Effect of home visits on lifestyle modification, drug adherence and control of hypertension

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ABSTRACT

Background: Hypertension remains the leading risk factor for cardiovascular morbidity and mortality globally. Unhealthy lifestyle and non-adherence to medication are believed to constitute serious obstacles to achieving blood pressure control among hypertensive patients. **Aim**: This study aimed to determine the effect of home visits on lifestyle modification, drug adherence and blood pressure control among patients with uncontrolled hypertension in Sokoto, Nigeria. **Materials and Methods**: A randomized control trial was conducted among 139 patients with uncontrolled hypertension (selected by systematic sampling technique) attending the General Outpatient Clinics of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria. A semi-structured questionnaire and data sheet were used to obtain information on the research variables. In addition to the routine hospital care for hypertension, the intervention group also had 3 home visits over a period of 3 months. Data were analyzed using the IBM SPSS version 22 statistical computer software package. **Results**: The participants in both groups were predominantly females and married. Although significant reductions in the proportion of participants that practiced unhealthy lifestyle, and significant increases in the proportion of participants that were adherent to medications, and those with controlled blood pressure, were recorded in both groups, the differences observed were by far higher in the intervention group as compared to the control group. **Conclusion**: This study showed that home visits are effective in facilitating healthy lifestyle modification, high medication adherence and blood pressure control among patients with uncontrolled hypertension in Sokoto, Nigeria. Management of healthcare institutions should make home visits a core component of the standard care of patients with hypertension.

Keywords: Home visits, lifestyle modification, drug adherence, blood pressure control

INTRODUCTION

Hypertension remains a major global health challenge that has been identified as the leading risk factor for cardiovascular morbidity and mortality, as well as all-cause mortality (Ndou et al., 2013). It affects approximately 1 billion people worldwide (i.e., 4.5% of the current global disease burden), with 340 million of these in economically developed and 340 million in economically developing countries; and it causes 7.1 million preventable premature deaths globally (Ogah et al., 2012; Ibrahim and Smith, 2010). High blood pressure (hypertension) is one of the most common chronic medical conditions in the developed world and it is rapidly becoming a major problem in the developing countries (Kearney et al., 2004). Until recently, hypertension was mainly associated with more affluent regions of the world. Estimates now show that in some settings in Africa, more than 40% of adults have hypertension (Awotidebe et al., 2014).

The prevalence of hypertension in Nigeria was estimated at 12.4 to 34.8%, and it was higher in urban than rural areas (Okwuonu et al., 2014). Non-adherence to medication is well established as an important contributor to poorly controlled blood pressure among hypertensive patients. However, despite the convenience of once daily dosing schedules of anti-hypertensive drugs, the relative lack of adverse effects and many interventions that were developed to improve medicine taking, adherence to anti-hypertensive drugs remain sub-optimal, thus resulting in persisting rates of uncontrolled blood pressure among hypertensive patients (Iloh et al., 2013; Cutrona et al., 2003). The blood pressure control rate is generally low across various settings in Nigeria including Kano (31%) (Sani et al., 2008), Umuahia (32.9%) (Iloh et al., 2013), and Abeokuta (31.4%) (Ayodele et al., 2004). One of the most important factors affecting the efficacy of blood

pressure control in Nigeria is the lack of patient adherence to prescribed anti-hypertensive drugs and therapeutic lifestyle modification (Iloh et al., 2014); and generally low drug adherence levels were reported in studies conducted across Nigeria including Ado-Ekiti (44.7%) (Raimi, 2017), and Kano (54.2%) (Kabir et al., 2004).

