Assessment of Adherence and Persistence to Drugs Prescription, Diet and Exercise among Hypertensive Patients Visiting Community Pharmacies in Benin City, Nigeria

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Abstract

Uncontrolled hypertension is a major risk factor for cardiovascular disease; poor medication adherence and persistence have been identified as a significant contributing factor. To determine the level of patient's persistence and adherence to antihypertensive drugs, diet, exercise and other socio demographic factors. A descriptive, cross-sectional study was carried out in some selected community Pharmacies in Benin City. A structured questionnaire consisting of both open and close ended questions on socio demographic, adherence, medication persistence and lifestyle modifications. Data was analysed using SPSS version 22 for descriptive analysis and Graph pad Instat version 3.0 for inferential analysis. Of 240 people participated, 123 (51.2%) were men, 197 (82.1%) take their drugs once daily, 128 (53.3%) reported that if drugs were free, they would take it regularly. About (60.8%) were on antihypertensive for <5 years, 93 (38.8%) adjusted salt intake. Price of drugs had a significant effect on the level of adherence (p-value=0.0435), (59.6%) were persistent with their medication and 50% of the patients with low adherence were persistent. Majority of respondents had high adherence to DASH diet and low level of medication adherence which was significantly associated with the price of drugs. Many were persistent with their medication regimen but the level of persistence was not significantly associated with socio demographic.

Introduction

Poor medication adherence and persistence have been identified as a significant contributing factor to uncontrolled hypertension [1]. The rate of discontinuation from antihypertensive drugs by hypertensive patients has been found to ranges from 50%-60% after 6 months of initiation of therapy [2]. Although, the WHO had estimated that between 20%–80% of patients receiving treatment for hypertension are adherent [3].

Some studies have investigated the rate of adherence to antihypertensive therapy and associated factors, A meta-analysis on interventions for enhancing medication adherence completed by the Cochrane Collaboration concluded that effective ways to help patients follow medical treatments could have far larger effects on health outcomes than any individual treatment by itself [4]. For example, a review has estimated that better adherence to antihypertensive therapy could prevent 89,000 premature deaths in the US alone on an annual basis [5].

Another study has shown that level of adherence to lifestyle changes and medications among male hypertensive patients was poor, and also level of monthly income was found to be strongly associated with adherence to a healthy diet and exercise [6]. Females, educated patients and the elderly have been found to adhere more to antihypertensive medications [7,8].

Persistence, another term for medication-taking behavior, is a relatively new descriptor that is different from adherence. Persistence is defined as the length of time during which physicians continue to prescribe therapy, while adherence represents the ratio of medication supply days over a given interval [8]. Together, persistence and adherence can provide a better understating of factors related to effective blood pressure control [9]. Some studies have investigated persistence with hypertensive therapy [10-12] one study done by Espoti et al., 2002 found that level of persistence was influenced by age and gender [13].

Although information about persistence with antihypertensive therapy in patient populations from North America, Europe and Asia is enormous [10-13], and also a lot of studies on adherence to antihypertensive medications have been carried out [14-18], no study on persistence to antihypertensive medications is relatively new in this part of the country. Hence this study sought to determine the level of persistence and adherence to antihypertensive drugs, diet and exercise that are prescribed to hypertensive patients and also to determine the factors that influence adherence among patients that visit community pharmacies.

Materials and Methods

Design/setting

A randomized descriptive, cross-sectional study was carried out in eight Community pharmacies, between April and June 2017, in four local Government areas within Benin City (namely; Oredo, Egor, Ikpoba-Okhai and Ovia North East local Government area), Edo state.

Population/Sample size determination

The sample size was determined using Fisher's (1998) formula for sample size determination; n=z2pq/d2

Where n= desired sample size, Z= standard normal deviate set at 1.96 at 95% confidence level

P= prevalence of hypertension in Nigeria valued at 18.4% q= 1-p

d= degree of precision (0.05). Therefore the desired population was calculated as follows 1.962x0.184x0.816/0.052=230.072. The desired population used was 240. Two pharmacies were randomly chosen from each local government area by simple balloting, bringing the total number of pharmacies to eight and 30 questionnaires were administered to thirty visiting hypertensive patients in each pharmacy [19].

