Determinants of Hypertension among Medical Practitioners in Bayelsa State: A Cross-Sectional Study

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ABSTRACT

Hypertension is a major risk factor for cardiovascular diseases (CVD). Objective was to assess prevalence of hypertension using 2017 American Heart Association/American College of Cardiology (AHA/ACC) guideline and its determinants among Medical Practitioners in Bayelsa State, Nigeria. Two hundred and forty-four apparently healthy medical doctors were recruited. A structured self-administered questionnaire was used to gather data on CVD risk factors. Anthropometric and blood pressure measurements were taken. Association between hypertension and sociodemographic features, anthropometric measures, smoking, alcohol, fruit and salt intake, exercise was explored with chi-square for proportions. Predictors of hypertension were identified by two-step binary logistic regression. A third of participants were women (29.9%), most were below age 30 years (40.2%) and married (54.9%). One fifth was consultant/professor cadre (18.9%) and a third had worked ≥ 11 years as medical practitioners. Almost 2 in every 3 of the participants (63.1%) were considered hypertensive by the AHA 2017 classification. However, using a cut off of $\geq 140/90$ mmHg used by other guidelines gave a prevalence of 25%. Only 13.5% had been diagnosed hypertensive prior to this study. The most important predictor of occurrence of hypertension was age, although marital status, salt intake, work cadre and duration of practice were also significantly associated with the occurrence of hypertension. The use of the 2017 ACC/AHA hypertension guidelines for diagnosis of hypertension with a blood pressure cut off = $130/80$ mmHg resulted in a marked increase in the prevalence of hypertension in medical doctors compared to other guidelines that use a cut off value of $140/90$ mmHg (63.1% versus 25%). Increasing age is a significant predictor of hypertension in medical doctors. Guidelines that are best suited for our local settings for diagnosis of hypertension are recommended.

Keywords: ACC/AHA Guidelines, Hypertension, Medical Doctors, Prevalence, Sociodemographic features

INTRODUCTION

In 2017, the American College of Cardiology (ACC) and the American Heart Association (AHA) released guideline recommendations for the diagnosis

and treatment of hypertension with lower blood pressure values used for the definition of hypertension and lower treatment thresholds,¹ than previously recommended in other guidelines.² The ACA/AHA 2017 guideline defined hypertension as a

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systolic blood pressure of 130 mm Hg or more or a diastolic blood pressure of 80 mm Hg or more¹ in contrast to other guidelines which have used systolic blood pressure of 140 mm Hg or more and or a diastolic blood pressure of 90 mm Hg or more to define hypertension.²⁻⁶ It further recommends that high risk patients with stage 1 hypertension (BP between 130/80 to <140/90 mmHg), with ASVD risk score of greater than 10% or cardiovascular disease (CVD), should be considered for drug treatment.¹ However, both the recent European and the 2017 American guidelines recommend the same therapeutic BP goal of <130/80 mmHg.^{1,3,4}

There is strong evidence that intensive BP lowering is highly beneficial in lowering the risk of major CV events with markedly significant reductions in the risks of coronary heart disease, stroke, heart failure and all-cause mortality.⁷ Lee *et al.* using the National Health Insurance Service Health Examination Database of Korea for 2005-2006, analyzed 148,761 low risk, treated stage 1 hypertensive subjects (systolic BP of 140 to 159 mm Hg or diastolic BP of 90 to 99 mm Hg). They found that the lowest adjusted risk of all-cause mortality was observed in subjects with an average SBP of 120 to <130mmHg and an average DBP of 70 to <80mmHg.⁸ These findings support the generalization of the recommended target BP of <130/80mmHg of the latest ACC/AHA and ESH/ESC guidelines in the general hypertensive population.^{1,3}

Systemic hypertension leads globally among causes of cardiovascular mortality and morbidity despite its easy diagnosis and availability of treatment options (pharmacologic and non-pharmacologic). Uncontrolled hypertension promotes target organ damage (eyes, brain, heart, kidneys, coronary and peripheral vessels) and confers a significant disease burden to the community.

