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Patients' Knowledge, Attitude and Compliance with Lifestyle Activities that can Potentially Interfere with the Outcome of Anti-hypertensive Medications

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Authors' contributions

This work was carried out in collaboration between the authors JDO and JSS. Author JDO designed the study, wrote the protocol, performed the data analyses and wrote the first draft of the manuscript. Author JSS managed the literature searches and data collection. Author JSS has read and approved the final manuscript.

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ABSTRACT

Non-drug therapy as component of management often compliments drug therapy in order to achieve positive clinical outcomes. This patient-focussed research studied 225 hypertensive patients comprising 95 males and 130 females to assess the knowledge, attitude and education received and compliance with lifestyle modification. A cross-sectional descriptive study using questionnaire was used to investigate herbal intake, patients' attitude and lifestyle activities like exercise, salt regulation, smoking habits, alcohol consumption, fat/cholesterol regulation, diets and sugar intake. The mean ages are 52.61±10.78 years for male and 47.12±11.37 years for female. Patients' knowledge of normal BP was related to educational levels (odds values for good to poor knowledge: 0.07, 0.43, 3.17 and 3.95 respectively for uneducated, primary, secondary and tertiary education) and to the duration of diagnosis (odds values: 0.56, 0.87, 1.24, 1.57, 0.71 and 1.60 respectively for <1 year, 1-2 years, 2-5 years, 5-10 years, 10-20 years and >20 years). About 52%

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(n= 118) are aware that uncontrolled BP causes stroke but similar awareness of damages to eye, kidney and heart were low (being 34.4%, 34.7% and 42.2% respectively). Out of 28(12.4%) smokers, 9.8% (n=22) quitted when advised against the habit leaving 2.7% (n=6) as active smokers. Only 29.3% are aware of danger of excessive alcohol intake while 63.1% (n=142) never checked their lipid profiles. 30.7% (n=69) of patients are aware of risks of high cholesterol levels but two-third of patients (66.7%; n=150) never received advice to monitor such parameter. Majority (71.1%; n=160) have poor knowledge of effect of high sugar levels while only 37.3% (n=84) have been advised on regular check-up for this parameter. Most patients (60.9%, n=137) are aware of benefits of physical activity and received advice (57.8%, n=130) leading to 63% (n=136) of patient who complied to advise and 5.366 Mantel-Haenszel common odds estimate ratio for educated and uneducated relating regular exercisers and non-exercisers. About 82% (n=184) avoided excessive salt intake giving rise to 99.5% of patients who complied. However, 43 (19.1%) patients combined herbal preparation with their orthodox medicines. Patients seemed to have good knowledge of complication of uncontrolled BP to the brain, regulate salt intake and are compliant with advice on physical activities but lacked knowledge of danger of high cholesterol level. Patient-focused pharmaceutical care services with emphasis on patients' education are required to optimize gains from drug therapy.

Keywords: Cigarette smoking; alcohol intake; herbal use; hypertensive patients; knowledge; advice and compliance.

1. INTRODUCTION

The management of hypertension or its complications is a great concern to health care practitioners as well as the society because of the complex nature of patients, drugs and the disease. These trio factors are crucial and any modification in one can influence the outcome of the others. Hypertension is considered as one of the key risk factors for cardiovascular disease. As a cardiovascular disease, the prevalence of hypertension increases with advancement in age. About 50% of people between the ages of 60 and 69 years old may be afflicted by the ailment with a higher prevalence rate reported in those above 70 years of age [1]. Hypertension is ranked as the third most causative effect of disability-adjusted life years and the global occurrence is estimated to be one billion [1]. Worldwide, approximately 40% of the adult population aged 25 and above had been diagnosed of hypertensive in 2008 [2]. Hypertension increase with age in people of all ancestries and the prevalence is higher in men when compared with women before 60 years of age although equal proportion exists beyond this age.

Many forms of hypertension like isolated systolic hypertension, White coat hypertension and gestational hypertension are known. But malignant hypertension causes acute impairment of one or more organ systems especially the central nervous systems, cardiovascular system and/or renal system. However in resistant hypertension, patients are un-responding to 3 or more antihypertensive agents [3,4,5,6,7].

Hypertension is a risk factor for premature death worldwide [8] and is capable of increasing the risk of ischemic heart disease [9] or that of stroke [10] and peripheral vascular disease [11]. Other cardiovascular disease conditions like heart failure, aortic aneurysm, diffuse atherosclerosis, pulmonary embolism, hypertensive retinal vascular signs, hypertensive encephalopathy and cerebrovascular accidents are known. Hypertension is also an important risk factor for brain infarction and haemorrhage [12,13]. Conditions like left ventricular hypertrophy and hypertensive heart disease may arise as a result of structural and functional adaptation to hypertension [14].

