checkbox"/>

### **APPENDIX 3: PATTERN OF DRUG COMBINATION**

(I) D+BB (ii) D+ACEI/ARB (iii) CCB +BB (iv) CCB+ACEI /ARB (v) CCB+D  
 (vi) AB +BB (vii) alpha 2 Adrenoceptor agonist +Imidazoline receptor

### **APPENDIX 4:**

- a. Cost of antihypertensive (Naira)/ Month  
 <200 ( ) 200-500 ( ) 501-1000 ( ) 1001-2000 ( ) 2001-4000 ( ) >4000 ( ) Unknown ( )
- b. Where do you buy your antihypertensive medications from?  
 Hospital Pharmacies ( ) Pharmacy Shop ( ) Patent Medicine stores ( )

Hospital pharmacies & Pharmacy shop ( )

- c. On purchase of drugs, do you always receive adequate information on the antihypertensive medication and how to take them? Yes ( ) No ( )

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