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ADHERENCE TO ANTIHYPERTENSIVE MEDICATION AND ITS CORRELATES AMONG INDIVIDUALS WITH HYPERTENSION IN A SEMI-URBAN COMMUNITY OF SOUTHERN NIGERIA

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ABSTRACT
Consistent control of blood pressure requires that patients with hypertension follow medication regimen and lifestyle modification. However, many patients fail to adhere to treatment recommendations resulting in less than optimal treatment. While most studies have focused on medication adherence and its associations among hypertensive patients seen in the hospital setting, little is known about this in the community. Knowledge of this will aid clinicians and health policy makers in designing community-based intervention programme to improve medication adherence in the populace. A cross-sectional community-based study carried out among individuals known to be hypertensive for more than 3 months and on antihypertensive medications. Modified version of the hypertension fact questionnaire and the 8-item Morisky Medication Assessment Scale was used to assess knowledge and adherence to medication respectively. Complete data was available for 252 participants. This included 143 (56.7%) males and 109 (43.3%) females with a mean age of 56.6 ± 12.7 years. Blood pressure control was optimal in 33%, good knowledge of hypertension was found in 52% while only 31.8% were adherent to prescribed medications. Duration of hypertension from time of diagnosis, systolic and diastolic blood pressures and total number of pills swallowed per time were found to independently correlate with medication adherence, albeit negatively. Education program and use of single pill combination regimen can be effective in promoting adherence to medication in our population.

Introduction

With the global burden of disease shifting from communicable to non-communicable diseases, hypertension has become a key public health problem. It is the commonest non-communicable disease and the leading cause of cardiovascular disease in the world[1-2]. Hypertension alone is responsible for more than 5.8 % of death worldwide, loss of 11.9 % year of life and adjusted life of 1.4 %[3].

Hypertension affects approximately 11% - 42% of Africans[4-6]. It ranks first among non- communicable diseases in Nigeria[7] with prevalence ranging from 8% - 46.4% in both men and women in rural and urban communities[8-13]. A recent non-communicable disease survey in Abia State reported a prevalence rate of 31.8% among 2,999 respondents[12].

Hypertension requires long term management and follow-up. Adherence to therapy is a key component of management. Adherence to a medication regimen is

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generally defined as the extent to which patients take medications as prescribed by their health care providers[14].

The word “adherence” is preferred by many health care providers, because “compliance” suggests that the patient is passively following the doctor's orders and that the treatment plan is not based on a therapeutic alliance or contract established between the patient and the physician[14].

Both pharmacologic (medications) and non-pharmacologic (psychotherapy, lifestyle) therapies are prescribed for hypertensive patients with the expectation that patients will be adherent1[5-16]. However, many patients fail to adhere to treatment recommendations resulting in less than optimal treatment[17]. A low level of adherence to antihypertensive medications is a major barrier to hypertension control and has been shown to be common especially in Africans[18]. Factors affecting adherence to medications include patient, physician and health system-related factors. Physician and health system-related factors have been described separately[14]. Patient-related factors include age, number of drugs prescribed, side effect of medications, poor understanding of disease, non appreciation of the benefits and risks of treatment and poor understanding of proper use of the medications[14].

In Nigeria, hospital-based studies have reported fairly similar adherence rates of 42.9% in Southeast[19] and 44.7% in Southwest[20], depending on the instrument used in assessing medication adherence. The patients in these studies were seen in a hospital setting and had regular attendance to hospital and contact with doctors. They were, thus, expected to have a better knowledge of hypertension, a factor which might improve other aspects of their treatment including adherence to medications. This might not be the case with people in rural and semi-urban communities who may not have the resources and motivation to seek medical attention. They may also have a lot of misconception regarding hypertension. There is paucity of community-based studies on medication adherence and factors associated with it in Nigeria.

Therefore, this study was aimed at assessing adherence to antihypertensive medications and determining the factors associated with it among adults with hypertension in a semi-urban community in Umuahia South local government area of Abia state, Nigeria.

Methodology

Study design and recruitment of subjects: This was a descriptive cross sectional study. The study population included all males and females aged 18 years and above with previous diagnosis of hypertension made by medical personnel. They were identified during a medical screening exercise carried out in Olokoro, Umuahia South Local Government Area of Abia state Nigeria between 15th and 18th August 2013. The sample size was calculated using the appropriate formula[21], based on medication adherence rate of 42.9%[19], confidence level of 95% and margin of error of 5%. This gave a minimum sample estimate of 376. Those who had been on antihypertensive medications for more than 3 months and consented to the study were included while those that had psychiatric illness were excluded from the interview.