Prevalence of hypertension in Nigeria is estimated at 30.6% and 26.4% among urban and rural dwellers,^{9,10} respectively in a population of over 170 million¹¹ with 48% of this large population residing in cities while the remaining 52% reside in rural areas.¹²

The prevalence of hypertension in Nigeria may form a substantial proportion of the total burden of hypertension in Africa because Nigeria is the most populous and the most populated country in Africa.⁹⁻¹² Several studies in Nigeria have shown a high prevalence of hypertension in medical doctors, similar to levels found in the general population.^{13,14} But these studies used a cut off value of =140/90mmHg which is the recommendation of several guidelines.^{2,3,5,6} Medical doctors are a selected group of adult population often missing in the literature, as the focus of most studies is on the general population or patients presenting to health facilities.

The present study assessed the prevalence of hypertension using the 2017 AHA/ACC guideline and determinants of hypertension among Medical Practitioners in Bayelsa State, Nigeria.

MATERIALS AND METHODS

Study setting

The study held in Bayelsa state, Nigeria. Bayelsa state is one of the six states in the Niger Delta region, created in the year 1996 from Rivers State, in the south-southern region of Nigeria. It is bounded by Delta state on the north, Rivers state on the east and the Atlantic Ocean on the western and southern parts. There are 8 local government areas in the state of which Yenagoa local government area (LGA) accommodates the state's administrative headquarters. It is the traditional home of the Ijaw people with an approximated total population of 1,703, 984 (projected from the 2006 census) and an annual growth rate of 3%. The Primary Health Care Board, State Ministry of Health, and Hospitals Management Board manage the healthcare system in the state. The healthcare service delivery system is organized along three levels of care – primary, secondary, and tertiary in the private and public sectors. The primary level is made up of a network of primary healthcare (PHC) centres with at least 1 PHC in 105 local administrative wards of the state. There are least 2 general hospitals in each of the 8 LGAs of the state

which make up the secondary level of care. The state has 2 tertiary health facilities – the Federal Medical Centre, Yenagoa and the Niger Delta University Teaching Hospital, Okolobiri – that serve as referral centres for the network of general hospitals and primary health centres distributed across the state and hospitals in neighboring states such as Delta, Rivers, Akwa-Ibom, Edo, and Imo in Nigeria.^{15,16} There is a mal-distribution of medical doctors across the different levels of care with a very high concentration of doctors in the tertiary centres to the detriment of the other levels of care.¹⁷

Study design

A cross-sectional study

Study population

Two hundred and forty-four apparently healthy medical doctors were recruited. There are about seven hundred medical doctors registered to practice in the three levels of healthcare service delivery in both public and private health sectors of Bayelsa state. Participants included house officers, resident doctors, medical officers, consultants and professors in various specialties and sub-specialties of medical practice. The study excluded pregnant female medical doctors.

Sample Size

Sample size for studying proportions with population <10,000¹⁸

nf= the desired sample size when population is less than 10,000

$$nf = \frac{n}{1 + \frac{n}{N}}$$

N = the estimate of the population size (approximately 700 registered doctors in the state)

Where z = the standard normal deviate (using 95% confidence level = 1.96)

$$n = \frac{z^2 pq}{d^2}$$

p = the proportion in the target population estimated to be obese (the prevalence of hypertension is 26.4% to 30.6%^{9,10}, therefore, midpoint = 28.5%)

q = 1.0 – p

d = degree of accuracy desired, set at 0.05 therefore, The sample size appropriately powered and calculated for this study was 216.

$$n = \frac{(1.96)^2 \times 0.285 \times 0.715}{(0.05)^2} = 313.13$$

$$\text{Hence, nf} = \frac{313.13}{1 + 313.13/700} = 216$$

Sampling Technique

Three clusters of doctors were created based on their work places in Bayelsa state. Doctors working at the Federal Medical Centre, Yenagoa formed Cluster One. Cluster Two comprised of doctors working at the Niger Delta University Teaching Hospital, Okolobiri, while doctors working at the secondary and primary levels of care in the private and public sectors of the state formed the third cluster. The doctors in the third cluster were members of the Association of General Medical Practitioners of Nigeria (Bayelsa state chapter) and that avenue was used for their sampling. Using a simple random sampling technique (Balloting), eighty-two doctors each were selected from the three clusters Any doctor who declined participation was replaced by picking a new name from the balloting box in each of the clusters. The management of Federal Medical Centre, Yenagoa and Niger Delta University Teaching Hospital Okolobiri, provided the lists of doctors in their institutions while the doctors' list in the Association of General Medical Practitioners of Nigeria was obtained from the Association's officials.

