

Self Reported Adherence to Antihypertensive Drugs in a Nigerian Population using the Morisky Medication Adherence Scale

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ABSTRACT

Background: Poor adherence to medications is one of the reasons for dismal outcomes in hypertensives. Only about one-third of hypertensives have good BP control, largely caused by poor adherence to medications. Although there are few studies in Nigeria that have studied self reported medication adherence in hypertensives none was done with a validated instrument.

Objective: This study was done to assess self-reported adherence to medication in Nigerian hypertensives using the Morisky Medication Adherence Scale.

Methods: A cross-sectional study involving adult hypertensives attending the Medical Outpatient Clinics of three District Hospitals in Lagos, Nigeria was carried out between September and October 2012. A standard, structured and self-administered questionnaire containing socio-demographic data and relevant medical history was administered to consenting participants. The outcome measure was the 8-item Morisky Medication Adherence Scale (MMAS-8). Good adherence was defined as MMAS score of 8.

Results: Complete data from 768 respondents was analysed. The mean age of the study population was 57.53 years, with a female preponderance of 69.1%. The mean adherence value on the MMAS-8 instrument was 6.31±1.56 while the prevalence of good adherence i.e. MMAS-8 score of 8 was 22.8%. Two hundred and twenty seven (29.6%) of the study population had good BP control (BP<140/90mmHg). Age and to a lesser degree female gender were predictors of adherence.

Conclusion: Using the MMAS-8 instrument adherence level to antihypertensives is lower than previously reported and control of BP is still poor. Effective communication with patients is advocated to improve adherence.

Keywords: Medication Adherence, blood pressure, Outpatients,

INTRODUCTION

Hypertension is an important contributor to the global burden of morbidity and mortality from cardiovascular diseases and with its rising prevalence it has become a prime public health issue globally¹. It is intimately associated with risk of development of target organ

complications such as congestive cardiac failure, stroke, chronic kidney disease, coronary artery disease and peripheral artery disease^{2,3}. It also ranks third as a cause of disability adjusted life years⁴ globally.

Data from prospective clinical trials show that adequate and long term control of hypertension tremendously reduce the risk of adverse outcomes from hypertension^{2,3}. The last two decades has witnessed the development several effective drugs for the control of hypertension. Sadly the rate of hypertension control still remains less than 50% in most countries of the world^{5,6}. The World Health Organisation (WHO) estimates show that adherence to antihypertensive drugs is between 50-70% and that poor adherence is a major cause of poor blood pressure control⁷. The WHO defines adherence as "the extent to which a person's behaviour viz taking medications, following a diet and or executing lifestyle changes corresponds with agreed recommendations from a healthcare provider"⁸. Rates of adherence to antihypertensive medications vary across the globe. In the US the rate of adherence to antihypertensive drugs is about 50% and between 35 and 97% in Europe^{9,10}. In Nigeria adherence rate to antihypertensive is between 49 and 70%^{11,12}. Low adherence to prescribed antihypertensive medications is associated with increased risk of adverse outcomes and high healthcare costs^{13,14}. A meta analysis showed that the odds of blood pressure control amongst medication adherent hypertensives compared to non-adherent hypertensives was 3.44 (95% confidence interval, 1.6-7.37)¹⁵.

Low patient adherence to antihypertensive medication is the most important modifiable patient related factor in the control of hypertension¹⁶. Barriers to medication adherence are multifactorial and include complex medication regimens, convenience factors (dosing frequency), behavioural factors, and issues of side effects¹⁷. Identifying non adherent patients in an outpatient clinic setting is crucial in improving control rates of hypertension. Most times physicians do not inquire about the medication adherence either due to lack of time, not being able to associate non adherence to poor BP control or uncertain about quantifying non adherent behaviour^{18,19}. The first step in assessing medication adherence is by measuring adherence. Approaches to measuring medication adherence include patient self report, pill

counts, pharmacy records, drug levels, biological surrogates and medication event monitoring systems²⁰. Amongst these the most easily applicable in clinical practice is patient self report of adherence, with its obvious advantages of simplicity, cheapness, speed and viability of use²⁰.

Self reporting instruments to assess adherence to antihypertensives have been developed^{22,23}. However, concordance of responses from patients on these instruments vis-a-vis objective measures of medication adherence has been variable^{24,25}. The validated Morisky Medication Adherence Scale (MMAS), an 8- item self report instrument, has been used in many studies and has been found to predict self adherence and also quality of blood pressure control^{22,26}.

There are few studies in Nigeria on antihypertensive medication adherence and none used the MMAS to assess adherence^{11,12}. The objective of this study was to assess antihypertensive adherence among Nigerians living in Lagos using the 8-item MMAS.

