Original Article

BLOOD PRESSURE CONTROL AND ASSOCIATED FACTORS AMONG HYPERTENSIVE PATIENTS IN UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL IN SOUTH-SOUTH NIGERIA

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ABSTRACT

Background: Hypertension a controllable disease is responsible for about 45% of deaths due to heart diseases and 51% of deaths due to stroke globally as at 2013. In Nigeria, a prevalence of 8-46.4% was reported depending on the population of interest. This study was to determine the level of BP control and associated factors among hypertensive patients in University of Port Harcourt Teaching Hospital in South-South Nigeria.

Materials and Methods: Sequel to requisite ethical approval this study was conducted among 423 hypertensive patients who were attending specialist clinics in University of Port Harcourt Teaching Hospital in Rivers State, South-South Nigeria. The patients were selected by systematic sampling technique. A pre-tested close ended interviewer-administered questionnaire and sphygmomanometer were used to collect data. The data was analyzed using Epi Info Version 7.02 statistical software with descriptive and analytical statistics used.

Results: The results showed that BP control was 36.69% with mean systolic and diastolic blood pressure of 147.28 ± 21.76 mmHg and 88.27 ± 15.18 mmHg respectively. BP control was significantly associated with being female (OR: 1.98; 95% CI= 1.29-3.05; p = 0.001), current alcohol consumption (OR: 2.42; 95% CI = 1.28-4.80; p = 0.006). Other factors were adherence to medications, consulting a CAM practitioner and use of CAM products.

Conclusion: The low level of BP control required physicians to counsel their patients on the need for medication adherence, avoidance of alcohol consumption and use of complementary and alternative medicine (CAM) which this study has identified as predictors of poor BP control.

Key words: Hypertension, blood pressure control.

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INTRODUCTION

Globally cardiovascular diseases accounts for about 17.6 million deaths annually and complications from hypertension are responsible for 9.4 million of these deaths.[1,2] Specifically, hypertension is responsible for nearly 45% of deaths due to heart disease and 51% of deaths due to stroke.[2] The global prevalence of hypertension was estimated to be almost 40% of adults aged 25 years and above.[2] Africa accounts for the highest prevalence with 46%.[3]

In Nigeria, a prevalence of 8-46.4% was reported depending on the population of interest.[3] Similarly, a study estimated an overall hypertension prevalence of 28.9% in Nigeria with a prevalence of 29.5% among men and 25% among women; with 30.6% and 26.4% in urban and rural dwellers respectively.[4] In Port Harcourt, a study reported a prevalence of 21.33% among university lecturers in Port Harcourt.[5] A crude prevalence of 18.3% and an age-adjusted prevalence of 2.63% were reported in a rural community in Rivers State.[6]

The high prevalence rates of hypertension among Nigerians reported by different researchers and its contribution to ill health and early death is a cause for serious concern. It therefore requires early detection and treatment particularly in this environment where ignorance and poverty are the drivers of poor health seeking

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behavior.[6-8] Over the years, the prevalence of hypertension has been on the increase due to increasing population, ageing, and behavioural risk factors such as unhealthy diet, harmful use of alcohol, lack of physical activity, overweight and exposure to persistent stress.[3]

Hypertension is a notable and treatable cause of ill health and death. On its own, hypertension is a risk factor for myocardial infarction, chronic kidney disease, ischaemic and haemorrhagic stroke, heart failure and premature death.[10-13] Evidence suggests that controlled blood pressure is associated with low risk of stroke, coronary heart disease (CHD), chronic kidney disease (CKD), heart failure and death.[6,14] It has also been found that lowering the blood pressure by as little as 1-2 mmHg within a population is known to markedly lower cardiovascular diseases and death.[15,16] Timely identification of hypertension as well as stringent measures to control BP are therefore imperative for reducing target organ damage and associated clinical conditions in the hypertensive patients.[17-19]

This study was therefore conducted to determine the level of blood pressure control and associated factors among hypertensive patients receiving care in the University of Port Harcourt Teaching Hospital in South-South Nigeria.