Study procedures

The study used a self-administered questionnaire developed using the WHO STEP wise (2018) approach to surveillance guidelines¹⁹ which has been used in studies of total cardiovascular risk in several populations²⁰. This was used to gather information on selected demographic characteristics including gender, age, number of years of medical practice and staff cadre, dietary intake, physical activity, tobacco and alcohol use, systolic and diastolic blood pressures (measured using a stethoscope & Accoson mercury sphygmomanometer), and the presence or absence of diabetes mellitus.

Physical examination

This included measurements of height and weight (to determine the body mass index), waist circumference, pulse rate, blood pressure, and collection of blood samples for random blood sugar using standard protocols.^{5,19-23}

Height was measured in meters using a standardized stadiometer with each participant standing feet together without shoes on. They stood upright on the scale, not leaning on any support/ wall with their heads up before the readings were taken. Weight was measured in kilograms with the participants wearing light clothing. Each participant removed everything in their pockets such as phones and keys, dropped their handbags, and were relieved of any material that could have increased their weight temporarily. Also, it was ensured that the weight scale was on the zero mark before each participant climbed on it for the measurement. A standardized weight scale was used. Body mass index was calculated as weight in kg divided by the square of the height in meters (kg/m^2). Obesity was defined as a BMI of $\geq 30 \text{ kg}/\text{m}^2$ using the WHO categorization. A BMI of <18.5 , $18.5\text{--}24.9$, and $25\text{--}29.9 \text{ kg}/\text{m}^2$ was characterized as underweight, normal, and overweight, respectively.^{19,24} Measurement for the waist circumference (WC) (to the nearest 0.1cm) was done using a non-stretch linear tape, which was placed at the

approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest. A WC cutoff of 94 cm for European men and 80 cm for European women was regarded as elevated and indicative of abdominal obesity.²¹

Random blood glucose levels were determined before participant's lunch using Accucheck glucometers. Diabetes mellitus and impaired glucose tolerance were defined by random blood glucose of ≥ 11.1 and $\geq 7.8 \text{ mmol}/\text{L}$, respectively or if there was a prior diagnosis of DM with use of insulin or oral hypoglycemic drugs at the time of survey. The measurements were taken by either the principal investigator or 3 well-trained house officers and a resident doctor. Systolic blood pressure was measured using an Accoson mercury sphygmomanometer with the mean of two measurements taken in rested participants in sitting position.⁵ Blood pressure was measured at the same time of the day (by 9am). Participants were instructed to avoid alcohol consumption, cigarette smoking, coffee/tea, and exercise for at least 30 minutes prior to these measurements.

All participants provided written informed consent and the study was approved by the Ethics Committee of the Niger Delta University Teaching Hospital (NDUTH), Okolobiri, Bayelsa State in line with the Helsinki Declaration of 1975 that was revised in 2000. (Ethical Clearance certificate no. NDUTH REC/0039b/2017, approved 6th July 2018)

Data Analysis

Collected responses were checked and fed into an excel sheet on a personal computer. Data analysis was done after data cleaning and completeness were ascertained. Analyses were done to determine the sociodemographic characteristics and hypertensive status of medical practitioner in the study. Participants were classified as hypertensive with a systolic blood pressure reading of $\geq 130 \text{ mmHg}$ and/or diastolic blood pressure of $\geq 80 \text{ mmHg}$ according to the 2017 AHA/ACA classification. Participants receiving

antihypertensive medications were also classified as hypertensive. Data was presented as frequency distribution tables and descriptive statistics like means, standard deviation were calculated. Association between hypertension (dependent variable) and explanatory variables like sociodemographic features, anthropometric measures, smoking, alcohol, fruit and salt intake, exercise was explored with Chi-square for proportions. Predictors of Hypertension were identified by a two-step binary logistic regression. In the first step of the binary logistic regression, the dependent variable Hypertension) was dichotomized by coding the presence of Hypertension as '1' and otherwise was coded as '0'. The explanatory variables were thereafter tested with dependent variable one after the other (univariate binary logistic regression). All factors found statistically significant in the univariate logistic regression were afterward used in a multivariate logistic regression (Stage 2) to identify the predictors of hypertension in the study population. All analyses were conducted with SPSS version 22 and p-values < 0.05 were considered significant.