Although, several studies have been conducted to determine the best way to promote medication adherence and lifestyle changes in hypertensive patients, only a few have addressed the effect of home visits on lifestyle modification and drug adherence in the management of hypertension. Reports from studies that employed home visits intervention generally showed improvement in blood pressure control and medication adherence. A study in South Africa by Ndou et al. (2013) utilized nurse supervised indigenous health workers who were trained and certified in blood pressure management, monitoring, education and counseling. It compared outcomes of patients receiving home visits and usual care with a control group receiving usual care alone. There was a significant decrease in the mean systolic and diastolic blood pressure after the intervention, and a significant increase in t h e proportion of those with controlled blood pressure.

A study conducted in Oklahoma, United States (Planas et al., 2009) reported that monthly home visits by community pharmacists to 52 patients with hypertension (which employed counseling on medication adherence and lifestyle modification) caused a significant improvement in medication adherence from 67.9% at baseline to 87.5% after six months of intervention. In an intervention (that comprised counseling on drug adherence and frequent telephone reminders) among patients on treatment for hypertension in a teaching hospital in Coimbatore, India, the compliance level rose from 0% at baseline to 67.0% at 6 months, and with an average blood pressure of 141/90mmHg (Palanisamy and Sumathy, 2009).

Despite the high burden of hypertension in Nigeria, and the prevalent poor drug adherence and blood pressure control across the country, little is known about the effect of home visits on lifestyle modification, drug adherence and blood pressure control in Nigeria. This study was therefore conducted to determine the effect home visits on lifestyle modification, drug adherence, and blood pressure control among patients with uncontrolled hypertension in Sokoto, Nigeria.

MATERIALS AND METHODS
Study Design, Population and Area
A randomized control study was conducted among patients with uncontrolled hypertension attending the General Outpatient Clinics of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria, from June to October 2016. The hospital is a tertiary health institution which serves as a referral center for the health facilities in Sokoto State and the surrounding Kebbi, Zamfara, Katsina and Niger States. Adult patients (i.e., $\geq$ 18 years old) with uncontrolled hypertension (defined as having a blood pressure reading of $\geq$ 140/90mmHg for $\geq$ 1 month) (American Academy of Family Physicians, 2014) who live in Sokoto metropolis (to avoid difficulties in performing home visits) and consented to participate were considered eligible for enrollment into the study, while pregnant women and those with severe debilitating conditions were excluded.

Sample Size Estimation and Sampling Technique
The sample size was statistically estimated at 67 participants per group using the formula for comparing proportions in two groups (Ibrahim, 2009), and it was adjusted to 73 participants per group in anticipation of a 10% attrition rate. The eligible participants were selected by systematic sampling technique using the patients' attendance register to constitute the sampling frame. About 950 hypertensive patients are seen at the outpatient clinics per month. Of these, a total of 442 patents with uncontrolled hypertension were identified over a period of 4 weeks to constitute the sampling frame. One of 3 patients on the list was recruited into the study and randomized into the intervention group (which received both routine hospital care for hypertension and 3 home visits) and the control group (which received only routine hospital care for hypertension) using the MS Excel program.

Data Collection and Analysis
Both groups had four treatment contacts after recruitment (i.e., at the commencement of the study, and at the 4th, 8th and 12th weeks). The routine hospital care for hypertension comprised blood pressure measurement, treatment monitoring and assessment of ill health, education on drug adherence and counseling on lifestyle modification; while the home visits involved educating both the participants and their family members on drug adherence and lifestyle modification, and monitoring of the participants for drug adherence and lifestyle modification). The home visits were made about 2 weeks after the participants' clinic visits, or before their next clinic appointment.

A semi-structured interviewer-administered questionnaire was used to obtain information on the participants' socio-demographic characteristics, lifestyle modification and drug adherence. The questions on lifestyle modification were adapted from the Simple Lifestyle Indicator Questionnaire (SLIQ) (Godwin et al., 2008). It was developed in 2005 in Ontario, Canada, by two family physicians and a nutritionist to measure the individual components of lifestyle that affects cardiovascular diseases. It has twelve questions in five components; diet (3 questions), exercise (3 questions), alcohol consumption (3 questions), smoking (2 questions) and stress (1 question). For each component, a raw score and a category score were calculated. To provide equal weighting for each component, the overall SLIQ score was based on the five category score. Each component has a category score of 0, 1 or 2, so the overall SLIQ score can range from 0 to 10; and the higher the score, the healthier the lifestyle (with 0-2 as very unhealthy lifestyle; 3-5 as unhealthy lifestyle; 6-8 as healthy lifestyle; and 9-10 as very healthy lifestyle).