Inclusion criteria

Inclusion criteria were adult 18 years and above, diagnosed of hypertension and must have been placed on antihypertensive medication with lifestyle modifications for at least 6 months and must be willing to participate in the study. Hypertensive patients on medication for other chronic conditions like diabetes were excluded from the study.

Data collection

A Pre-tested structured interviewer administered questionnaire consisting of four sections with open and close ended questions that addressed adherence and medication persistence was used. The first section consists of demographic data of the participants, second section consist of eight questions on adherence, adapted from the Morisky 8 adherence scale; these are followed by other questions that assess certain factors that can influence adherence like frequency of drug administration, side effects, price of the medication and the different methods employed by various respondents to remember when to take their medication.

The third section assessed the level of medication persistence. Participants were asked if he/she has ever intentionally stopped taking their medication and if they have altered their dosage regimen without informing their physician.

The fourth section focused on the lifestyle modifications. The participants were asked if they were counselled about their diet and if changes have been made. The exact changes made and if these changes have been difficult for the respondent are also noted in the questionnaire. The same is repeated for exercise.

Data analysis

Data were sorted and analysed using the SPSS version 22. For descriptive analysis and Graph pad Instat version 3.0 for inferential analysis. The morisky adherence questions were analyzed using the morisky adherence scale and each respondent was rated depending on their score. Those that scored 0 were rated highly adherent, 1-2 moderately adherent and 3-8 low adherences [20].

Results

A total of 240 people participated in the study, out of which 123 (51.2%) were men and 117 (48.8%) were women. Other social demographic data are displayed in Table 1.

Variables	Variables	Frequency	Percentage
Age	<30	12	5.0
	30-60	153	63.8
	>60	75	31.3
Gender	Male	123	51.2
	Female	117	48.8
Marital Status	Single	16	6.7
	Married	163	67.9
	Divorced	15	6.3
	Widowed	38	15.8
	Separated	8	3.3
Level Of Education	No Formal Education	14	5.8
	Primary	34	14.2
	Secondary	64	26.7
	Tertiary	128	53.3
Occupation	Business	70	29.2
	Retired	44	18.3

	Artisans	36	15.0
	Civil servant	52	21.7
	Student	2	0.8
	Others	36	15.0
Monthly income	< N 30000	52	21.7
	N 30000- N 60000	87	36.3
	> N 60000	101	42.1

Table 1: social demographic data of respondents.

Of the 240 people participated in the study and they were all on oral antihypertensive medications out of which 197 (82.1%) take their drugs once daily, 40 (16.7%) respondents take their drugs twice daily while 3 (1.3%) take theirs thrice daily. 128 (53.3%) reported that if their drugs were free, they would take it regularly, 26 (10.8%) said they would not, while 86 (35.8%) reported maybe. 146 (60.8%) have been on antihypertensive for less than 5 years, 110 (45.8) participants were on amiloride/hydrochlorothiazide combination, 105(43.8%) took their drugs after meals, 47(19.6%) used nothing as a reminder for taking their drugs, 141 (58.8%) did not experience side effects, 66 (27.5%) respondents reported that the side effects occur sometimes.

On life style modifications, 93 (38.8%) of the respondents adjusted their salt intake as life style modification, while 23 (9.6%) increased intake of fruits and 11 (4.6%) reduced carbohydrate intake, 15 (6.3%) had difficulty in carbohydrate restrictions, and 7 (2.9%) had difficulty reducing alcohol intake. Among the respondents that exercised regularly, 39 (16.3%) exercised for about 30-39 minutes.

Assessment of medication adherence

Of the 240 participants 221(92.1%) were aware of the consequences of non-adherence, and 66.7% displayed a low level of adherence.

Price of drugs had significant effect on the level of adherence (p-value=0.0435) as seen in Table 2. More residents (25%) earning above N60000 reported that they have never discontinued their therapy because they ran out of pills as shown in Figure 2.