Many classes of drug such as the diuretics, beta-blockers, calcium channel blockers, angiotensin converting enzyme inhibitors and angiotensin receptor blockers are employed alone or in combination in appropriate doses for patients. Angiotensin converting enzyme inhibitors prevent the kinase II enzyme from the conversion of angiotensin I to angiotensin II and prevent the formation of aldosterone that cause sodium and water retention [15]. Angiotensin II receptor blocker displace angiotensin II thereby blocking the stimulation of aldosterone. But calcium channel blockers inhibit calcium influx into arterial muscle cells to reduce peripheral resistance and blood pressure.

However, while these drugs are used in various combinations to control BP, patients' attitude, behaviour and lifestyle practices are capable of interfering with the desired clinical outcome of medications. For example, sodium restriction lowers BP pressure at varying degree [16,17].

Patients' knowledge of cardiovascular diseases and their complications is vital if they are expected to comply with both drug and non-drug management plans. Patients' compliance involves taking the prescribed medications and also adherence to follow-up appointments, and maintaining the recommended lifestyle modifications. Patients who actively participated in their health care plan are likely going to comply with lifestyle and behavioural changes that promote preventive health care.

Many patients are often unaware of benefits of lifestyle modifications. Good nutrition with adequate potassium content showed positive correlation between total body Na^+ and blood pressure while a negative correlation between total body K^+ and blood pressure in hypertensive patients are observed. However, the consumption of food substances containing caffeine can raise blood pressure and elevate the plasma concentrations of norepinephrine, while long term consumption of caffeine can lead to the development of hypertension [18]. Weight reduction reduces the prevalence of hypertension particularly in obese patients [19] while weight gain conversely increases blood pressure and increase cardiovascular risk factor. It is important that patients understand how these factors are interconnected for effective management of their diseases and for good drug therapy outcomes.

1.1 Aim and Objectives

The aim of this study was to assess patients' knowledge and practices of lifestyle modification as a component of patients care and to assess health information/advice received from professional in order to evaluate patients' compliance with non-drug therapy.

2. MATERIALS AND METHODS

2.1 Study Area/Population

This study was conducted at Cardiology Clinic of University of Maiduguri Teaching Hospital (UMTH), Maiduguri, in North-East geopolitical zone of Nigeria. The hospital is a tertiary institution with several clinics and has capacity of over 500 beds with patients from six (6) states. The target population are volunteered hypertensive patients attending cardiology clinic. Both genders irrespective of age strata, educational backgrounds and marital status are included in the study. However, patients who are newly diagnosed but yet to commence treatment and those on first visit were excluded from the study.

2.2 Study Design/Description

A cross-sectional descriptive design was used, via the administration of questionnaire to 250 hypertensive patients with a retrieval record of 225 questionnaires. Respondents were identified during their clinic visits. Informed consents were made and the patients that participated were volunteered patients.

The scope of the questionnaire covered five domains of demographic data of the patients, patient information on hypertension such as family history and co-morbid diseases. The third part of the questionnaire focuses on awareness of patients on target organ damage. Other sections of the questionnaire involve the knowledge they have, the information they received and their compliance with such information. The questionnaire was compiled in English but translated to some respondents in their local dialect by the service of an interviewer. For those patients who are literate, the questionnaire was directly filled by them. All the data were collected between the months of November 2011 and July 2012 which covers a total of 48 clinic visits.

2.3 Ethical Clearance

The study was approved by the research and ethic Committee of University of Maiduguri Teaching Hospital.

2.4 Pretesting/Face and Content Validity

The questionnaire was pretested with initial 25 respondents, who were excluded from the main study. Relevant adjustments were made to the questionnaire before the final administration. Face and content validity was conducted by a hospital pharmacist. The Cronbach's Alpha value was determined and found to be 84.1%.

2.5 Data Analysis

The data were analysed using statistical package for social science (SPSS) windows 17.0 version to conduct descriptive statistics like frequency distribution and proportions, odds, Mantel-Haenszel common odds estimate ratio and 95% CI. The results are presented in Tables.

3. RESULTS

3.1 Background Information

A total of 225 questionnaires representing 90% were successfully completed and retrieved in the study. The high retrieval rate attained was attributed to the self-administration of the questionnaires by the researcher during patients' waiting time for consultation with their physicians, as well as the subsequent use of information obtained from patients as cancelling aids. The 10% failures in retrieval rate recorded are attributed to form rejection arising from incomplete filling and loss of contact with patients who indicated returning forms in their next clinic visit but never did.

Table 1 describes patients' specific characteristics such as age, marital status, educational status and standard, employment status and duration of diagnosis of hypertension in 225 respondents.