MATERIALS AND METHODS

This hospital-based cross-sectional study was conducted among 423 hypertensive patients who were attending specialist clinics in University of Port Harcourt teaching Hospital in Rivers State, South-South Nigeria. Data was collected using a structured close ended interviewer-administered questionnaire over a period of 5 weeks from 19th June to 21st July, 2017 from the 423 patients who were selected by systematic sampling technique.

The blood pressure was taken with a *Silver Careplus* brand of digital sphygmomanometer with a standard adult cuff of 30-42 centimeters using the left upper arm with the lower edge of the cuff about 2 centimeters above the elbow joint while the patient was in sitting position and the cuff at the same level with the left breast. For the classification of blood pressure control, patients were categorized as uncontrolled if their systolic blood pressure was ≥140 mmHg and/or diastolic blood pressure was ≥90 mmHg at the time of data collection irrespective of blood pressure readings at other times.

The data was analysed using Epi Info Version 7.02 statistical software. Mean and standard deviation were used for descriptive statistics while chi-square test and logistic regression were used to determine association between key variables at p ≤0.05 level of significance. Ethical approval was obtained from the Research and Ethics committee of the University of Port Harcourt and signed informed consent duly obtained from each respondent.

RESULTS

Out of the 423 administered questionnaires, 417 questionnaires were considered suitable for analysis after data cleaning involving removal of questionnaires with uncompleted responses for key variables. This gave a completed response rate of 98.58%.

The socio-demographic characteristics of the respondents showed that the mean age of the respondents was 58.66 ±10.34 years with those who are ≥ 50 years accounting for 75.78%. The sex distribution was 194 (46.52%) for males and 223 (53.48%) for females. About 270 (64.75 %) were married and 380 (91.13%) of them live with their spouses or family members. Almost all of the respondents (95.68%) were Christians; with 57.07% having not more than secondary education and majority (58.5%) earning ≤ ₦60,000. The results further revealed that 45.56% of the participants previously consumed tobacco but only 6.24% still do so. Similarly, 62.11% previously consumed alcohol but only 16.79% currently do so. Additionally, 74.58% were on low salt diet while 33.81% engaged in regular physical exercise (Table 1).

Table 1: Social history and lifestyle of respondents

Characteristics	Frequency n=417	Percentage (%)
Previous Tobacco consumption		
Yes	190	45.56
No	227	54.44
Current Tobacco consumption		
Yes	26	6.24
No	391	93.76
Previous Alcohol consumption		
Yes	259	62.11
No	158	37.89
Current Alcohol consumption		
Yes	70	16.79
No	347	83.21
Low Salt diet		
Yes	311	74.58
No	106	25.42
Regular exercise		
Yes	141	33.81
No	276	66.19

Hypertensive and medication history of respondents.

The results also shows that 191 (45.80%) of the respondents have been hypertensive for ≤ 5 years with mean duration of being diagnosed with hypertension was 7.81 ± 6.24 years. About 221 (53.00%) of the respondents have been receiving treatment from health practitioners for ≤5 years, 34.53% for 6-10 years while 18.47% for over 10 years with a mean duration of treatment of 7.43 ± 5.99 years.

The results further shows that 192 (46.04%) of the respondents have had adverse cardiovascular or end organ effect; and 236 (56.59%) had one or more co-morbid conditions with hypertension. while 43.41% had only hypertension. Additionally, of those with co-morbidities, 213 (90.25%) had only one co-morbidity. On medications, 314 (75.30%) of the respondents were taking three or more drugs daily with 350 (83.93%) of them taking only once daily dose of their medications.

Furthermore, the results reveals that 220(52.76%) were poorly adherent to their medications; 184 (44.12%) had consulted a complementary & alternative medicine (CAM) practitioner in the preceding 12 months with 168 (40.29%) of the respondents using CAM products during the same period (Table 2)

Table 2: Hypertensive and medication history of respondents

Characteristics	Frequency n=417	Percentage (%)
Duration of being hypertensive		
≤ 5 years	191	45.80
>5 years	226	54.20
Mean duration 7.81 ± 6.24 years		
Duration of being managed by doctors/ hospital setting		
≤ 5 years	221	53.00
> 5 years	196	47.00
Mean duration 7.43 ± 5.99 years		
Cardiovascular complications		
Yes	192	46.04
No	225	53.96
Presence of co-morbidities		
Yes	236	56.59
No	181	43.41
Number of co-morbidities (n = 236)		
1	213	90.25
≥2	23	9.75
Number of currently used drug		
1-2	103	24.70
≥3	314	75.30
Frequency of taking of drugs in a day		
1	350	83.93
≥2	67	16.07
Medication adherence		
Poor	220	52.76
Good	197	47.24
Consultation of CAM practitioner		
Yes	184	44.12
No	233	55.88
Use of CAM products		
Yes	168	40.29
No	249	59.71