Assessment of medication persistence

Majority of the respondents 59.6% were persistent with their medication therapy, and 50% of the patients with low adherence were persistent, details can be seen if Figures 2 and 3.
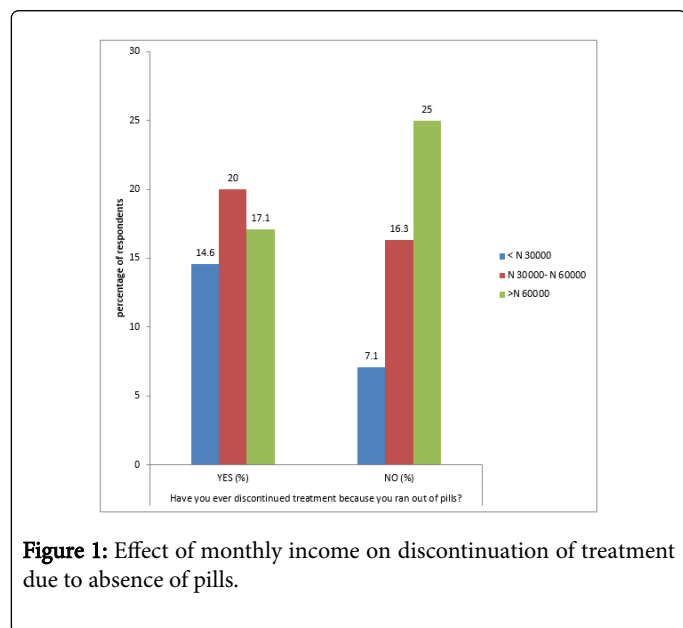

Figure 1: Effect of monthly income on discontinuation of treatment due to absence of pills.

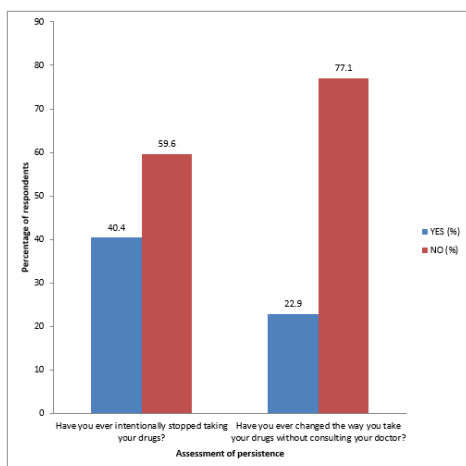| Variables	Yes (%)	No (%)
Are your drugs too expensive on a monthly basis?	85(35.4)	155(64.6)
Are you aware of the consequences of non-adherence to your drug?	221(92.1)	19(7.9)
Have you ever discontinued treatment because you ran out of pills?	124(51.7)	116(48.3)
Are you satisfied with your treatment plan?	212(88.3)	28(11.7)

Table 2: Assessment of adherence.

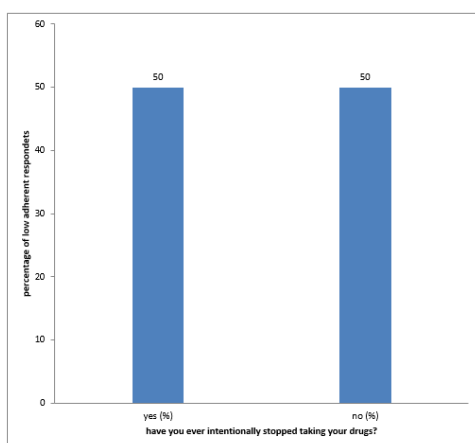**Figure 2:** Level of medication persistence among respondent.

Figure 3: Level of medication persistence among respondents with low adherence.

Adherence to lifestyle modifications

Majority of the respondents 70.1% were counseled about their diet and 52.1% were adherent Details can be seen in Figure 4 and Table 3. On the level of medication persistence among respondents with low adherence, Age, gender, level of education, monthly income and monthly price range of drugs did not have any significant effect on the level of persistence because the p-values were more than 0.05 as shown in Table 4. Age, gender and level of education did not have any significant effect on the level of adherence to lifestyle modifications because the p-values are more than 0.05 as seen in Table 5-7.
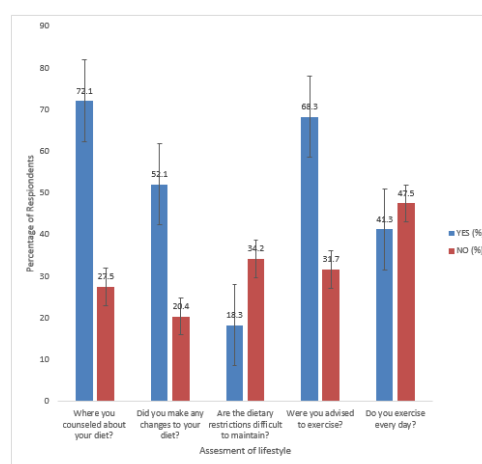
Figure 4: Assessment of lifestyle modifications (diet and exercise).