Table 1. Background data of patients

S/no.	Subjects	Variables	Frequency	Percentage %
1.	**Age range (years)**			**Total (%)**
	21-30	Male/Female	1/7	8 (3.6)
	31-40	Male/Female	13/35	48 (21.3)
	41-50	Male/Female	31/47	78 (34.6)
	51-60	Male/Female	28/25	53 (23.5)
	61-70	Male/Female	15/12	27 (12.0)
	71-80	Male/Female	6/3	9 (4.0)
	81-90	Male/Female	1/1	2 (0.9)
		Total	**95/130**	**225 (100)**
2.	Gender	Male	95	42.2
		Female	130	57.8
		Total	**225**	**100**
3.	Marital status	Single	26	11.6
		Married	170	75.6
		Divorcee	10	4.4
		Widow	15	6.7
		Widower	2	0.9
		Others	2	0.9
		Total	**225**	**100**
4.	Educational status	Educated	146	64.9
		Uneducated	79	35.1
5.	Educational standard	Uneducated	79	35.1
		Primary school	20	8.9
		Secondary school	25	11.1
		Tertiary education	100	44.4
		Adult education	1	0.4
		Total	**225**	**100**
6.	Employment status	Civil servant	85	37.8
		Retired civil servant	13	5.8
		Business/Trade	52	23.1
		Housewife	47	20.9
		Student	5	2.2
		Unemployed	18	8.0
		No response	5	2.2
		Total	**225**	**100**

7.	Duration of diagnosis	Below 12 months	43	19.1
		Between 1-2 years	25	11.1
		Between 2-5 years	49	21.1
		Between 5-10 years	55	24.4
		Between 10-20 years	38	16.9
		Between 20-30 years	14	6.2
		Above 30 years	1	0.4
		Total	**225**	**100**

Table 2 describes patients' knowledge of normal blood pressure and knowledge of effects of cigarette smoking, excessive alcohol consumption, and regular exercise. The table also describes patients' knowledge of effects of high blood sugar, cholesterol concentrations and the their knowledge of damage cause by hypertension to some organs.

Table 3 describes the areas of advice giving to patients. Patients were asked whether or not they were advised on regular BP check, smoking cessation, salt regulation as well as periodic checking for sugar and cholesterol levels.

Table 4 summarises the compliance of patients to medical advice. The compliances are below average in most cases except in salt intake and regular exercise.

3.2 Age and Gender Distribution

The age and gender distribution of the study population (Table 1) showed the mean age for male and female subjects of 52.61±10.78 years and 47.12±11.37 years respectively; and 49.47±11.43 years for combined genders. The distribution indicated similar pattern (being skewed toward low frequency of higher age range) with hypertensive episodes peaking during fourth decades of life in both genders, and progressively decline with increasing age. The proportions of women to men were 57.8% versus 42.2%. Majority of population are educated (64.9%) and those with tertiary level of education were observed higher than the uneducated class (Table 1). Nearly one-quarter of the population were diagnosed between 5-10 years and those who are civil servant accounted for 37.8% of the population.

Table 2. Assessment of patients' knowledge

S/no	Patients' knowledge of blood pressure Related issues	Yes N (%)	No N (%)	NR N (%)	Total N (%)
1.	Knowledge of normal blood pressure value	109 (48.4)	108 (48.0)	8 (3.6)	225 (100)
2.	Knowledge of effect of cigarette smoking	65 (28.9)	160 (71.1)	0 (0)	225 (100)
3.	Knowledge of effect of high alcohol intake	66 (29.3)	159 (70.7)	0 (0)	225 (100)
4.	Knowledge of effect of high cholesterol level	69 (30.7)	152 (67.6)	4 (1.8)	225 (100)
5.	Knowledge of effect of high blood sugar	64 (28.4)	160 (71.1)	1 (0.4)	225 (100)
6.	Knowledge that high BP causes eye problem	77 (34.2)	147 (65.3)	1 (0.4)	225 (100)
7.	Knowledge that high BP affect the heart	95 (42.2)	130 (57.7)	0 (0)	225 (100)
8.	Knowledge that high BP lead to kidney damage	78 (34.7)	145 (64.4)	2 (0.9)	225 (100)
9.	Knowledge that high BP causes stroke	118 (52.4)	101 (44.9)	6 (2.7)	225 (100)
10.	Knowledge of benefits of regular exercise	137 (60.9)	88 (39.1)	0 (0)	225 (100)
11.	Knowledge of effect of excessive salt intake	184 (81.8)	41 (18.2)	0 (0)	225 (100)
12.	Knowledge of benefit of dietary regulation	91 (40.4)	134 (59.6)	0 (0)	225 (100)
13.	Knowledge of effect of uncontrolled BP	154 (68.4)	71 (31.6)	0 (0)	225 (100)
14.	Knowledge of effect of combined use of herbal & orthodox medicines	81 (36.0)	141 (64.0)	0 (0)	225 (100)