The questions on drug adherence were adapted from the modified Morinsky Medication Adherence Scale 8 (MMAS-8) (Morisky et al., 2008). It was developed by Dr. Morinsky D.E. and his colleagues in 2008 from an original four item Morinsky scale. It has 8 questions, and each question has a score of either 0 or 1 (with a minimum of 0 and a maximum of 8); and the higher the score, the lower the adherence (with 0 as high adherence; 1-2 as medium adherence; and 3-8 as low adherence). Blood pressure was measured using the Omron M2 sphygmomanometer (Omron Global, Japan) and stethoscope (Littman quality) with all tight clothing and other similar materials removed from the arm and in the sitting position. The first measurement was taken after the participant had rested for at least 10 minutes in a sitting position with the arm rested on a table such that the middle of the forearm is about the level of the heart. The second measurement was taken at the end of the interview; the mean of the 2 readings was entered into a data sheet and used in the analysis. Eight resident doctors assisted in data collection after pre-training on the study objectives, selection of participants, procedure for attending to patients, and use of survey instrument. Data were analyzed using the IBM Statistical Package for the Social Sciences (SPSS) version 22.0 software. Frequency distribution tables were constructed; and cross tabulations were done to examine the relationship between categorical variables. The chi-square test was used to compare differences between proportions. All levels of significance were set at p < 0.05.

Ethical Consideration

Ethical approval was obtained from the Ethical Committee of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria, and informed written consent was also obtained from the study participants before data collection.

RESULTS

Socio-demographic characteristics of participants

One hundred and thirty nine of the 146 participants that were recruited completed the study giving an attrition rate of 4.8%. Of these, 68 were in the experimental group, while 71 were in the control group. Majority of participants in both groups were females, married, practiced Islam as religion, and had at least primary education. There was no significant difference (p > 0.05) in the socio-demographic characteristics of the participants in both groups (Table 1).

Participants' lifestyle, drug adherence and blood pressure control status

Almost all the participants in both the intervention group (95.6%) and the control group (95.8%) practiced unhealthy lifestyle. Only a quarter of the participants in the intervention group (25.0%) and less than a quarter (23.9%) of those in the control group were adherent to their medications for hypertension. All the participants (100%) in both groups had uncontrolled blood pressure. There was no significant difference in the distribution of the participants in both groups by their lifestyle, drug adherence and blood pressure control status (Table 2).

Effect of home visits on lifestyle modification, drug adherence and control of hypertension among participants

Although significant reductions in the proportion of participants that practiced unhealthy lifestyle; and significant increases in the proportion of participants that were adherent to medications, and those with controlled blood pressure were recorded in both groups, the changes were more pronounced in the intervention group as compared to the control group. The proportion of participants that practiced unhealthy lifestyle reduced drastically in the intervention group from 95.5% at baseline to 20.6% at post intervention, while it only decreased marginally in the control group from 95.8% at the beginning of the study to 73.3% at the end of the study. The proportion of participants that were adherent to anti-hypertensive medication increased markedly in the intervention group from 25.0% at baseline to 76.5% at post intervention, while it only increased marginally in the control group from 23.9% at the beginning of the

study to 39.4% at the end of the study. The proportion of participants with controlled blood pressure increased substantially in the intervention group from 0% at baseline to 80.9% at post intervention, but the increase was much less in the control group from 0% at the beginning of the study to 46.5% at the end of the study (Table 3).