		Morisky Adherence Level			p-value
		High Adherence (%)	Medium Adherence (%)	Low Adherence (%)	
Age	<30	3 (1.3)	4 (1.7)	5 (2.1)	0.2299
	30-60	18 (7.5)	27 (11.3)	108 (45.0)	
	>60	9 (3.8)	19 (7.9)	47 (19.6)	
Gender	Male	11 (4.6)	30 (12.5)	82 (34.2)	0.1296
	Female	19 (7.9)	20 (8.3)	78 (32.5)	
Level of education	No formal education	1 (0.4)	3 (1.3)	10 (4.2)	0.3107
	Primary	1 (0.4)	8 (3.3)	25 (10.4)	
	Secondary	8 (3.3)	9 (3.8)	47 (19.6)	

	Tertiary	20 (8.3)	30 (12.5)	78 (32.5)	
Monthly income	<N30000	4 (1.7)	10 (4.2)	38 (15.8)	0.6400
	N30000- N60000	10 (4.2)	19 (7.9)	58(24.1)	
	>N60000	16 (6.7)	21 (8.8)	64 (26.7)	
price of drugs monthly	< N 3000	23 (9.6)	27 (11.3)	110 (45.8)	0.0435
	N3000- N6000	3 (1.3)	18 (7.5)	42 (17.5)	
	> N 6000	4 (1.7)	5 (2.1)	8 (3.3)	
Length of treatment	<5 years	18 (7.5)	27 (11.3)	101 (42.1)	0.6556
	5-10 years	8 (3.3)	12 (5.0)	37 (15.4)	
	>10 years	4 (1.7)	11 (4.6)	22 (9.2)	

Table 3: Effect of demographics on level of adherence.

Variables		Have You Ever Intentionally Stopped Taking Your Drugs?		Have You Ever Changed The Way You Take Your Drugs Without Consulting Your Doctor?	
		Yes (%)	No (%)	Yes (%)	No (%)
Age	<30	4 (1.7)	8 (3.3)	0 (0)	12 (5.0)
	30-60	68 (28.3)	85 (35.4)	38 (15.8)	115 (47.9)
	>60	25 (10.4)	50 (20.8)	17 (7.1)	58 (24.2)
p-value	0.2413			0.1430	
Gender	Male	53 (22.1)	70 (29.2)	33 (13.8)	90 (37.5)
	Female	44 (18.3)	73 (30.4)	22 (9.2)	95 (39.5)
p-value	0.3870			0.1392	
Level Of Education	No formal education	9 (3.8)	5 (2.1)	1 (0.4)	13 (5.4)
	Primary	12 (5.0)	22 (9.2)	8 (3.3)	26 (10.8)
	Secondary	29 (12.1)	35 (14.6)	19 (7.9)	45 (18.8)
	Tertiary	47 (19.6)	81 (33.8)	27 (11.3)	101 (42.1)
p-value	0.1684			0.2746	
Monthly Income	< N 30000	20 (8.3)	32 (13.3)	9 (3.8)	43 (17.9)
	N30000 - N 60000	35 (14.6)	52 (21.7)	16 (6.7)	71 (29.6)
	> 60000	42 (17.5)	59 (24.6)	30 (12.5)	71 (29.6)
p-value	0.9319			0.1019	
Price Range	< N 3000	65 (27.1)	95 (39.6)	38 (15.8)	122 (50.8)
	N3000 - N6000	27 (11.3)	36 (15.0)	15 (6.3)	48 (20.0)
	> N 6000	5 (2.1)	12 (5.0)	2 (0.8)	15 (6.3)
p-value	0.6024			0.5251	

Table 4: Effect of Demographic data and other factors on Medication Persistence.