RESULTS

Sociodemographic characteristics of participants

A total of 244 doctors participated in the study, of which about a third were women (29.9%), most were below age 30 years (40.2) and married (54.9%). About one fifth were very senior doctors in the consultant/professor cadre (18.9) and a third have worked for eleven years and more as medical practitioners. The mean age of participants in the study is 37.4years (SD $\pm$ 11.3 years) and mean duration of practice is 9 years (SD $\pm$ 11.1 years).

Table 1: Sociodemographic information of Study participants

Characteristics	Frequency (N = 244)	Percent (%)
Sex of Respondents		
Male	171	70.1
Female	73	29.9
Age of Respondents		
< 30 years	98	40.2
31 - 40 years	68	27.9
41 - 50 years	44	18.0
51 - 60 years	25	10.2
> 60 years	9	3.7
Mean age — 37.4 ± 11.3 years		
Marital Status		
Single	110	45.1
Married	134	54.9
Professional Cadre		
House Officer	98	40.2
Resident/MO	100	41.0
Consultant/Prof	46	18.9
Duration of Practice		
< 1 years	88	36.1
1 - 5 years	55	22.5
6 - 10 years	24	9.8
11 - 20 years	36	14.8
21 - 30 years	28	11.5
> 30	13	5.3
Mean duration of practice — 9.0 ± 11.1 years		

Blood pressure categories as classified by AHA 2017

Table 2 shows that almost 2 in every 3 of the participants (63.1%) were considered hypertensive by the AHA 2017 classification. While about 169 participants (69.2%) had normal or elevated systolic blood pressure, only 95 participants (38.9%) were so classified by the diastolic blood pressure. Most participants (61.1%) were classified as hypertensive because of their diastolic blood pressure.

Table 2: Distribution of BP categories as classified by AHA 2017 among participants

Characteristics	Classification (in mmHg)	Frequency (N = 244)	Percent (%)
Systolic blood pressure			
Normal	< 120	75	30.7
Elevated	120 – 129	94	38.5
Hypertension stage 1	130 – 139	41	16.8
Hypertensive stage 2	= 140	34	13.9
Diastolic Blood pressure			
Normal/Elevated	< 80	95	38.9
Hypertension stage 1	80 – 89	88	36.1
Hypertension stage 2	= 90	61	25.0
Hypertension	SBP =130 ±DBP = 80	154	63.1

History of Hypertension among study participants

Prior to the study 13.5% of medical practitioners who participated in the study have been diagnosed as hypertensive and have managed hypertension for a mean duration of 8.7 years (SD – 5.6 years) with calcium channel blockers (72.7%) and thiazide diuretics (54.5%) as the commonly used drugs (Table 3).

Table 3: Features of Hypertension among the study participants

Characteristics	Frequency (N = 244)	Percent (%)
Known Hypertensives	33	13.5
Duration of Hypertension among known hypertensives (N = 33)		
= 5 years	14	42.4
6 – 10 years	7	21.2
= 11 years	12	36.4
Mean duration of hypertension = 8.7 ± 5.6 years		
Medication used for Hypertension among known hypertensives		
Calcium channel blockers	24	72.7
Thiazide diuretics	18	54.5
Angiotensin II receptor blocker	9	27.2
ACE Inhibitors	4	12.1
Beta-receptor blocker	3	9.1
Centrally-acting	1	3.0

Modifiable risk factors

Table 4 reveals that about a third of participants consume alcohol (33.2%), take fruits daily (33.2%) and engage in exercise (31.1%). Two in every five participants consider their salt intake as moderate (41.0%) and perceive their level of stress as severe (42.2%). More than half sometimes take soda drinks (52.5%). Only 2 study participants had been diagnosed diabetic and were on anti-diabetic medications.