Key: NR=No Response, BP=Blood Pressure

Table 3. Areas of advice received by patients

S/no	Advice received by patients	YES N (%)	NO N (%)	Others N (%)	Total N (%)
1.	Advised to regularly check BP	160 (71.1)	65 (28.9)	0	225 (100)
2.	Instructed to quit cigarette smoking n=28	15 (6.7)	13 (5.8)	197†	225 (100)
3.	Advised to moderate alcohol consumption n=23	15 (6.7)	8 (3.6)	202†	225 (100)
4.	Advised to check cholesterol levels	69 (30.7)	150 (66.7)	6 ††	225 (100)
5.	Advised to check blood sugar level	84 (37.3)	140 (62.2)	1(0.4)	225 (100)
6.	Advised on ocular examination	60 (26.7)	163 (72.4)	2 (0.9)	225 (100)
7.	Advised on heart examination	136 (60.4)	88 (39.1)	1 (0.4)	225 (100)
8.	Advised on renal status examination	72 (32.0)	151(67.1)	2 (0.9)	225 (100)
9.	Advised on regular exercise	130 (57.8)	95 (42.2)	0 (0)	225 (100)
10.	Advised against excessive salt intake	185 (82.2)	40 (18.8)	0 (0)	225 (100)
11.	Advised on dietary content/regulation	91 (40.4)	134 (59.6)	0 (0)	225 (100)
12.	Advised against herbal/orthodox drug use	62 (27.5)	19 (8.4)	141†	225 (100)

Key: †=Not applicable, ††=No response

Table 4. Compliance with advice on lifestyle modification

S/no	Patients' compliance with medical advice	YES N (%)	NO N (%)	Others N (%)	Total N (%)
1.	Check blood pressure regularly	205 (91.1)	20 (8.9)	0 (0)	225 (100)
2.	Quit cigarette smoking n=28	22 (9.8)	6 (2.7)	197†	225 (100)
3.	Moderate alcohol intake n=23	13 (5.8)	10 (4.4)	202†	225 (100)
4.	Check cholesterol level	81 (36.0)	142 (63.1)	2 (0.9)	225 (100)
5.	Check blood sugar level	106 (47.1)	119 (52.9)	0 (0)	225 (100)
6.	Engage on regular exercise	143 (63.6)	82 (36.4)	0 (0)	225 (100)
7.	Regulates excessive salt intake	184 (81.8)	41 (18.2)	0 (0)	225 (100)
8.	Regulate dietary intake (on DASH)	58 (25.8)	130 (57.8)	37†††	225 (100)
9.	Stopped combined use of herbal & orthodox medicines	43 (19.1)	182 (80.9)	0 (0)	225 (100)

Key: †=Not applicable, †††=Not always, DASH: Dietary approach to stop hypertension

The numbers of patients who knew the normal BP value and those who lacked such knowledge are nearly in equal proportion (being 48.4% and 48.0% respectively) (Table 2). The knowledge of normal blood pressure was found to be related to patients' levels of education. For instance, the odds values of those knowing the value to those who do not are 0.07, 0.43, 3.17 and 3.95 for uneducated, primary, secondary and tertiary education respectively. Surprisingly, as high as one-fifth of those with tertiary education (20%, n=100) do not know normal BP value. The knowledge of normal BP value also appeared to be related to duration of diagnosis of hypertension in most patients as judged by the odds values between patients who knew the value and those who do not (being 0.56, 0.87, 1.24, 1.57, 0.71 and 1.60 respectively for <1 year, 1-2 years, 2-5 years, 5-10 years, 10-20 years and >20 years of diagnosis of hypertension).

More than two-thirds of the study population do not know the effects of cigarette smoking (Table 2) although majority of them are non-smokers. Out of the 12.4% (n=28) who admitted to cigarette smoking at one point or the other in their life, a small proportion (2.7%; n=6) still engaged in smoking while 9.8% (n=22) quitted when advised against the habit (Table 4). The results of this study are lower than the 20% population of smokers normally encountered among patients with cardiovascular diseases or hypertension [20]. Many authors have similarly reported high level of unawareness as well as low awareness in some regions [21,22]. Among the smokers and ex-smokers (28), 13 (5.8%) never received advice from health professionals to quit the habits (Table 3) while 3.1% (n=7) quitting on their own. However, when ex-smokers and those still smoking were assessed in terms of whether advised or not to quit smoking, the odds ratio was 0.17 compared to the odds ratio of 3.4 when both classes of smokers were assessed for knowledge of danger of smoking.