Variables	Yes n (%)	No n (%)	P-Values
Counseled about diet			
Age (yrs.)			
Less than 30	7.0 (2.9)	5.0 (2.1)	P=0.5352
30-60	111.0 (46.3)	41.0 (17.1)	
Above 60	55.0 (22.9)	20 (8.3)	
Sex			
Male	64.0 (52.0)	59.0 (48.0)	P=0.0914
Female	73.0 (62.9)	43.0 (37.1)	
Level of education			
No formal	11.0 (4.6)	3.0 (1.3)	P=0.1676
Primary	27.0 (11.3)	7.0 (2.9)	
Secondary	49.0 (20.4)	15.0 (6.3)	
Tertiary	86.0 (35.8)	47.0 (17.1)	
Advised to exercise			
Age			
Less than 30	6.0 (2.5)	6.0 (2.5)	P=0.6681
30-60	99.0 (41.3)	54.0 (22.5)	
Above 60	59.0 (24.6)	16.0 (6.7)	
Sex			
Male	83.0 (34.6)	40.0 (16.7)	P=0.7831
Female	81.0 (33.8)	36.0 (15.0)	
Level of education			
No formal	8.0 (3.3)	6.0 (2.5)	P=0.3973
Primary	27.0 (11.3)	7.0 (2.9)	
Secondary	42.0 (17.5)	22.0 (9.2)	
Tertiary	87.0 (36.3)	41.0 (17.1)	

Table 5: Level of counseling on lifestyle modifications.

Variables	Yes n (%)	No n (%)	P-Values
Change in diet			
Age (yrs.)			
Less than 30	7.0 (2.9)	0.0 (0.0)	P=0.2023
30-60	80.0 (33.3)	31.0 (12.9)	
Above 60	38.0 (15.8)	18.0 (7.5)	
Sex			

Male	59.0 (24.6)	26.0 (10.8)	P=0.5058
Female	66.0 (27.5)	23.0 (9.6)	
Level of education			
No formal	10.0 (4.2)	1.0 (0.4)	P=0.1162
Primary	23.0 (19.6)	4.0 (1.7)	
Secondary	30.0 (12.5)	17.0 (7.1)	
Tertiary	62.0 (25.8)	25.0 (10.4)	
Advised to exercise			
Age			
Less than 30	6.0 (2.5)	4.0 (1.7)	P=0.5150
30-60	63.0 (26.3)	69.0 (28.8)	
Above 60	30.0 (12.5)	41.0 (17.1)	
Sex			
Male	49.0 (20.4)	60.0 (25.0)	P=0.6816
Female	50.0 (20.8)	54.0 (22.5)	
Level of education			
No formal	1.0(0.4)	7.0 (2.9)	P=0.2449
Primary	14.0 (5.8)	16.0 (6.7)	
Secondary	29.0 (12.1)	28.0 (11.7)	
tertiary	55.0 (22.9)	63.0 (26.3)	

Table 6: effect of demographic data on adherence to lifestyle modifications.

Class of drug	Drugs	Frequency n (%)
Angiotensin converting enzyme	Lisinopril	66.0 (10.0)
Inhibitors (ACEIs)	Ramipril	8.0 (1.2)
	Enalapril	3.0 (0.5)
Angiotensin receptor blockers (ARBs)	Valsatan	27.0 (4.1)
	Candesartan	5.0 (0.8)
	Telmisatan	5.0 (0.8)
	Losartan	17.0 (2.6)
Calcium channel blockers	Amlodipine	84.0 (12.8)
	Nifedipine	55.0 (8.4)
Diuretics	Amiloride	110.0 (16.7)
	Hydrochlorothiazide	135.0 (20.5)
	Indapamide	5.0 (0.8)
Antithrombotic agent	Acetylsalicylic acid	81.0 (12.3)

	Clopidogrel	27.0 (4.1)
Beta blockers	Atenolol	3.0 (0.5)
	Bisoprolol	2.0 (0.3)
	Propanolol	4.0 (0.6)
Centrally acting antihypertensive	Methyldopa	20.0 (3.0)

Table 7: Drugs taken by respondents.

Medications used by respondents: Diuretics were the most prescribed class of drugs 250 (38%) and the most prescribed drug is hydrochlorothiazide 135 (20.5).

Discussion

The findings of this study identified the level of medication persistence, adherence to drugs, lifestyle modifications (diet and exercise), and the possible factors that influence medication persistence and adherence among hypertensive patients visiting community pharmacies.