Data collection; Two different questionnaires were used for the study. A modified version of the hypertension fact questionnaire (HFQ)[22] was used to obtain each participants' knowledge of hypertension while the 8-item Morisky questionnaire (the Morisky Medication-taking Adherence Scale-MMAS-8) was used in measuring adherence to medications[23].

The HFQ, comprising 15 questions, was used to assess the knowledge of patients about hypertension, its causes and management. Each response was scored as 'yes', 'no' or 'do not know'. Knowledge scores for individuals were calculated and summed up to give the total knowledge score. The scoring range of HFQ was 0 (minimum) to 15 (maximum). A cut off level of < 8 was considered as poor knowledge while a score of 8 and above was considered good knowledge of hypertension.

The MMAS-8 scores ranged from zero to eight with higher scores reflecting higher adherence. Participants were categorized as having poor adherence (<4 scores) and good adherence (>4 scores) based on the number of positive responses obtained.

The questionnaires written in English were translated to the local dialect using an expert in Igbo language as modified in the community. This was thereafter translated back to English by a second party. The two versions were then cross-checked for originality and consistencies in meaning of questions.

Both questionnaires were pilot-tested with 38 hypertensive patients seen in a health center in the adjacent community. The aim of the pilot study was to determine the reliability of the questionnaire, reveal difficulties in understanding the meaning of the questions, estimate the amount of time for completion of the questionnaire and to assess the participants' willingness to be involved in the study. The face and content validity of the questionnaires were also evaluated by one family physician and two resident doctors.

On the basis of the feedback obtained, some questions on HFQ were modified, the clarity of some questions was improved, and the option “I do not know” was added to few questions. Those that answered 'I do not know' were categorized as 'no' for the purpose of statistical analysis. The reliability test of the MMAS-8 questionnaire gave a Cronbach's alpha of 0.77. This statistically implies a high reliability of the tool to measure adherence in the respondents for this study. The interview for each participant took 14 minutes.

In addition to the two instruments, another form was also added to collect socio-demographic data that included age, gender, occupation, educational level, marital status, duration of hypertension, weight and height of the participants. Interview was conducted in English or local dialect (depending on participant's preference) by three research assistants trained by the principal investigator.

After the interview, blood pressure was measured twice in the non-dominant arm using a mercury sphygmomanometer (Accoson, England) in sitting position. Participants with systolic BP <140mmHg and diastolic BP < 90mmHg were regarded as having controlled BP.[24] The BP was further categorized according to the Seventh report of the Joint National Committee on Prevention, Detection and Evaluation of high blood pressure (JNC-7)[24].

Height was measured using a stadiometer with the participant standing erect, bare foot, without caps; the occiput, back, buttock and heel making contact with a vertical wall. The weight was obtained using a digital bathroom weighing scale. Both height and weight were recorded to the nearest one decimal place.

We obtained permission from the local government authorities and consent from the patients.

Statistics

All statistical analyses were performed with commercially available computer program- Statistical Package for Social Sciences version 21.0 (SPSS Inc., Chicago, IL). Means (±Standard deviations) were used to describe the distributions of continuous variables. Percentages were used to describe categorical variables. Analysis of variance (with post hoc analysis) was used to identify the difference in the mean adherence scores across the different occupational groups. Correlation analysis was performed between medication adherence and relevant continuous variables, using appropriate test statistic. Cross-tabulation (with chi-square analysis) was used to analyze the relationship between medication adherence (good adherence versus poor adherence) and some categorical variables. All tests were two-tailed with a p-value < 0.05 considered statistically significant.

Results

Data for two hundred and fifty two (252) participants were turned in and used in the analysis. The information collected were all self-reported data, as actual behaviors were not measured independent of the survey reports. Details of the socio-demographic characteristics are shown in table 1. Blood pressure was controlled in 33% of the study participants. Good knowledge of hypertension was demonstrated in 52% of the participants (Table 2) while 31.8% were adherent to prescribed medication based on the MMAS-8 used in this study (Table 3 and Figure 1). Analysis of variance (ANOVA) showed there was a statistically significant difference between the mean adherence score across the different occupational groups ($F_{6,246} = 3.8$, $p < 0.01$). Post hoc analysis showed that clergy men had significantly higher adherence score than civil servants (5.7 ± 2.4 vs 3.1 ± 1.6, $p = 0.04$), traders (5.7 ± 2.4 vs 3.2 ± 2.4, $p = 0.03$) and pensioners (5.7 ± 2.4 vs 2.2 ± 1.0, $p < 0.01$). Duration of hypertension from time of diagnosis, number of pills swallowed, systolic BP and diastolic BP were found to significantly correlate negatively with adherence to medications in this study (Table 4). Participants that were adherent to medications were more likely to have better blood pressure control (OR = 3.65, 95% CI = 2.08 to 6.42, $p < 0.01$), more likely to be non-smokers (OR = 2.77, 95% CI = 1.48 to 5.20, $p = < 0.01$) and more likely to have a non significant history of alcohol (OR = 2.07, 95%CI = 1.05 to 4.07, $p = 0.03$) than participants that were not adherent to medication (Table 5).