Level of blood pressure control of the respondents

On the level of BP control, the results reveal that 153(36.69%) of the respondents had controlled BP while majority (63.31%) were uncontrolled with a mean systolic and diastolic BP of 147.28 ± 21.76 mmHg and 88.27 ± 15.18 mmHg respectively. The difference in proportion of those with controlled BP and those with uncontrolled BP is statistically significant (p = 0.001).

On the BP pattern, 25 (6%) were optimal, 61 (14.63%) were normal while 67 (16.07%) were high normal (Table 3). Of those with uncontrolled BP, 140 (33.57%) had mild hypertension, while 76 (18.23%) and 48 (11.51%) had moderate and severe hypertension respectively. The difference in the pattern of BP among the respondents is statistically significant (p = 0.001).

Table 3: Blood pressure pattern and level of control of respondents

BP Characteristics	BP Range (mmHg)	Frequency: n=417	Percentage (%)	χ2	df	p- value
BP Pattern						
Optimal	<120/<80	25	6.00	130.07	5	0.001*
Normal	120-129/80-84	61	14.63			
High Normal	130-139/85-89	67	16.07			
Grade 1 (mild)	140-159/90-99	140	33.57			
Grade 2 (moderate)	160-179/100-109	76	18.23			
Grade 3 (severe)	≥180/≥110	48	11.51			
Level of BP Control						
Controlled	<140/<90 mmHg	153	36.69	59.09	1	0.001*
Uncontrolled	≥140/≥90 mmHg	264	63.31			
Mean Systolic BP	147.28 ± 21.76 mmHg					
Mean Diastolic BP	88.27 ± 15.18 mmHg					

Factors associated with BP Control

Of the socio-demographic variables considered in this study (Table 4), only sex was significantly associated with BP control ($p = 0.001$). Logistic regression analysis shows that females were twice more likely to have controlled blood pressure compared to males (OR: 1.98; 95% CI = 1.29-3.05).

Table 4: Relationship between social-demographic factors and level of blood pressure control

Socio-demographic factors	Blood Pressure		df	χ2 (p-value)	OR (95% CI)
	Uncontrolled (≥140/90)	Controlled (<140/90)			
Age					
≤50	56 (55.45)	45 (44.55)	1	3.548 (0.060)	0.65 (0.40-1.05)
>50	208 (65.82)	108 (34.18)			
Total	**264 (63.31)**	**153 (36.69)**			
Sex					
Male	139 (71.65)	55 (28.35)	1	10.863(0.001)*	1.98 (1.29-3.05)
Female	125 (56.05)	98 (43.95)			
Total	**264 (63.31)**	**153 (36.69)**			
Marital Status					
Single					
(Widowed/divorced)	102 (63.39)	45 (30.61)	1	3.611(0.057)	1.51 (0.97-2.38)
	162 (60.00)	108 (40.00)			
Married					
Total	**264 (63.31)**	**153 (36.69)**			
Education					
≤Secondary	156 (65.55)	82 (34.45)	1	0.981(0.322)	1.25 (0.82-1.91)
Tertiary	108 (60.34)	71 (39.66)			
Total	264(63.31)	153 (36.69)			
Income					
≤60,000	157 (65.15)	84 (34.85)	1	0.631(0.427)	1.20 (0.79-1.84)
>60,000	104 (60.82)	67 (39.18)			
Total	**261(63.35)**	**151 (36.65)**			
Living Status					
Living alone	26 (70.27)	11 (29.73)	1	0.550 (0.458)	1.41 (0.64-3.14)
Living with family	238 (62.63)	142 (37.37)			
Total	**264 (63.31)**	**153 (36.69)**			

Similarly, of the social and lifestyle factors, only current alcohol consumption status is shown to have a statistically significant relationship with BP control ($p = 0.006$). Logistic regression analysis shows that respondents that are currently taking alcohol are 2.42 times more at odds of having uncontrolled blood pressure compared to those that are not currently taking alcohol (OR: 2.42; 95% CI = 1.28-4.80). The result does not show any statistically significant relationship between current tobacco consumption, low salt diet and regular physical exercise with level of BP control (Table 5).