DISCUSSION

This study assessed the effect of home visits on lifestyle modification, drug adherence and blood pressure control among patients with uncontrolled hypertension in Sokoto, Nigeria. The predominance of females among both the intervention group and the control group participants in this study is similar to the findings in studies conducted in other cities in Nigeria including Kano (Sani et al., 2008) and Abia (Iloh et al., 2013) in which majority of participants were females.

Table 1: Socio-demographic characteristics of participants

Variables	Intervention Group (n = 68) Frequency (%)	Control Group (n = 71) Frequency (%)	Test of significance
Age group (years)			
35-39	7 (10.3)	4 (5.6)	χ^2= 2.366, p = 0.669
40-44	13 (19.1)	17 (24.0)	
45-49	14 (20.6)	16 (22.5)	
50-54	16 (23.5)	20 (28.2)	
≥55	18 (26.5)	14 (19.7)	
Sex			
Male	31 (45.6)	27 (38.0)	χ^2= 8.816, p = 0.366
Female	37 (54.4)	44 (62.0)	
Marital status			
Single	14 (20.6)	16 (22.5)	χ^2= 1.433, p = 0.838
Married	40 (58.8)	41 (57.8)	
Separated	3 (4.4)	2 (2.8)	
Divorced	7 (10.3)	5 (7.0)	
Widowed	4 (5.9)	7 (9.9)	
Religion			
Christianity	16 (23.5)	23 (32.4)	χ^2= 1.352, p = 0.245
Islam	52 (76.5)	48 (67.6)	
Educational status			
None	2 (3.0)	2 (2.8)	χ^2= 2.592, p = 0.628
Qur'anic school only	13 (19.1)	18 (25.4)	
Primary	27 (39.7)	20 (28.1)	
Secondary	13 (19.1)	18 (25.4)	
Tertiary	13 (19.1)	13 (18.3)	
Occupational status			
Unemployed	11 (16.2)	11 (15.5)	χ^2= 4.509, p = 0.341
Farmer	12 (17.6)	11 (15.5)	
Unskilled laborer	20 (29.4)	12 (16.9)	
Skilled laborer	22 (32.4)	31 (43.7)	
Professional	3 (4.4)	6 (8.4)	

Table 2: Participants' lifestyle, drug adherence and blood pressure control status

Variables	Intervention Group (n = 68) Frequency (%)	Control Group (n = 71) Frequency (%)	Test of significance
Lifestyle			
Healthy	3 (4.4)	3 (4.2)	χ^2= 0.1442, p = 0.931
Unhealthy	65 (95.6)	68 (95.8)	
Drug adherence status			
Adherent	17 (25.0)	17 (23.9)	χ^2= 0.021, p = 0.885
Non adherent	51 (75.0)	54 (76.1)	
Blood pressure control status			
Controlled	0 (0)	0 (0)	χ^2= 0.066, p = 0.798
Uncontrolled	68 (100)	71 (100)	

Table 3: Effect of home visit on lifestyle modification, drug adherence and control of hypertension among participants

Variables	Intervention Group		Control Group	
	Pre-intervention (n = 68) Frequency (%)	Post-intervention (n = 68) Frequency (%)	Beginning of study (n = 71) Frequency (%)	End of study (n = 71) Frequency (%)
Lifestyle				
Healthy	3 (4.4)	55 (79.4)	3 (4.2)	19 (26.7)
Unhealthy	65 (95.6)	14 (20.6)	68 (95.8)	52 (73.3)
	χ^2= 79.542, p = 0.000		χ^2= 13.770, p = 0.0002	
Drug adherence status				
Adherent	17 (25.0)	52 (76.5)	17 (23.9)	28 (39.4)
Non adherent	51 (75.0)	16 (23.5)	54 (76.1)	43 (60.6)
	χ^2= 36.037, p = 0.000		χ^2= 3.936, p = 0.047	
BP control status				
Controlled	0 (0)	55 (80.9)	0 (0)	33 (46.5)
Uncontrolled	68 (100)	13 (19.1)	71 (100)	38 (53.5)
	χ^2= 92.346, p = 0.000		χ^2= 42.991, p = 0.000	

Also, the finding of majority of the participants in both the intervention and control groups in this study being married is in agreement with the higher proportion of females that was reported in the latter studies, and this could be due to the cultural similarities in the study areas concerned.