METHODS

This study, cross sectional and descriptive in design, was carried out in Lagos, South West Nigeria and involved adult hypertensives attending the State's District (General) Hospitals in the three Senatorial zones of the State. These centres were chosen by simple random balloting from the identified State District Hospitals in each Senatorial zone. Consecutive consenting hypertensives attending the Medical Outpatient Clinics of the chosen hospitals were recruited for this study. Diabetics, hypertensive-diabetics and hypertensives with other co-morbidities were excluded from the study to eliminate the issue of pill burden. The purpose of the study was clearly explained to participants and written informed consent was obtained from any consenting participant in the study.

A structured pretested self administered questionnaire was administered to the participants. The questionnaire was in two parts. The first part was on their bio data, socio-demographic details and medical history while the second part the 8 item Morisky Medication Adherence Scale. Participants who could not communicate in English language or who needed assistance in completing the questionnaire had the questionnaire read to them in a language they best understood by any medical personnel who understood this particular language while the researcher filled in their responses.

Measurement of Adherence:

Self reported adherence was measured by the 8-item Morisky Medication Adherence Scale, MMAS, which was developed from a previously validated 4 item scale. This 8 item scale has higher reliability than the 4 item scale ($\alpha = 0.85$ vs 0.61) and also captures impediments to adherence²². The MMAS scores range from 0 to 8 and are divided into three categories of adherence for ease of use in clinic settings viz high adherence (score 8), medium adherence (score 6- <8) and low adherence (score < 6). The 8 item MMAS is significantly associated with blood pressure control in hypertensives $p < 0.05$, with 67.2% of low adherers having uncontrolled blood pressure vs 55.2% and 43.3% of medium and high adherers, respectively having uncontrolled blood pressure²². In this study patients were said to be adherent if they had a score of 8 on the MMAS. The MMAS is attached in the Appendix and permission to use was obtained from the developer of the instrument.

After administering the MMAS instrument blood pressure of each participant was measured with an Accoson branded mercury sphygmomanometer on both arms in a sitting position. The higher reading was taken as the true BP value. The subsequent reading was taken from the arm with the higher reading. The mean of two BP values taken 5 minutes apart was obtained and recorded as the participant's BP. For all readings Korotkoff phase I and V were used to determine the systolic and diastolic blood pressures respectively. Blood pressure is said to be well controlled if it is $< 140/90$ mmHg.

This study was approved by the Research and Ethics Committee of the Lagos State Hospital Board and lasted from September 1st October 3rd 2012.

Data Analysis:

The data collected were analysed using SPSS version 17.0 and descriptive and inferential statistics were used.

RESULTS

General characteristics of the study population:

The Morisky Medication Adherence Scale was administered to 800 respondents but only 768 were completely filled out the instrument for analysis, giving a response rate of 96%. The mean age of the study population was 57.53 years with female preponderance (69.1%). The average duration of the diagnosis of hypertension was 2.36 years and the average number of antihypertensives was 2.31. Two hundred and eighteen respondents (28.4%) had primary education, 224 (29.2%) had secondary education, 121 (15.8%) had post secondary education while 178 (23.3%) respondents did not have any form of education. Twenty seven (3.5%) did not indicate their educational status. (Table 1). Four hundred and thirteen (53.8%) of the respondents disclosed their average monthly income while 355 (46.2%) did not disclose theirs. Majority of the respondents who disclosed their monthly income, 184, (44.6%) earned less than 10,000 naira (62.5 USD) monthly, 145 (35.1%) earned between 10,000 and 25,000 naira (62.5 - 156.25 USD) monthly, 69 (16.7%) earned between 25,000 and 50,000 naira (156.25 - 312.5 USD), 11 (2.6%) earned between 51,000 and 100,000 naira (312.5 - 625 USD) while 4 (0.97%) earned above 100,000 naira (> 625 USD) monthly. (Table 1)

Morisky Medication Adherence Scale Score

The mean MMSA score of the participants was 6.31 ± 1.56 , which represents medium adherence. Males and females had mean MMSA scores of 6.15 ± 1.56 and 6.39 ± 1.5 respectively. One hundred and seventy five (22.8%) of the participants had high MMAS score of 8, 310 (40.4%) and 243 (31.6%) medium and low MMAS scores 6 to < 8 and < 6 respectively (Fig 1). Forty (5.2%) of the participants however did not respond to the instrument. Thus 72% of the participants were non adherent to their medications. Two hundred and twenty-seven of the participants (29.6%) of the participants had good BP control, BP < 140/90mmHg. Of the 175 participants with good adherence i.e. MMAS of 8, 112 (63.9%) had good BP control.