Table 1: Socio-demographic characteristics of the study participants

Indices	**Frequency (N=252)**	**Percent**
Mean Age(±SD) = 56.6(±12.7)		
Gender		
Male	143	56.7
Female	109	43.3
Marital Status		
Single	24	9.5
Married	159	63.1
Divorced/separated/widowed	69	27.4
Occupation		
Trader/self employed	112	44.4
Farmer	68	26.9
Civil servant	35	13.9
Pensioners	13	5.2
Student	8	3.2
Clergy	8	3.2
Unemployed	8	3.2
Educational Status		
No formal education	31	12.3
Primary	72	28.6
Secondary	105	41.6
Tertiary	44	17.5
Blood Pressure Categories(JNC-VII)		
Normal	15	6
Prehypertension	68	27
Stage 1	99	39.3
Stage 2	70	27.8
Mean Duration of Hypertension Diagnosis (±SD) = 6.1 (±3.3) years		
Mean BMI (±SD) = 27.3(±3.5) kg/m^2		
Mean Systolic BP(±SD) = 145(±18) mmHg		
Mean Diastolic BP(±SD) = 80(±12) mmHg		

Abbreviations: SD, Standard Deviation; BMI, Body Mass Index; BP, Blood Pressure

Table 2: Knowledge of hypertension among the participants

Knowledge item	Yes (%)	No (%)	Don't know (%)
Hypertension is a rise in blood pressure above normal for age	**65.1**	**10.7**	**24.2**
Hypertension can be inherited from parents	**57.1**	**5.6**	**27.4**
Too much salt in food can cause hypertension	**75.8**	**6.7**	**17.5**
Kidney disease can cause hypertension	**21.0**	**8.3**	**70.6**
Diseases of the thyroid gland can cause hypertension	**8.7**	**6.7**	**84.5**
Too much stress and thinking can cause hypertension	**62.7**	**18.3**	**19.0**
Smoking is a risk factor for hypertension	**45.2**	**22.0**	**32.8**
Being overweight does not increase the risk for hypertension	**50.1**	**42.9**	**7.0**
Uncontrolled hypertension can lead to stroke	**79.8**	**6.0**	**14.2**
Regular exercise reduces the chance of getting high BP	**12.3**	**50.7**	**37.0**
Uncontrolled hypertension can lead to heart disease	**47.2**	**10.7**	**42.1**
Uncontrolled hypertension can lead to eye problem	**59.1**	**7.9**	**32.9**
Uncontrolled hypertension can lead to kidney problem	**29.0**	**10.3**	**60.7**
Treatment of hypertension is for life if cause is not known	**42.9**	**7.5**	**49.6**
Dietary approaches to control hypertension do no good	**50.1**	**13.9**	**36.0**
Good knowledge= 131 (52%) **Poor Knowledge= 121 (48%)**			

Table 3: Drug adherence data and scores

Drug adherence item	Yes (%)=1	No (%)=0
Do you sometimes forget to take your medicines?	77.4	22.6
Have you missed taking your medicines in past 2 weeks?	74.2	25.8
Do you sometimes forget to bring along your medicines while travelling?	65.5	34.5
Did you take all your medicines yesterday?	85.3	14.7
Do you sometimes stop taking your medicines when you feel like symptoms are under control?	25.8	74.2
Do you feel uncomfortable sticking to treatment plan?	31.0	69.0
Do you sometimes stop taking drugs due to its side effects?	21.4	78.6
How often do you have difficulty remembering to take your medicines? A-Never/rarely, B-Once in awhile, C-Sometimes, D-Usually, E- All the time A=0, B-E=1	A – 34.9% B-E- 65.1%	