Table 4: Distribution of modifiable risk factors for hypertension among participants

Characteristics	Frequency (N = 244)	Percent (%)
Smoking	13	5.3
Alcohol Consumption	81	33.2
Daily Fruit Intake	81	33.2
Exercise	76	31.1
Estimation of Routine salt intake		
None	13	5.3
Little	128	52.5
Moderate	100	41.0
A lot	3	1.2
Extra salt on Table	19	7.8
Perception of stress level		
Mild	25	10.2
Moderate	116	47.5
Severe	103	42.2
Frequency of Soda intake		
Rarely	60	24.6
Sometimes	128	52.5
Frequently	56	23.0
History of Diabetes		
Yes	2	0.8
No	242	99.2
Family History of Hypertension		
Yes	142	58.2
No	102	41.8
Family history of Diabetes mellitus		
Yes	70	28.7
No	174	71.3

Sociodemographic characteristic and hypertension as classified by AHA 2017

From Table 5, sex ($X^2 = 4.20$; df = 1; $p = 0.040$), age ($X^2 = 11.73$; df = 4; $p = 0.020$), marital status ($X^2 = 6.32$; df = 1; $p = 0.012$), work cadre ($X^2 = 6.18$; df = 1; $p = 0.045$) and duration of practice ($X^2 = 17.69$; df = 5; $p = 0.003$) were significantly associated with the occurrence of hypertension in the study.

Table 5: Association between Sociodemographic characteristic and Hypertension as classified by AHA 2017

Characteristics	Hypertensive status			X^2	df	pValue
	Total N = 244 (%)	Hypertensive N = 154 (%)	Non-Hypertensive N = 90 (%)			
Sex						
Male	171 (70.1)	115 (74.7)	56 (62.2)	4.20	1	0.040
Female	73 (29.9)	39 (25.3)	34 (37.2)			
Age						
< 30 years	98 (40.2)	51 (33.1)	47 (52.2)	11.73	4	0.020
31 – 40 years	68 (27.9)	43 (27.8)	25 (27.8)			
41 – 50 years	44 (18.0)	33 (21.4)	11 (12.2)			
51 – 60 years	25 (10.2)	20 (13.0)	5 (5.6)			
>60 years	9 (3.7)	7 (4.5)	2 (2.2)			
Marital Status						
Single	110 (45.1)	60 (39.0)	50 (55.6)	6.32	1	0.012
Married	134 (54.9)	94 (61.0)	40 (44.4)			
Medical Cadre						
House officer	98 (40.2)	54 (35.1)	44 (48.9)	6.18	2	0.045
Resident/MO	100 (41.0)	65 (42.2)	35 (38.9)			
Consultant/Prof	46 (18.9)	35 (22.7)	11 (12.2)			
Duration of Practice						
< 1 year	88 (36.1)	47 (30.5)	41 (45.6)	17.69	5	0.003
1 – 5 years	55 (22.5)	29 (18.8)	26 (28.9)			
6 – 10 years	24 (9.8)	19 (12.3)	5 (5.6)			
11 – 20 years	36 (14.8)	24 (15.6)	12 (13.3)			
21 – 30 years	28 (11.5)	24 (15.6)	4 (4.4)			
>30 years	13 (5.3)	11 (7.1)	2 (2.2)			

Modifiable Risk factors and hypertension as classified by AHA 2017

Only intake of salt ($X^2 = 8.02$; df = 3; $p = 0.046$) demonstrates a statistically significant association with hypertension (Table 6)

Table 6: Association between Modifiable Risk factors and Hypertension as defined by AHA2017