More than two-third of the population lacked the knowledge of effects of excessive alcohol intake (Table 2) but only 10 patients (4.4%) are active consumers of alcohol in this study with about 13 (5.8%) out of the 15 (6.7%) advised (Table 3) quitting the intake in compliance to advise received from health professionals (Table 4). Eight patients were never advised to moderate their alcohol intake (Table 3) while 2 never complied with such directive (Table 4). However, nearly one-third of the study population knew the danger of effects of excessive intake of alcohol among patients when compared with those lacking such knowledge (29.3% versus 70.7%) (Table 2). The odds ratio in terms of Knowledge of effect of alcohol consumption to those who lacked such knowledge was 1.25 between ex-consumers and active users. The corresponding values in terms of advice received and not receive between the two classes of smokers was 0.09.

Almost all the patients who do not know the effects of high cholesterol levels (n=152) (Table 2) were similarly never advised to regularly check their lipid profile (n=150) (Table 3) and as such never checked their lipid profile (n =142) (Table 4). Values higher than this study have been reported in some Tertiary health facilities in Karachi [21].

The Mantel Haenszel common odds ratio for checking lipid profile and failing to check on the basis of knowing the effects of high lipid levels was 24.38 (95% CI: 21.26-27.50) while the corresponding values for advice received to check and not received was 21.52 (95% CI: 18.77-24.27) suggesting that the effects not knowing the danger of unregulated fats/cholesterol intake as well as low level of advice given by professionals have a great potential to influence patients attitude to the disease. The values for knowing the effects lipid profile to that of not knowing were related to levels of education as indicated from the odds values (being 0.03, 0.18, 0.44 and 1.33 for uneducated, primary, secondary and tertiary levels of education respectively). Relating the patients who have checked their lipid profiles and those who never checked to the levels of education indicated odds values of 0.24, 0.54, 0.56 and 1.0 for uneducated, primary, secondary and tertiary levels of education respectively. Both the knowledge of effects of high cholesterol levels and that of compliance to check level appear (to some extent) to be related with the duration of diagnosis. For example the odds values for knowing the effects of high lipid levels to not knowing are 0.13, 0.5, 0.53, 0.69, 0.37 and 1.17 respectively for <1 year, 1-2 years, 2-5 years, 5-10 years, 10-20 years and >20 years of diagnosis of hypertension. The corresponding odds values for compliance to check and not checking are 0.19, 0.56, 0.69, 0.77, 0.64 and 0.75.

Majority of the patients (71.1%; n=160) do not know the effect of high sugar levels. Although only 37.3% (n=84) have being advised on regular check-up for high sugar levels, about 106 (47.1%) have checked their sugar levels since the parameter is among the comprehensive evaluation carried out on patients.

Patients were further assessed on their knowledge regarding exercise and their compliance with such advice. Majority of patients reported knowing the benefit of exercise (Table 2) and have received professional advice (Table 3). We found a small proportion (5.78%, n=13) over and above the population advised who claimed that though not advised but often carry out physical activities that falls within the definition of aerobic exercise. In general, close to two-third of patients (63.6%, n=136) reported engaging in physical activities. Rakumakoe [23] similarly reported values in agreement with this finding in Carletonville (South Africa) while findings in Karachi [26] is in contrast to this present results. The Mantel-Haenszel common odds estimate ratio for educated and uneducated relating regular exercisers and non-exercisers was found to be 5.366 (95% CI= 2.966-9.708).

When these results are evaluated among patients who were neither advised on salt restriction (0.18; 95% CI=0.13-0.23) nor regulate intake, the least proportion was found in this class of those with primary school level of education (0.05, n=1) while the highest (0.24, n=6) were found among the secondary level of education. Surprisingly, a high proportion of 0.20 (95% CI=0.15-0.25) occurred in those with tertiary education.

The results of patient knowledge of effects of hypertension when not controlled, and advice received on regular checking of BP is shown in Tables 2 and 3 respectively. A very high proportion (91.1%) checked their BP values regularly while a small proportion (0.089; 95% CI:

0.070-0.108) never did. However, close to one-third of the population had no knowledge of the problems associated with uncontrolled BP (Table 2). The Mantel-Haenszel common odds ratio of BP monitoring relative to having knowledge of danger of uncontrolled BP and lacking in such knowledge was found to be 2.954 (95% CI: 1.164-7.493). The corresponding values for the advised group to unadvised group on regular BP check was 3.418 (95% CI: 1.343-8.698) suggesting that both knowledge and advice received influences BP check.

In our assessment of patients' knowledge of the DASH program and advice received to undertake the programme, we found out that all the patients who knew the benefits of the programme were similarly advised, though they constitute the minority (25.8%; 95% CI of proportion: 21.3-30.3) and were all in compliance with the DASH programme (Table 4).This was in contrast to the high proportion 57.8 (95% CI of proportion: 54.5-61.1) who neither observed the DASH programme nor advised on the programme (Table 3). More than half of the study population (n=134) do not have the knowledge of the types of food to eat or avoid. However a small proportion of the population (16.4%) however responded that they do not always observe such program.