Table 5: Relationship between social/life style factors and level of blood pressure control

Life style factor	Blood Pressure (mmHg)		df	χ2 (p-value)	OR (95% CI)
	Uncontrolled (≥140/90)	Controlled (<140/90)			
Current use of Tobacco					
Yes	19 (73.08)	7 (26.92)	1	0.73 (0.391)	0.62 (0.63-4.66)
No	245 (62.66)	146 (37.34)			
Total	**264 (63.31)**	**153 (36.69)**			
Current use of Alcohol					
Yes	55 (78.57)	15 (21.43)	1	7.66 (0.006)*	2.42 (1.28-4.80)
No	209 (60.23)	138 (39.77)			
Total	**264 (63.31)**	**153 (36.69)**			
Low salt diet intake					
No	63 (59.43)	43 (40.57)	1	0.709 (0.40)	0.80 (0.50-1.30)
Yes	201 (64.63)	110 (35.37)			
Total	**264 (63.31)**	**153 (36.69)**			
Regular physical exercise					
No	181 (65.58)	95 (34.42)	1	1.534 (0.216)	1.33 (0.86-2.06)
Yes	83 (58.87)	58 (41.13)			
Total	**264 (63.31)**	**153 (36.69)**			

On the medical factors, Table 6 shows that there is a statistically significant association between the number of drugs taken daily and the level of BP control. Those who took 1-2 drugs had better BP control than those who took 3 or more drugs daily (p = 0.03). It also show that those who took 1-2 drugs are 1.65 times more likely to have controlled BP compared with those who took 3 or more drugs daily (OR 1.65; 95% CI = 0.38-0.98).

The table also shows that there is a statistically significant association between frequency of taking medications and level of blood pressure control. BP control increased with increase in the number of doses of medication. Respondents who took single dose of medication constituted 34% of those with BP control compared with those who took ≥2 doses that accounted for 50.75% (p = 0.014). Additionally, those with ≥2 doses are 2 times at odds of BP control than those with single dose (OR: 2.0; 95% CI = 1.14-3.51). There is however no statistically significant association between the duration of being hypertension and period of being managed by a doctor and BP control.

Additionally shows that there is a statistically significant relationship between level of medication compliance and BP control. Respondents with low adherence accounted for 70.45% of those with uncontrolled BP compared to 55.33% for those with combined medium and high adherence (p = 0.002). It also shows that respondents with a low adherence score were 1.93 times more at odds of having uncontrolled blood pressure compared to those with medium and high adherence score (OR=1.93; 95% CI = 1.26-2.94).

It further shows a statistically significant association between the use of CAM and BP control. It shows that 71.20% of those who consulted CAM practitioners had uncontrolled BP compared to 57.08% for those who did not consult CAM practitioners (p = 0.004). Logistic regression shows that those who consulted CAM practitioners were 1.86 times more likely to have uncontrolled BP compared to those who did not consult CAM practitioners (OR: 1.86; 95% CI = 1.21-2.86). Similarly those who used CAM products accounted for 70.83% of those with uncontrolled BP compared to 58.23% for those who did not use CAM products (p = 0.01). Logistic regression shows that users of CAM products were 1.74 times at odds of having uncontrolled BP compared to those who did not use CAM products (OR: 1.74; 95% CI = 1.12-2.70).