Characteristics	Hypertensive status			χ^2	df	pValue
	Total N = 244 (%)	Hypertensive N = 154 (%)	Non-hypertensive N = 90 (%)			
Smoking						
Yes	13 (5.3)	9 (5.8)	4 (4.4)	0.22	1	0.639
No	231 (94.7)	145 (94.2)	86 (95.6)			
Alcohol intake						
Yes	81 (33.2)	53 (34.4)	28 (31.1)	0.28	1	0.597
No	163 (66.8)	101 (62.0)	62 (68.9)			
Daily fruit intake						
Yes	81 (33.2)	48 (31.2)	33 (36.7)	0.77	1	0.379
No	163 (66.8)	106 (68.8)	57 (63.3)			
Extra salt on Table						
Yes	19 (7.8)	10 (6.5)	9 (10.0)	0.97	1	0.324
No	225 (92.2)	144 (93.5)	81 (90.0)			
Exercise						
Yes	76 (31.1)	51 (33.1)	25 (27.8)	0.76	1	0.385
No	168 (68.9)	103 (66.9)	65 (72.2)			
Salt intake						
None	13 (5.3)	4 (2.6)	9 (10.0)	8.02	3	0.046*
Little	128 (52.5)	88 (57.1)	40 (44.4)			
Moderate	100 (41.0)	60 (39.0)	40 (44.4)			
A lot	3 (1.2)	2 (1.3)	1 (1.2)			
Perceived Stress level						
Mild	25 (10.2)	13 (8.4)	12 (13.3)	1.52	1	0.469
Moderate	116 (47.5)	74 (48.1)	42 (46.7)			
Severe	103 (42.2)	67 (43.5)	36 (40.0)			
Any existing medical condition						
Yes	19 (7.8)	11 (7.1)	8 (8.9)	0.24	1	0.623
No	225 (92.2)	143 (92.9)	82 (91.1)			

Predictors of hypertension among study participants

Table 7 displays the results of the univariate binary logistic regression between explanatory variable in the study and the occurrence of hypertension. Men (OR – 1.79;95%CI:1.02 – 3.13;p-0.041) and married participants (OR – 1.96;95% CI: 1.16 – 3.32;p – 0.012) are more likely to be hypertensive than the women and single participants respectively. Table 7 further shows that with increasing age (OR – 1.05;95%CI:1.02 – 1.08;p – 0.001), duration of practice (OR – 1.04;95%CI:1.01 – 1.07;p – 0.001), BMI (OR – 1.09;95%CI:1.01 – 1.17;p – 0.021) and waist circumference (OR – 1.03;95%CI:1.01 – 1.05; p–0.021) the likelihood of hypertension is higher.

Table 7: Result of univariate logistic regression

Independent Variable – (Reference category)	B	UOR	95%CI		pValue
			Min	Max	
Sex – (Female)					
Male	0.58	1.79	1.02	3.13	0.041*
Marital Status – (Single)					
Married	0.67	1.96	1.16	3.32	0.012*
Medical Cadre – (House Officer)					
Resident/Medical Officer	0.41	1.51	0.85	2.68	0.156
Consultant/Professor	0.95	2.59	1.18	5.69	0.017*
Smoking – (No)					
Yes	0.29	1.33	0.39	4.46	0.640
Alcohol intake (No)					
Yes	0.15	1.16	0.67	2.03	0.597
Exercise (No)					
Yes	0.25	1.29	0.73	2.28	0.385
Frequency of Soda intake – (Frequently)					
Rarely	0.26	1.30	0.62	2.73	0.496
Sometimes	0.36	1.43	0.75	2.72	0.274
Salt intake – (None)					
Little intake	1.60	4.95	1.44	17.03	0.011
Moderate	1.22	3.38	0.97	11.71	0.055
A lot	1.50	4.50	0.31	65.23	0.270
Perceived stress level – (Mild)					
Moderate	0.49	1.63	0.68	3.89	0.274
Severe	0.54	1.72	0.71	4.15	0.230
Any existing medical condition – (No)					
Yes	0.24	1.27	0.49	3.28	0.624
Family history of hypertension – (No)					
Yes	0.03	1.03	0.61	1.74	0.919

However, in the multivariate binary logistics regression, in which all variables statistically significant in the univariate regression were used, the age of participant (OR – 1.05;95%CI:1.02 – 1.08;p – 0.001) was the only statistically significant variable showing age as the most important predictor of occurrence of hypertension in this study (Table 8).

Table 8: Predictors of hypertension among study participants

Independent Variable (Reference category)	—	B	aOR	95%CI		P-Value
				Min	Max	
Sex — (Female)						
Male		0.45	1.56	0.85	2.88	0.155
Marital Status — (Single)						
Married		0.05	1.05	0.49	2.28	0.896
Medical Cadre — (House Officer)						
Resident/Medical Officer		-0.35	0.70	0.32	1.54	0.382
Consultant/Professor		-0.62	0.54	0.13	2.17	0.384
Age		0.05	1.05	1.02	1.08	0.001*
Duration of Practice		0.01	1.01	0.92	1.10	0.975
Body Mass Index		0.07	1.07	0.97	1.18	0.190
Waist Circumference		-0.01	0.99	0.96	1.03	0.582
Constant		-1.22	0.29			0.014