A total of two hundred and forty people participated in this study, half of the study participants were males, this can be related to data from an urban study that indicated a higher prevalence of hypertension is common among men [20] and majority of the respondents were within the age range of 30-60, probably because they make up the active work force and tend to visit the community pharmacies themselves unlike those above 60 year (made up 31.3% of the respondents) who due to old age and/or ill-health may not necessarily come to purchase their drugs by themselves rather will prefer their care givers to visit Pharmacies for them in proxy.

More than half of the respondents (53.3%) were graduates of tertiary institutions and almost half of the respondents (42.1%) earn more than N60000 monthly. this may be due to the fact that as majority of them are graduates of tertiary institutions and within the age range of 30-60years, they can take up more specialized jobs leading to a larger monthly income.

Majority of the respondents (66.7%) displayed a low level of adherence. A lot of factors affect the level of adherence like high pill burden, drug costs and drug adverse effects [21]. Study has also shown that adherence rates are generally higher among patients with acute conditions than chronic conditions [8]. Another major reason for the high percentage of poorly adherent respondents is the perception and beliefs of the patients concerning hypertension. Patient's adherence to treatment often improves when they have positive beliefs about the efficacy of the treatment, some hypertensive patients hold the belief that taking antihypertensive treatment will result in side effects [22]. A study of Chinese immigrants with hypertension living in the United States of America found that they had low adherence levels influenced by the perceived benefits of Chinese herbs in controlling patient's blood pressure and western medications for hypertension were perceived to be less beneficial [23]. Some religious beliefs also contribute to patient practices regarding taking medications [24].

The level of adherence was compared with age, gender, level of education, monthly income and the number of years the patient has been on the medication to determine if these factors had any significant effect on the adherence level of respondents. The results show that these factors did not have any significant effect on the level of adherence (p-values >0.05). These findings are contrary to the research that was conducted in Malaysia7 that concluded that females were more adherent than their male counterparts and the research in India [25] that concluded that elderly patients (>60) and literates who had been on the drugs longer were more adherent.

However, the monthly price of antihypertensive medications had a significant effect on adherence (p-value=0.0435). The costs of medications have an inverse relationship with treatment adherence as cost related issues are considered a possible reason for patients failing to respond to pharmacotherapy [22]. One study showed that increased medication cost occurred in most cases where guidelines were not adhered to, suggesting that more expensive drugs were prescribed instead of cheaper drugs as first line treatment [26].

Though monthly income did not have a significant effect on the level of adherence (pvalue=0.6400), it however had an effect on the number of patients that discontinued treatment due to lack of pills. It can be seen that for those earning more than N60000 monthly, most of them have never discontinued treatment because they ran out of pills. This is due to the fact that the standard of living in Nigeria is very high and majority of Nigerians live on less than 2 dollars daily [27], so for people earning less than N 60000, it is a challenge to be able to buy their medications along with other competing demands like feeding and accommodation on such a small income. Though monthly income had an effect on discontinuation of treatment due to lack of pills, this does not automatically translate to adherence because while a person may always have his/her medication available at all times, taking the drugs as at when due is an entirely different issue, as adherence describes every behaviour influencing patients' outcomes, such as medication-taking behaviour, following dietary and lifestyle advice, vaccinations and keeping follow-up visits.

Medication persistence determines if the patient has ever intentionally stopped taking his/her medication without being advised by a health professional to do so. A patient may change the way he/she was supposed to take the medications and such a patient would be said to be non-adherent but if the patient continues to take the drug consistently without stopping, such a patient can be said to be persistent [8]. From the study, 40.4% of the respondents were not persistent with their medication regimen. This may be due to poor understanding of the chronic nature of hypertension; studies have shown that 43.7% of patients believe that antihypertensive drugs can be stopped once the blood pressure has stabilized [22]. This cannot necessarily be blamed on the patient, because study has shown that patient's poor knowledge about medication is often related to the effectiveness of the health education they received [28].

The level of persistence among the respondents with low adherence was determined. It showed that 50% of the respondents that had a low

level of adherence were however persistent with their medication regimen. This means that although these respondents do not adhere strictly to their medication regimen, they are however consistent and have never stopped taking their drugs without consulting the doctor [8].