Table 6: Relationship between medical factors and level of blood pressure control

Medical factor	Blood Pressure (mmHg)		df	$\chi 2$ (*p-value*)	OR (95% CI)
	Uncontrolled	Controlled			
Duration of being hypertensive					
≤ 5 years	116 (60.73)	75 (39.27)	1	0.813 (0.367)	0.82 (0.54-1.24)
>5 years	148 (65.49)	78 (34.51)			
Duration of being managed by a doctor					
≤ 5 years	145 (65.61)	76 (34.39)			
>5 years	119 (60.71)	77 (39.29)	1	0.87 (0.350)	1.23 (0.81-1.88)
Number of drugs taken					
1-2	56 (54.37)	47 (45.63)	1	4.71 (0.03)*	1.65 (0.38-0.98)
≥ 3	208 (66.24)	106 (33.75)			
Frequency of taking drugs daily					
1	231 (66.0)	119 (34.00)	1	6.087 (0.014)*	2.0 (1.14-3.51)
≥2	33 (49.25)	34 (50.75)			
Duration of being hypertensive					
≤ 5 years	116 (60.73)	75 (39.27)	1	0.813 (0.367)	0.82 (0.54-1.24)
>5 years	148 (65.49)	78 (34.51)			
Duration of being managed by a doctor					
≤ 5 years	145 (65.61)	76 (34.39)			
>5 years	119 (60.71)	77 (39.29)	1	0.87 (0.350)	1.23 (0.81-1.88)
Drug Adherence					
Low	155 (70.45)	65 (29.55)	1	9.594(0.002)*	1.93 (1.26-2.94)
High & Medium	109 (55.33)	88 (44.67)			
Consulted CAM practitioners					
Yes	131 (71.20)	53 (28.80)	1	8.22 (0.004)*	1.86 (1.21-2.86)
No	133 (57.08)	100 (42.92)			
Used CAM products					
Yes	119 (70.83)	49 (29.17)	1	6.33 (0.01)*	1.74 (1.12-2.70)
No	145 (58.23)	104 (41.77)			

DISCUSSION

BP control

This study found that only 36.69% had BP control among the patients with hypertension receiving care at the University of Port Harcourt Teaching Hospital (UPTH). This low level of BP control is similar to findings from the study in Central Kenya, Michigan in USA, Community Health Centres in USA among Blacks, Younde in Cameroun, Maylasia and the multi-centre study in Ghana and Nigeria.[6-10,20-22]

The level of BP control in this study is however, much lower than the 63% found in

Riyadh. This might not be unconnected with the availability of free medications and easy access to health facilities in Riyadh as reported by Alanzi et al in a similar study in the same location. It is also lower than the 50.3% reported in the study in Southwest Ethiopia. The higher level of BP control could be attributable to the 60.5% medication adherence rate in that study compared to the 47.24% combined high and medium adherence rates in this study.[11-14]

Similarly, the reported 60.1% BP control from the Malaysian study is again much higher than the result from this study. This wide difference could be as a result of the disaggregated result from the Malaysian study where BP control for diabetics was separated from non-diabetics whereas this study aggregated all cases with or without any co-morbidity.[21]

The 46.4% BP control in the study in Western Nigeria which again is much higher than the result from this study could be ascribed to the characteristics of the patients at the Family Medicine Clinics at the Federal medical Centre Abeokuta, the location of the study. The clinics comprised the GOPD, the Corporate Clinic and the NHIS clinic. Aside the GOPD where there is heterogeneity of patients and everyone pays out of pocket for services, the Corporate Clinic cares for well-to-do patients and staff of the hospital who have the financial muscle to pay, while the NHIS clinic is for those who are covered by insurance and so do not pay out of pocket for their services particularly drugs. They are therefore guaranteed drug availability similar to the Saudi study patients in Riyadh study.[23-26]

Factors associated with BP control

This study found that of all the socio-demographic variables, only sex was associated with BP control. Males were almost twice more likely to have uncontrolled BP compared to females (OR: 1.98 95% CI =1.29-3.05; p = 0.001). Age was not associated with BP control in this study which is contrary to the report of Asgedom et al who found that patients aged ≥65 years had significantly poorer BP control (p = 0.008). Similarly, level of education was not associated with BP control contrary to the report of Cheong et al where those with less than secondary education were more likely to have poor BP control (OR = 1.7, 95% CI: 1.150, 2.521; p = 0.008).[27-30]