aOR — adjusted odd ratio

DISCUSSION

Using the AHA 2017 classification, almost 2 in every 3 of the participants (63.1%) were classified hypertensive. However, using a cut off of =140/90 mmHg used by other guidelines²⁻⁶ would have given a prevalence of 25%. Similar finding was reported by Ofori *et al* who compared the prevalence of hypertension among staff of a multinational oil/gas company in Niger-Delta, Nigeria using the 2017 ACC/AHA guidelines and the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) guidelines. The result was a doubling of the prevalence of hypertension from 25.9% to 53.9%.²⁵

The difference in prevalence of hypertension using the cut off blood pressure levels of SBP =130 mmHg and DBP levels of =80mmHg is quite significant. Intensive BP lowering to achieve target BP below 130/80 mmHg is beneficial in reducing CV outcomes, and is advisable for most patients with hypertension^{26,27} especially high risk hypertensive patients with coronary artery disease, congestive heart failure, CKD with proteinuria and diabetes mellitus with CVD.²⁸ Although BP <140/90 mm Hg is associated with significant reductions in the risks of mortality, stroke, and end-stage renal disease,

BP ranges of 120 to <130 and 70 to <80 mm Hg are associated with the lowest mortality risk.²⁶

Prior to the study, only 13.5% of medical practitioners who participated in the study had been diagnosed as hypertensive using BP cut off =140/90mmHg and had managed hypertension for a mean duration of 8.7 years (SD – 5.6 years) using mostly calcium channel blockers (72.7%) and thiazide diuretics (54.5%). Community surveys in Nigeria show less than 30% of the general population are aware of their blood pressure status.^{29,30}

Calcium channel blockers and thiazide diuretics are the most prescribed anti-hypertensive classes in Nigeria according to several studies^{31–33} and are first line drugs in the treatment of hypertension.^{5,34,35}

Higher work cadre and duration of practice were significantly associated with the occurrence of hypertension in the study. The association of higher work cadre and duration of practice has been demonstrated in several studies.^{13,36–39} This is likely because of advancing age that comes with seniority⁴⁰ and less physically demanding routines of senior cadre doctors.^{1,41–45}

Advancing age was shown to be the most important predictor of occurrence of hypertension in the study. Advancing age is an established risk factor for hypertension and cardiovascular disease.^{42–44}

Also significantly associated with the occurrence of hypertension in the study was salt intake. Added salt to prepared meals has been shown to increase the risk of hypertension and CVD.^{46–48}

The study also showed men and married participants are more likely to be hypertensive than the women and single participants. This is in contrast with several studies which show higher risk of hypertension in single persons, with never married men having on average, higher SBP and DBP than married men and higher risk of hypertension.^{49, 50} Protective role of marriage has been linked to the social and psychological support it may offer.^{51,52} However, several other studies have also found a high prevalence of hypertension in married persons.^{53,54} Possible reasons included obesity, short nighttime sleep

duration, stress related to a high number of children/dependents, discordance in marriage leading to stress, abnormal eating and drinking behavior.^{54,55}

Increasing waist circumference was also associated with an increased likelihood of hypertension on univariate analysis. This finding agrees with several studies showing WC (which is an indirect measure of visceral obesity) is a useful predictor of hypertension.^{56–58}

CONCLUSION

The use of the 2017 ACC/AHA hypertension guidelines for diagnosis of hypertension with a blood pressure cut off = 130/80 mmHg resulted in a marked increase in the prevalence of hypertension in medical doctors compared to other guidelines that use a cut off value of 140/90mmHg (63.1% versus 25%). Increasing age is a significant predictor of hypertension in medical doctors. Careful consideration needs to be given to what guidelines are best suited for our local settings to diagnose hypertension and intervene early enough and appropriately.

Limitations of the study

The population from which our sample was drawn is the Medical Doctors practicing their profession in the state of Bayelsa in the Niger Delta region of Nigeria. We think a sample size of 244 participants spread across different segments of practice and cadre of physicians is not too small to study the population in question. However, generalization of the findings from this study on the entire population of Bayelsans should be done with caution.

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