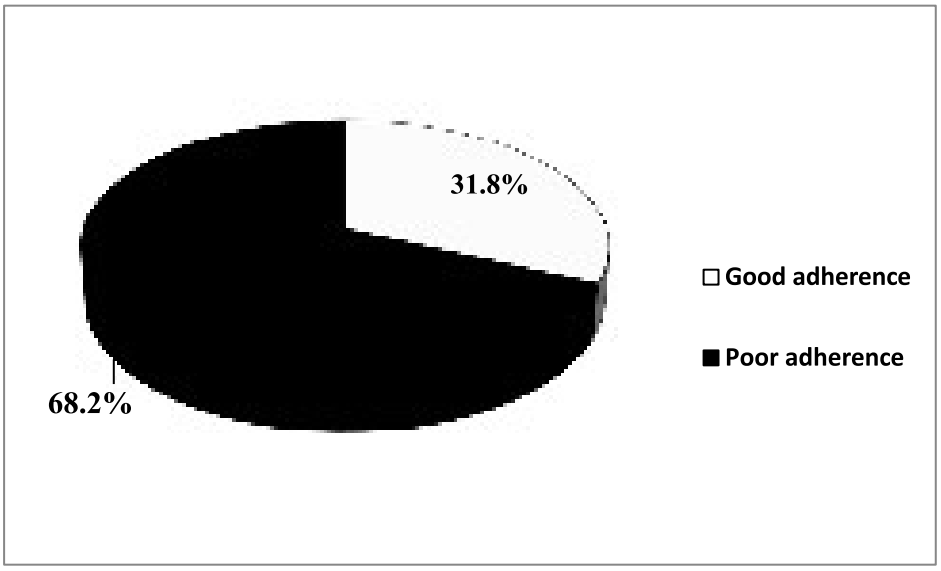

Figure 1: Overall assessment of medication adherence in the participants

Table 4: Correlation analysis of medication adherence scores and patients variables

Variable	Spearman rho	p-value
Age	-0.11	0.90
Body mass index	-0.03	0.958
Duration of hypertension	**-0.32**	**<0.01**
Knowledge of hypertension	-0.05	0.40
Number of pills swallowed	**-0.04**	**<0.01**
Systolic BP	**-0.41**	**<0.01**
Diastolic BP	**-0.23**	**<0.01**

Table 5: Cross tabulation of some participant's variables and adherence to medications

Variable	Adherent n (%)	Non-adherent n (%)	OR	95% CI	p-value
History of smoking	40 (50)	86 (50)	2.77	1.48 - 5.20	<0.01
History of significant alcohol intake	36 (45.2)	94 (54.8)	2.07	1.05 – 4.07	0.03
Controlled blood pressure	40 (50.6)	85(49.4)	3.65	2.08 – 6.42	<0.01

Abbreviations: OR, Odd's ratio; CI, Confidence interval

Discussion

This study was carried out in a semi-urban community among adults with previous diagnosis of hypertension and on drug treatment, to determine the level of adherence to medications and factors that are associated with it.

Our study is similar to earlier studies in Nigeria among hypertensives[19,25-27] in terms of mean age of hypertensives and the age category commonly reported to have a high prevalence of hypertension. This is also in line with the observation that blood pressure increases with age[28].

Majority of participants in this study were traders/self employed and farmers. This confirmed earlier reports from a non-communicable disease survey[12] and Abia State's core welfare indicators document[29] which showed that the predominant occupations of the people of Abia State is farming, artisan and trading. Ulasi et al had earlier reported a high prevalence of hypertension among traders in Nigeria[30]. This is because they sit in one place to conduct their businesses (sedentary lifestyle) and may not have regular exercise. In addition, they spend most of the day at the market and depend on food vendors for most of their meals. Foods from these sources are often salt-laden to improve taste. All these are risk factors for high prevalence of hypertension in traders.

Most of the participants had some form of education, corroborating earlier report by the Abia State Planning Commission in 2008 which gave a high literacy rate of 85.6% in the State[31].

Adherence to antihypertensive medications as measured by MMAS-8 in this study was 31.3%. This is lower than 42.9% from earlier hospital-based studies from the study area[19] and 44.7% in Southwest Nigeria[20]. Most of the participants in this study may not have easy access to health care and contact with health officers as their urban counterparts in the latter studies, a factor which may result to lower rate of adherence as obtained.

None of the socio-demographic variables significantly correlated with medication adherence. This differs from an earlier study in Nsukka, Nigeria[32] where higher educational status increased adherence to antihypertensive medications. The number of participants seen in the latter study was three times greater than our study and may account for the observed difference. However, our study showed that occupation may account for some differences in adherence among this cohort.