On the relationship between BP control and the level of compliance with anti-hypertensive medications, this study revealed a statistically significant association between the two variables. The higher the level of adherence the higher the proportion of respondents with controlled BP (p = 0.000). Similarly, logistic regression showed that those who were adherent are almost twice more likely to have controlled BP than those who were no-adherent (OR: 1.93; 95% CI: 1.26-2.94; p = 0.002). This finding of medication compliance as a predictor of BP control is in consonance with the results from all the studies reviewed. In like manner, the result from this study agreed with the reported findings from other studies.[31]

Besides level of compliance, this study also found a statistically significant association between BP control and current alcohol consumption (p = 0.006). Additionally this study showed that those who currently consume alcohol are 2.42 times more at odds of having uncontrolled BP compared to those who do not currently consume alcohol (OR:2.42; 95% CI: 1.28-4.80) This indicates that alcohol consumption is a predictor of uncontrolled BP. This finding is not surprising as alcohol consumption is a known risk factor for cardiovascular diseases.

Addition of salt to food and physical activity were not associated with poor BP control in this study. This was however dissimilar to the findings of Asgedom et al which showed that these factors were related to uncontrolled BP.[32-34]

Furthermore, this study revealed that the number of drugs taken daily is a predictor of BP control. Those who took fewer drugs were 1.65 times at odds of having controlled BP than those who took more drugs (OR: 1.65; 95% CI: 0.38-0.98; p = 0.03). The taking of fewer drugs could be an indication of the absence of complications and co-morbidities among these patients that would otherwise have necessitated additional drugs. This study also showed that the frequency of taking drugs is a predictor of BP control. The more the doses of drugs taken daily the better the BP control (p = 0.034). Logistic regression showed that those who took medications 2 or more times daily were almost twice as likely to have controlled BP compared with those who took only a single dose of medication (OR: 1.89; 955 CI: 0.03-0.93; p = 0.023). The study however did not show any association between current tobacco consumption, low salt diet, physical exercise, duration of being hypertensive, duration of being managed by health practitioner and number of co-morbidities with BP control (p > 0.05).[35]

The finding of taking fewer drugs being associated with BP control is in agreement with result of the Malaysian study which showed that taking ≥2 medications is associated with poor BP control. The finding of taking ≥3 medications being associated with poor BP control by Mutua et al in their Central Kenyan study also corroborated this finding. Furthermore, the absence of association between low salt diet and BP control in this study is however at variance with that reported by Asgedom et al in their Southwest Ethiopian study. Though this study did not try to establish any relationship between diabetes mellitus and BP control, the finding of no association between the number of co-morbidities and BP control is contrary to what was reported in other studies who found an associated between diabetes and BP control.

On the relationship between BP control and consulting a CAM practitioner and also the use of CAM products, this study found an association with these variables with the CAM users having poor BP control (OR: 1.86; 95% CI: 1.21-2.86; p = 0.004 for consulting CAM practitioner; OR:1.74; 95% CI: 1.12-2.70; p = 0.01 for use of CAM products). This is contrary to the claim helpfulness by nearly 90% of CAM users in this study. This finding is however dissimilar with what was reported by Mbulo and Amira & Okubadejo who did not find any association between CAM use and BP control. Earlier findings showed a reduction in mean systolic and diastolic BP by the use of garlic compared to placebo and is the reverse of what this study found. This difference in the two sets of findings could be due to the study designs. While this study was on the use of CAM among hypertensives that were all on anti-hypertensive medications, the other studies were mainly clinical trials on efficacy of garlic: a CAM product against a placebo among hypertensive patients who were not on any anti-hypertensive medications.[36-38]

CONCLUSION

This study showed that majority of the patients had uncontrolled BP despite receiving care at the tertiary level and being managed by clinicians for over 7 years. The predictors of BP control in this study were good compliance, non-use of alcohol, and number and frequency of taking drugs. Other predictors of BP control were non-consultation of CAM practitioner and non-use of CAM products.

RECOMMENDATION

To improve BP control among hypertensive patients, it would be desirable to ensure that patients adhere strictly to their medication regimens as well as avoid alcohol consumption which is a known risk factor for

NCDs particularly cardiovascular diseases. Furthermore, there is the need for attending physicians to counsel their patients to desist from using CAM products and practices of unproven efficacy as they could be deceptive and be used as alternative medicines thereby depriving patients of their appropriate medications and thus affect compliance negatively.

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