Morisky Medication Adherence Scale and Socio Demographic Characteristics

Age:

The mean MMAS scores of subjects between the ages of 25 and 40 years and 41-65 years were comparable viz 6.36 ± 1.68 and 6.19 ± 1.63 respectively, $p = 0.78$ while that of age 66 years and above was 6.69 ± 1.34 . There was no

significant statistical difference in the mean MMAS scores when ages 25-40 was compared to ages 66 and greater, $p=0.31$. However, the mean MMAS score of subjects 66 years and above differed significantly from that of the age group 41-65years, $p=0.0001$.

Gender:

Females had higher mean MMAS score than males 6.39 ± 1.51 vs 6.14 ± 1.68 . However this difference was not statistically significant, $p=0.055$.

Educational Status:

Subjects with Post secondary education and no form of education had comparable mean MMAS scores of 6.48 ± 1.58 and 6.47 ± 1.47 respectively, $p=1.00$. Subjects with both primary and Post primary education had comparable mean MMAS scores as well, 6.21 ± 1.58 and 6.24 ± 1.58 respectively, $p=1.00$. There was no statistically significant difference between the mean MMAS scores of subjects with Post secondary education and those with either primary or secondary education, $p=0.59$ and 0.69 respectively.

Income:

There was no significant difference in the MMAS score for patients who earned less than N10,000.00, N10,000.00 - N50,000.00 and greater than N50,000.00, $p=0.68$, 0.71 and 0.77 respectively.

Appendix 1

- 1) Do you sometimes forget to take your blood pressure medication?
- 2) In the last two weeks, was there any day when you did not take your high blood pressure medication?
- 3) Have you ever stopped taking your medications or decreased the dose without first warning your doctor because you felt worst when you took them?
- 4) When you travel to leave the house, do you sometimes forget to take your medications?
- 5) Did you take your high blood pressure medication yesterday?
- 6) When you feel your blood pressure is controlled, do you sometimes stop taking your medications?
- 7) Have you ever felt distressed or strictly following your high blood pressure treatment?
- 8) How often do you have difficulty to remember taking all your blood pressure medication?

Never / almost never/ sometimes/ frequently/ always

Table 1
General Characteristics of the Study Population

Parameter	Mean/Frequency
Age	57.53 years
Gender	69.1% females
Duration of Hypertension	2.36 years
Number of Anti-hypertensive	2.31
Education Status Primary	28.4%
Secondary Education	29.2%
Post-Secondary	15.8%
None	23.2%
No response to question	3.5%
Average Monthly Income	
≤10,000 Naira	44.6%
10,000-25,000 Naira	35.1%
25,000-50,000 Naira	16.7%
51,000-100,000 Naira	2.6%
>100,000 Naira	0.97%
MMAS	6.31 ± 1.56
BP Control	29.6%

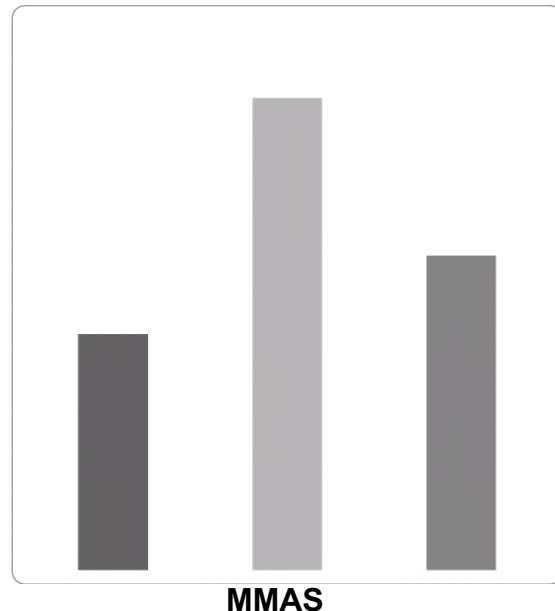


Figure 1: Frequency of Medication Adherence

DISCUSSION

The study was designed to evaluate self reported adherence to antihypertensive medications using the Morisky Medication Adherence Scale, a validated instrument yet to be used in Nigerian hypertensives. In this study only 22.8% of the respondents had good adherence to their antihypertensive medications. This is lower than values obtained from similar studies here in Nigeria^{11,12}. This difference may be due to research methodology. None of these two studies used the MMSA instrument. The adherence level of 22.8% found in this study is comparable to the 27% found in a similar study in the Gambia²⁷ but lower than 74% found in a study in Egypt²⁸.

This huge difference could be due to cost reasons. In Egypt antihypertensive drugs are highly subsidised and the health insurance scheme is robust and effective, thus possibly accounting for their higher adherence level²⁸. A study in Ethiopia found an adherence rate of 64.6%²⁹. However in this study the 4-item MMAS was used instead of the 8-item variety. The 8-item MMAS is said to be a better predictor of adherence than the 4-item variety²². A study in Brazil³⁰ using the 8 item MMAS Scale found an adherence level of 19.7%, which is comparable to the 22.8% obtained in this study.