Although, there was no significant difference in lifestyle between the participants in the intervention and control groups at baseline, it is disturbing that almost all the participants in both the intervention (95.6%) and control (95.8%) groups practiced unhealthy lifestyle considering the adverse effects of such practices on blood pressure control, disease progression and onset of complications. Evidence from studies has shown that lifestyle modifications (including dietary control, regular moderate exercise, weight reduction, cessation of smoking and stress management, among others) are cardinal points in achieving blood pressure control (Okwuonu et al., 2014; Mcdonald et al., 2009; Onwukwe and Omole, 2012). Whereas, the proportion of participants that practiced unhealthy lifestyle reduced drastically from 95.6 to 20.6% in the intervention group, far less reduction was observed in the control group (from 95.8 to 73.3%). These findings therefore provide additional evidence in support of the effectiveness of home visits intervention in causing lifestyle changes among patients with hypertension.

The low drug adherence levels among the participants in both the intervention (25.0%) and control (23.9%) groups in this study essentially mirror the low drug adherent levels that were reported in studies conducted in other cities across Nigeria including Ado-Ekiti (44.7%) (Raimi, 2017), and Kano (54.2%) (Kabir et al., 2004).

A very important finding in this study is the tremendous increase in adherence levels among the participants in the intervention group (from 25.0 to 76.5%) as compared to the marginal increase in adherence levels among the participants in the control group (from 23.9 to 39.4%). This finding is similar to the finding in a community based randomized trial that reported a high anti-hypertensive medication adherence level (77.0%) following a home visit intervention (Morisky et al, 2008), and it is reassuring as it highlights the importance of home visits in facilitating drug adherence among patients with hypertension.

Even though, all the participants (100%) in both groups had uncontrolled hypertension at baseline (being one of the eligibility criteria for recruitment into the study), the proportion of participants that achieved blood pressure control in the intervention group (80.9%) was almost twice that of the control group participants (46.5%). Similar to the finding in this study, a community based randomized control trial in Nigeria reported a high proportion of participants (66.0%) that achieved blood pressure control in the intervention group following the home visits intervention (Adebowale et al., 2013). Likewise, a study in Germany which involved delegated General Practitioner home visits to uncontrolled hypertensive patients showed a significant decrease in the mean systolic blood pressure after the intervention (van den Berg et al., 2013). Also, a study that utilized Community Health Workers (CHWs) who were trained to provide social support, deliver drugs and offer counseling to hypertensive patients reported a significant improvement in blood pressure control among the group visited at home as compared to the group that received routine care (Gaziano et al., 2014).

While the significant improvement in the proportion of the control group participants with healthy lifestyle, drug adherence, and blood pressure control is not surprising (as their routine care also involved counseling on the elements of the intervention), the substantially higher levels of improvement that were recorded in the intervention group as compared to the control group provide additional evidence in support of the submissions of other studies (Gaziano et al., 2014; Chiu and Wong, 2011; Theile et al., 2011) regarding the effectiveness of home visits in facilitating healthy lifestyle modification, high medication adherence, and ultimately blood pressure control. These findings therefore underscore the need for the management of healthcare institutions to make home visits a core component of the standard care of patients with hypertension.

CONCLUSION
This study showed that home visits are effective in facilitating healthy lifestyle modification, high medication adherence and blood pressure control among patients with uncontrolled hypertension in Sokoto, Nigeria. Management of healthcare institutions should make home visits a core component of the standard care of patients with hypertension.

Conflict of interest
None declared.

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