The level of persistence was compared with age, gender, level of education, monthly income and monthly price range of medications. The results show that none of these factors had a significant effect on the level of medication persistence (p-value>0.05). This result is contrary to the research conducted in Italy [13] where it was concluded that the level of persistence was significantly associated with the age and gender of the patient.

Alongside medication persistence, 22.9% of the respondents admitted that they had changed the way they took their drugs without seeking medical counsel. Age, gender, level of education, monthly income and monthly price of medication also did not have any significant effect on the patients who chose to alter their medication regimen (p-value>0.05).

Lifestyle is an important determinant of our physical health and its modification is an effective public health tool for successful treatment and control of hypertension (JNC7, 2003). From the results, more than half of the respondents admitted that they had been counseled about their diet and exercise. Among the respondents that were counseled about dietary modifications, 52.1% were adherent to their dietary modifications, while 41.3% were adherent to their exercise regimen daily. The levels of adherence obtained here is higher than those obtained in the research conducted in Saudi Arabia where adherence to diet and exercise were 11.8% and 20.1% respectively [13]. This level of adherence to lifestyle modifications may be due to low prevalence of health lifestyle behaviors in poor countries like Nigeria [29]. The inadequate adherence to lifestyle modifications could also be due to misconceptions and health beliefs about hypertensive disorder due to lack of resources [30]. In addition, lack of emphasis and knowledge of lifestyle modifications by Nigerian Clinicians may contribute to poor adherence to lifestyle modifications by hypertensive patients [31,32].

The level of adherence to lifestyle modifications was not influenced by age, gender and monthly income of respondents. This is contrary to the research in south east Nigeria where adherence to lifestyle modifications was significantly associated with the female gender (p=0.036) [14].

The most common dietary modification was reduction in salt intake; this is also contrary to the study carried out Iloh et al., 2014 where the highest adherence rate was on the use of tobacco followed by reduced salt intake [14]. Reduction in sodium intake to less than 100mmol (2.4g of sodium or 6gNaCl) per day, can lead to reduction in systolic blood pressure of 2-8mmHg. Reduction in salt intake being the most common dietary modification could be attributed to the widespread awareness on the role of dietary salt in blood pressure control (Sacks et al, 2001). More so this could be a reflection of wider social interactions among hypertensive patients who are adherent to dietary use of salt [14].

The most difficult dietary modifications according to the respondents were reduction in carbohydrate consumption, reduction in salt intake and reduction in alcohol consumption This can be explained by the fact that a lot of the staple foods in this region are majorly carbohydrates like garri, rice and yam; making the adoption of a special diet quite expensive especially among the low income earners [33,34]. Reduction in salt intake is a very serious challenge for a lot of

people especially those who consume a lot of processed foods or eat at fast foods and other food outlets, because research has shown that, most of the sodium in our diet comes from processed foods [35]. Reduction in alcohol consumption can be a big challenge especially for hypertensive patients that are addicted to it; hence Nigerian Clinicians should be aware of the risks of excessive alcohol consumption in hypertension and deliver this knowledge as a crucial aspect of counselling for hypertensive patients [14].

The most common exercises that the respondents engaged in were walking, household chores and climbing stairs. This is due to the fact that walking is a relatively simple activity that almost everybody can engage in quite easily. Regular aerobic physical activity such a brisk walking (at least 30 minutes per day most days of the week) can reduce systolic blood pressure by 4 mmHg-9 mmHg [33]. Household chores are activities that almost everybody can engage in around the house. Stairs are also very common in a lot of establishments and some homes, so a lot of people climb stairs on a daily basis. Household chores and climbing stairs are considered aerobic activities that increase heart and breathing rates [33].

The most common drug prescribed was hydrochorothiazide which is a thiazide diuretic. This is due to the fact that according Joint National Committee on prevention of high blood pressure JNC 8 2014, hypertensive medication for Africans mostly include a thiazide or a calcium channel blocker [36].

Conclusion

Majority of respondents displayed a low level of medication adherence which was significantly associated with the price of drugs (p-value=0.0435) and many were persistent with their medication regimen, but the level of persistence was not significantly associated with age, gender, level of education, monthly income and price of drugs. Hypertensive patients also displayed a higher level of adherence to DASH diet than exercise and the most common lifestyle modifications were reduced salt intake and walking.

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