A well informed patient is more likely to accept treatment, comply with physician's prescriptions and has fewer tendencies for pre-mature discontinuation of treatment[27,33]. However, despite the good knowledge level of hypertension demonstrated by majority of the participants, only about 32% of those with good knowledge of hypertension were adherent to antihypertensive medications. This may be due to the fact that more than 70% of the participants in this study sometimes forget to take their medications (Table 3). Studies have shown that forgetting to take antihypertensive medication is not a problem that adults outgrow and this has been attributed to competing psychosocial demands of life[34-35] especially among traders, who constitute majority of the participants in this study.

This study also did not find a significant association between knowledge of hypertension and adherence to antihypertensive medication. There are also other studies[17,36] that did not find any

association between knowledge of hypertension and adherence to medications while others[37-38] showed a positive relationship between knowledge of hypertension and adherence to treatment. The apparent reason for the conflicting outcomes and opinions may be due to differences in the concept and definition of adherence and knowledge. For an illustration, most tools used in assessing adherence to medication in some studies[27,35,39] were developed by authors themselves for the purpose of their studies. They were not previously validated and no pre-test reliability analysis was reported for most. The MMAS-8 used in this study, and some previous reports[20,40] had been validated for use in assessing adherence to medications. In a previous study, this scale was reported to have acceptable internal consistency (Cronbach's alpha = 0.83), the items maintained a high item-to-item correlation (> 0.4 for each item) and scores correlated with blood pressure control[23].

Sometimes, the effect of other factors cannot be discounted. In responses to a questionnaire, some of the factors cited by patients for not taking their medications included forgetfulness (30%), other priorities (16%), decision to omit doses (11%), lack of information (9%), and emotional factors (7%); 27 % of the respondents did not provide a reason for poor adherence to a regimen[41]. Physicians contribute to patients' poor adherence by prescribing complex regimens, failing to explain the benefits and side effects of a medication adequately, not giving consideration to the patient's lifestyle or the cost of the medications, and having poor therapeutic relationships with their patients[42-44].

There was a weak negative significant correlation between medication adherence and both duration of hypertension from diagnosis and the number of drugs used for treatment of hypertension. The findings of our study differs from previous reports[20,45] which showed strong positive correlation between adherence to antihypertensive medications and number of pills swallowed while another report[46] showed no correlation. Difference in study design (prospective/retrospective), study population (in hospital/community) and method of assessment of medication adherence could account for these differences.

This negative association between medication adherence and duration of diagnosis as reported in this study is not surprising. Adherence rates are typically higher among patients with acute conditions, as compared with those with chronic conditions; persistence among patients with chronic conditions is disappointingly low, dropping most dramatically after the first six months of therapy[47-48]. For example, approximately half of patients receiving hydroxymethylglutaryl–coenzyme A reductase inhibitor therapy were reported to discontinue their medication within six months of starting the therapy in a retrospective study by Benner et al among elderly patients in United States of America[49].

Blood pressure control is multifactorial and adherence to medications is a key factor. Several studies have reported improvement in blood pressure profile with improved adherence to medications[50-52]. Our study supports this assertion as 16% and 5% of changes in systolic and diastolic blood pressure respectively is accounted for by changes in medication adherence in our cohort (Table 4).

In conclusion, poor blood pressure control was noted among our participants despite the fact that more than half of the participants have good knowledge of hypertension. A good proportion (> 60%) were poorly adherent to antihypertensive

medications. Factors found to be correlated with medication adherence in this cohort include number of pills swallowed, duration of hypertension from diagnosis, systolic and diastolic blood pressures.

The MMAS-8 which was used as the only method of measuring adherence has the disadvantage of recall bias and eliciting socially acceptable responses. Hence, it has the tendency to overestimate adherence level; though it is a validated and reliable tool with significant linear relation with adherence measured as a continuum. Despite this, the strength of our study is in being one of the few studies in Nigeria carried out in the community among hypertensives with the aim of assessing their adherence to medications and factors associated with it.

The findings of this study can be used to design a community-based intervention program aimed at improving medication adherence among hypertensives in Nigeria. We recommend the use of minimum effective number of drugs in treatment of hypertension as this study had shown that higher medication adherence is associated with lower number of drugs consumed per time. This can be achieved through the use of single pill combination therapy. Secondly, the nature of essential hypertension as a chronic disease whose treatment is for a life time should be emphasized to the patient from the initiation of therapy. Also the importance of lifestyle modification needs to be addressed each time the health care provider comes in contact with patients.No matter how effectively the clinician communicates the benefits of antihypertensive therapy, patients are still ultimately responsible for taking their medications. Since adherence is enhanced when patients are involved in medical decisions about their care and in monitoring their care, the traditional model of the authoritarian provider should be replaced by the more useful dynamic of shared decision making by the health care provider and the patient[14,53-54].

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