Nearly two-third of the study population (n=141) do not know the effects of combined use of herbal preparations with their orthodox medicine (Table 2). However, 62 out of the 81 (36.0%) patients who combine both agents were advised to stop the habit while 19 others were not (Table 3). Majority of patients in this category were in compliance with the advice. This finding is lower than reported by Olisa and associates who found that 47.5% of the patients combine orthodox anti-hypertensive with herbal anti-hypertensive agents [24].

4. DISCUSSION

The low incidences of smoking recorded in this present study are possibly attributable to the efforts of the Federal ministry of health to dissuade the habit. Although majority of respondents are non-smokers, but their lack of knowledge of effects of cigarette smoking is worrisome since it implies that they are at risk of being passive smokers. Smoking cessation are advocated since cigarette smoking increases morbidity and mortality in cardiovascular diseases as well as causing interaction with some antihypertensive medications [25], thereby affecting the desired outcome. Some researchers reported that cigarette smoking can blunt medication effect on reduction of arterial stiffness independently of the mean BP level [25] and acutely increases aortic stiffness and blood pressure in male smokers with hypertension [26].

Unlike cigarette smoking which has received a national warning that those who engaged in the habits are liable to die young, similar warning against alcohol consumption is restricted to few operations such as driving and operating machines. But luckily enough, the religious practices in the region forbid alcohol consumption, which possibly influenced the low numbers of patients who consume the substance. Similarly, less than one-third of the population lacked the knowledge of effects of excessive alcohol intake. In some regions, as high as 40.2% patients are reported to consume alcohol above limit [23] while some researchers have reported that as high as 70% of patients in some quarters knew the danger of alcohol by hypertensive patients. Chronic high-dose alcohol intake and BP elevation has been shown in both gender, multiple racial and ethnic groups, disparate international populations, and across all adult age groups [27]. Even light to moderate drinks is associated with decreased hypertensive risk in women and increased hypertensive risk in men [28]. In general, alcohol beverage reduction lowers both systolic and diastolic BP while intake in its acute or chronic manner can jeopardise the effects of medications.

As a component of patient focused care in pharmaceutical care services, greater attention should be paid toward educating patients on danger of smoking and excessive alcohol consumption as they negatively affect clinical outcomes of some anti-hypertensive agents.

As observed, more than one-third of patients had their lipid profiles determined (Table 4) whereas less than one-third were actually advised to do so (Table 3). Lipid profile assessment is often part of the comprehensive evaluation conducted during diagnosis or prior to drug therapy. However, majority of patients may not have been adequately educated on the reasons or benefits of such assessment (Table 2). Similarly, over two-third patients never received professional advice to monitor their lipid profile. This may jeopardise future self-monitoring of levels of this parameter since patients with cardiovascular diseases are expected to check their lipid profile at two years interval. Hyperlipidaemia particularly those of high levels of low density lipoprotein cholesterol, low levels of high density lipoprotein cholesterol and high levels of total cholesterol have previously been established as important cardiovascular risk factors requiring attention. Many physicians most time ignore the assessment of most parameters may not because they are less important but possibly because of the socio-economic status of patients.

The number of patient who knew the effects of high sugar levels as a cardiovascular risk factor and compliances with advice on regular assessment is low. The study also found a high proportion of people who were never advised (Table 3) to correlate with high proportion of people who never complied with checking of their sugar status (Table 4). More than half of the educated class and a vast majority of the uneducated class do not know the danger in high blood sugar levels. About half of those with tertiary education lacked knowledge of effects of high sugar level. This notwithstanding, the odds values for those who know to those who do not increased with the levels of education (being 0.08, 0.18, 0.22 and 0.48 respectively for uneducated, primary, secondary and tertiary education). There is the need to educate patients on the relationship between sugar levels and hypertension and to always comply with advice.

The patients' knowledge of target organ damage (Table 2) indicated that a little above average of the study population knew the effects of uncontrolled BP in causing stroke. However, the number of patients with similar awareness of effects of uncontrolled BP to the eyes, heart and kidney are below average. Patients' levels of education and duration of diagnosis influences was however found to be related to knowledge of target organ damage. Practitioners should make efforts in educating all patients on target organ damage arising from effects of uncontrolled BP. It is most likely that patients' understanding and knowledge of uncontrolled BP in causing vital organ damage can improve their compliance to medications and health advice.

Patients' knowledge of benefits of exercise and their compliances with advice on exercise are both high. However, more than one-third of patients do not undertake any form of exercise. This minority group of patients need further education and advice on benefit of exercise. Exercises have been established to effectively reduce both the blood pressure and the rate of cardiovascular disease [29]. In contrast, physical inactivity is associated with higher incidence of hypertension [29,30]. Exercise is regarded as qualitative or beneficial in reducing the blood pressure or cardiovascular diseases of patients when it is aerobic in nature [31].