Generally there is a minor gender difference in non-adherence, with rates of adherence slightly higher in females³¹. In our study we found an association between adherence level and gender. Females had higher adherence level than males. This is similar to findings from two studies in India and Ethiopia^{32,29}. The reasons might be related to the busy outdoor job demands of males and also alcohol consumption, which could be a barrier to adherence. In this study also there were more females than males, a pattern that has been observed in similar studies^{29,30,32}. It is known that females take their health issues more serious than males and thus are able to use healthcare facilities more than males. This has also been proposed as the reason for their higher life expectancy in Nigeria³³.

We observed in this study that age was significantly associated the level of adherence. Participants above 66 years of age had better adherence levels than those below this age cut off point. This is similar to the findings in two other studies^{31,34}. In most chronic conditions adherence has been found to have a linear relationship with age. In the Minnesota Colon Cancer Control Study a linear relationship was observed between age and compliance to screening for colorectal cancer with those below 55 years having the worst compliance rate for screening³⁵. Hinkinet al³⁶, studying adherence to antiretroviral medications found patients younger than 50 years to be less adherent. Although age itself has not been found to a risk factor for medication non adherence studies have shown that people less than 65 years are more likely to be less adherent to their medications^{34,35}. Although no reasons have been reported to explain this trend youth is associated with vigour and feeling of invincibility. This may partially explain why they are less likely to be adherent to medications for chronic conditions. Secondly older people often have comorbidities and may perceive themselves to be sicker and hence adhere better to their antihypertensive medications³⁶. On the other hand some studies have found poor adherence to be higher in the elderly population^{37,38}. Factors like cognitive impairment, physical impairment and poor personal grooming may account for this.

Furthermore no significant association was found between income and level of adherence in this study. This is similar to observations in several studies^{15,17,29,30}. However factors such as complexity of regimen (pill burden), the treatment of asymptomatic disease, presence of psychological problems like depression and as well as adverse drug reactions are strongly associated with poor adherence³⁰. In this study these factors were not studied.

With regards to blood pressure control 29.6% of the participants had good control, lower than the 34.1% and 35.6% found in two studies that used the 8-item MMSA instrument^{30,39}. The difference can be accounted for by the availability of efficient Health Insurance coverage in these studies compared to what is presently obtainable in Nigeria where Health Insurance coverage is not extensive. The

World Health Organisation estimates that 51% and 43% of hypertensives in the United States and China adhere to their medications⁸. In all these studies the cost of medications was a major predictor of adherence. Although cost of medication was not assessed in our study but with the lack of universal health insurance coverage in the country most patients pay for their medications from their meagre incomes and this might affect adherence. Other probable reasons for the high level of poor BP control from this study could be due to white-coat effect, inappropriate dosing, poor quality generic formulations and complexity of regimen and the fact that most patients attending Public Hospitals come very early for their appointments and have not have taken their antihypertensives prior to being interviewed for this study. These reasons might account for the 20.4% of those with good adherence who still had poor BP control.

CONCLUSION

Poor adherence to medication is a major problem in the control of hypertension in Nigeria like in most other countries. This used a validated instrument, the Morisky Medication Adherence Scale to assess adherence. The rate of adherence of 22.8% and 29.6% rate of BP control were observed in this study. Among the factors studied only age and possibly female gender were observed to be predictors of adherence. However other factors such as complexity of regimen, psychological factors and knowledge and perception of hypertension were not assessed.

In this study the MMAS proved to be a simple, reliable, rapid, noninvasive and cheap method of real-time measurement of self adherence⁴⁰. The other approaches above are cumbersome and have been reported to overestimate adherence^{20,21,22}.

The rates of adherence to medications and BP control are still poor in Nigeria like most regions of the world. Efforts at improved adherence to medications such as effective communication with patients and robust health insurance scheme will not only improve control rates but will necessarily reduce cardiovascular morbidity and mortality from hypertension.

LIMITATIONS

In this study some predictors of poor adherence such as depressive illness, complexity of regimen, and presence of co-morbidities were not studied. White-coat hypertension and time of administration of drugs which can affect assessment of rate of BP control were not accounted for and might have introduced bias in the assessment of rate of control. Further studies on this subject should address these limitations.

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DISCLOSURE

The authors have potential conflicts of interest with regards to this study and the write-up.

AUTHORS CONTRIBUTIONS

Conceptualization and design of study were done by OAA, CEA and AEJ. Data collection and analysis were by OAA. CEA, ACM and JNA wrote up the article. All authors agreed with the final draft of the article.

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