A very high number of patients (99.5%) were in compliance with advice on regulation of salt intake (Tables 3 and 4). The result is a reflection of patients' knowledge of effects of salt levels (Table 2). This may have suggested that salt restriction is one of the mostly emphasized lifestyle modifications by health practitioners in this region. Excessive salt intake interferes with BP control and drug therapy in many ways. In particular, is capable of causing resistant hypertension and/or undermining the beneficial effects of drugs like diuretics. Sodium restriction lowers systolic BP in values ranging from 6-11.5 mmHg in hypertensive patients [16,17]. However, the one-fifth of proportions of patients that was neither educated nor advised on salt restriction need to be educated in order to improve on their compliances.

Another parameter that patients paid much attention to was on the aspect of their regular check of blood pressure. As observed, many patients lacked the knowledge of the benefits of regular check, but high percentage of patients responded they often check their BP values all patients are subjected to BP check during their clinic visits. Patients who monitor their BP regularly are likely to comply with both drug and non-drug therapies.

The DASH program has long been identified as beneficial toward the reduction of systolic BP. Good nutrition with adequate potassium content showed positive correlation between total body Na^+ and blood pressure while a negative correlation between total body K^+ and blood pressure in hypertensive patients are observed. An oral potassium intake reduces the blood pressure. According to He and associates, the risk of stroke varies greatly with potassium intake [32]. Food rich in fibres, vegetables and fishes has long been established as beneficial. In this study, only one-quarter of the population are in compliance with their food schedules. The low number of patients' compliance and knowledge of the DASH programme may be attributed to the low level of education offered to patients by professionals and well as the socio-economic factors. There is the need to integrate the services of nutrition experts as well as educate patients on locally available food containing these contents.

More than one-third of patients who combined both orthodox and herbal agents lacked the knowledge of the effects of such combined agents. The reason for the low levels of advice offered by practitioners is attributed to the fact that most patients always hide their herbal medications from their physicians. Several herbal preparations have the potentials for interacting with orthodox medicines and affect the desired outcomes.

5. CONCLUSION

Non-drug therapy often compliments gains from drug therapy and consequently improves the expected positive clinical outcomes in cardiovascular diseases. Patients' knowledge of danger pose by smoking, alcohol consumption high blood sugar and cholesterol were generally low but the knowledge of the benefits of regular exercise, salt reduction, uncontrolled BP were high. Most patients were advised on regular BP check, salt reduction and avoidance of combination of herbal and orthodox medicines. Apart from the heart, advices on regular check of other target organs were below average. Compliant with medical advice were generally high among patients except for dietary intake and cholesterol check.

6. RECOMMENDATION

It is recommended that patients' education centres be established in all tertiary health facilities where such services is lacking and patients should be referred to these centres from time to time. This will augment the poor or low levels of information pass to patients from practitioners who are always under crowd pressure.

7. LIMITATION OF THE STUDY

Many patients are possibly unaware of some of the laboratory and diagnostic procedures carried out on them since physician do not normally give details on the types and purposes of such investigation to patients. The procedures likely affected are the assessment of the renal status and the cholesterol levels which are component of the comprehensive assessment of patient during diagnosis.

CONSENT

Informed consent was obtained from the participants.

ETHICAL APPROVAL

Ethical approval was sought and obtained from the research and ethics committee of the University of Maiduguri Teaching Hospital.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL. Jr. et al. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. Hypertension. 2003;42:1206-1252.
2. World Health Organization. Global status report on non-communicable diseases 2010. Document number WHO/DCO/WHD/2013.2 Geneva, WHO; 2011.
3. Smulyan H, Safar ME. The diastolic blood pressure in systolic hypertension. Ann Intern Med. 2000;132(3):233-7.
4. Thomas L. Managing hypertensive emergencies in ED. Canadian Family Physician. 2011;57(10):1137-97.
5. Calhoun DA, Jones D, Textor S, Goff DC, Murphy TP, Toto RD, et al. Resistant hypertension: Diagnosis, evaluation, and treatment. A scientific statement from the American Heart Association Professional Education Committee of the Council for High Blood Pressure Research. Hypertension. 2008;51(6):1403-1419.
6. Magee LA, Ornstein MP, von Dadelszen P. Management of hypertension in pregnancy. BMJ. 1999;318;1332-6.
7. Kazoumi K, Thomas GP. White coat hypertension syndrome. Arch Intern Med. 2000;160(22):3495-3496.
8. World Health Organization. Global health risks: Mortality and burden of disease attributable to selected major risks. WHO

Press, 20 Avenue, 1211 Geneva 27, Swizerland; 2009.

9. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R. Age specific relevance of usual blood pressure to vascular mortality. Lancet. 2002;360(9349):1903-13.
10. Michael AW, George LB, Luis MR, Brent ME. Identifying the resistant hypertension patient. Medscape Education Cardiology; 2011.

    Available:http://www.medscape.org/viewarticle/745764_transcript (Assessed May 2015)
11. Singer DRJ, Kite A. Management of hypertension in peripheral arterial disease. European Journal of Vascular and Endovascular Surgery. 2008;35(6):701-8.
12. White WB. Defining the problem of treating patient with hypertension and arthritis pain. The American Journal of Medicine. 2009; 122(5 Suppl):S3-9.
13. Gregory YH, O'Brien Eoin, Beevers dD. Glip. ABC of hypertension. London BMJ Books; 2007. ISBN 1-4051-306 1-x [5]
14. Steinmetz M, Nickenig G. Cardiac Sequelae of hypertension. Internist (Berl). 2009;50(4):397-409.
15. Neal LB. Antihypertensive agents: In basic and clinical pharmacology. 10th edition. 2007;159-181.
16. Sacks FM, Svetkey LP, Vollmer WM, Apel LJ, Bray GA, Harsha D, et al., DASH: Sodium collaborative research group. Effects of reduced dietary sodium and dietary approaches to stop hypertension (DASH) diet. N. Engl J Med. 2001;344(1): 3-10.
17. Graudal NA, Hubeck-Gradual T, Jurgens G. Effects of low sodium vs high sodium diet on blood pressure, renin, aldosterone, catecholamines, cholesterol and triglycerides (Cochrane review). Am J Hypertension. 2012;25(1):1-15.
18. Terry RH, Bong HS, Gwendolyn AP, Thomas LW, Michael FW, Williams RL. Hypertension risk and effect of caffeine on blood Pressure. Hypertension. 2000;36: 137-141.
19. Srividya K, Theodore AK. Treatment of hypertension in obese patients. Am. J. Cardiovascular Drugs. 2013,13(3):163-176.
20. Sobieraj DM, White WB, Baker WL. Cardiovascular effects of pharmacologic therapies for smoking cessation. J Am Soc Hypertens. 2013;7(1):61–67.
21. Tabinda, Qudsia A, Hemma S, Shazia S. Awareness of hypertension among patients attending primary health care center and outpatient department of tertiary care hospital in Karachi. Journal of Pakistan Medical Association. 2007;57(8): 396-399.
22. Salawu F, Danburam A, Isa B, Agbo J. Cigarette smoking habits among adolescents in North-East Nigeria. Internet Journal of Epidemiology. 2009;8(1).
23. Rakumakoe MD. To determine the knowledge, attitudes and perceptions of hypertensive patients towards lifestyle modification in controlling hypertension. WIReDSpace Electronic Thesis and Dissertations (ETD); 2012.

    Available:http://hdl.handle.net/10539/11047 (Assessed April 2015)
24. Olisa NR, Oyelola FT. Evaluation of use of herbal medicines among ambulatory hypertensive patients attending a secondary health care facility in Nigeria. Int. Journal Pharm Pract. 2009;17(2):101-5.
25. Matsui Y, Kario K, Ishikawa J, Hoshide S, Eguchi K, Shimada K. Smoking and antihypertensive medication: Interaction between blood pressure reduction and arterial stiffness. Hypertens Res. 2005; 28(8):631-8.
26. Rhee MY, Na SH, Kim YK, Lee MM, Kim HY. Acute effects of cigarette smoking on arterial stiffness and blood pressure in male smokers with hypertension. Am J Hypertension. 2007;20(6):637-41.
27. Klatsky AL, Gunderson E. Alcohol and hypertension: A review. J. Am. Soc. Hypertens. 2008;2(5):307-317.
28. Sesso HD, Cook NR, Buring JE, Gaziano JM. Alcohol consumption and the risk of hypertension in women and men. Hypertension. 2008;51(4):1080-1087.
29. Ishikawa-Takata K, Ohta T, Tanaka H. How much exercise is required to reduce BP in essential hypertension: A dose-response study. Am. J. Hypertens. 2003, 16(8):629-33.
30. Warren TY, Barry V, Hooker SP, Sui X, Church TS, Blair SN. Sedentary behavors increase risk of cardiovascular mortality in men. Med Sci. Sports Exerc. 2010; 42:879-885.

31. Seamus PW, Ashley C, Xue X, Jiang H. Effects of aerobic exercise on blood pressure: A meta-analysis of randomized controlled trials. Annals of Intern Med. 2002;136(7).

32. He FJ, MacGregor GA. Fortnightly review: Beneficial effects of potassium. BMJ. 2001;323:497-501.

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