

Original Research Article

Prevalence of hypertension and associated factors in a rural community in Bayelsa State

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ABSTRACT

Background: Hypertension is considered among the most common non-communicable diseases globally with significant morbidity and mortality. Closely related to it is pre-hypertension, a category between hypertension and normotension which is believed to be a forerunner to hypertension and cardiovascular disease. Hypertension has been on the increase in recent times, even in rural communities which were previously less affected. The study was carried during the world health day as a screening exercise to determine the prevalence of hypertension and its associated factors in a rural community.

Methods: This cross-sectional study was conducted in Ogboloma village, a small rural community in Bayelsa State, Nigeria. Consecutive sampling of all eligible participants who presented for the screening exercise was done. Socio-demographic data, clinical history, anthropometry and blood pressure were taken. Data was stored and analyzed using SPSS version 20.0.

Results: One hundred and thirty-one participants completed the study. There were 49(37.4%) males. The prevalence of hypertension was 50.4% while pre-hypertension was found in another 41.2%. Factors associated with hypertension on univariate analysis were age ($p < 0.001$) body mass index ($p = 0.038$) waist hip ratio ($p = 0.008$) hyperglycemia ($p = 0.030$) and smoking ($p = 0.009$). However, only age ($p = 0.004$) and smoking ($p = 0.037$) remained significant on multivariate analysis.

Conclusions: Hypertension and Pre-hypertension were highly prevalent in this rural community. Age and smoking were significant predictors of hypertension. Hypertension screening and control programmes should therefore target rural communities and smokers.

Keywords: Hypertension, Nigeria, Obesity, Pre-hypertension, Rural community, Smoking

INTRODUCTION

Hypertension, also known as high blood pressure ranks amongst the most common non-communicable diseases worldwide. High blood pressure is thought to account for about 9.4 million deaths globally, more than other medical conditions such as elevated body mass index (BMI), fasting plasma glucose, and total cholesterol combined.¹ Blood pressure is the hydrostatic pressure

exerted by circulating blood on the walls of a blood vessel. Although hypertension may initially be asymptomatic, uncontrolled hypertension may become complicated with serious end-organ damage such as heart disease, stroke, renal disease and blindness.²⁻⁴

To increase awareness about the increased risks resulting from elevated blood pressure, the concept of prehypertension was introduced. Prehypertension is a

category between normotension and hypertension and was proposed by the Seventh Report of the Joint National Committee (JNC-7) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure in 2003.⁵ It is defined as systolic blood pressure (SBP) of 120-139mmHg and/or diastolic blood pressure (DBP) of 80-89mmHg in adults. Apart from the risk of developing clinical hypertension, patients with pre-hypertension are also at a higher risk of developing coronary artery disease and myocardial infarction.⁶

Hypertension is generally classified into primary hypertension, which accounts for over 90% with no identifiable cause but with usually recognizable risk factors; and secondary hypertension, which results from other diseases present in the body such as kidney disease, cardiovascular disease (CVD), coronary heart disease, etc.⁷ Although a few of the risk factors for primary hypertension, such as age, race and gender are non-modifiable, the majority of the other risk factors like tobacco use, alcohol, overweight and obesity can be effectively prevented.⁷

Although hypertension was initially thought to rare in Sub-Saharan Africa, the prevalence of hypertension has continued to rise in the sub-continent in recent years. This increasing trend has been observed not only in urban communities but among rural dwellers as well. A recent national multistage survey of 13,591 Nigerians reported a prevalence of 44.9%.⁸ This is notably high compared with past surveys from Nigeria which reported lower prevalence rates of between 20.2 to 36.6%.⁹ This suggests that the prevalence of hypertension may be on the increase. The rising prevalence may be partly attributable to progressive ageing of the population, changes in lifestyle and diet.¹⁰⁻¹²

The aim of this study was to determine the current prevalence and associated factors of hypertension in a rural population in Bayelsa State.

METHODS

The study was conducted in Ogboloma village in Gbarain community in Bayelsa State, Nigeria. Ogboloma is a small rural arid setting in Yenagoa local government area. The inhabitants are Ijaw-speaking and are mostly peasant farmers.

A cross-sectional design was used for this study. A consecutive sampling of all consenting adults that presented for a routine screening exercise during the World Health Day in April 2012 was done. Individuals who were less than 18 yrs old and pregnant women were excluded from the study.

Interviewer-administered questionnaire were used to obtain useful data from respondents. Interviewers were made up of medical doctors, nurses and counselors from the Niger Delta University Teaching Hospital (NDUTH)

located in Okolobiri, a neighbouring community. Approval was granted by the traditional ruler of the community before proceeding with the exercise. Prior notification was given to the residents of the community a few days before the programme by the village town crier. Informed consent was also obtained from each individual. Participants found to be hypertensive or diabetic or needing subsequent care were referred to NDUTH. The first part of the interview involved extraction of socio-demographic data, medical and social history from respondents. Demographic information obtained included age, sex, occupation, level of education, and marital status. Occupation was used to determine the job class which was categorized into the unemployed, lower, lower middle, upper middle and upper upper.¹³ Education was categorized into none, primary, secondary and tertiary while marital status was classified into single, married and 'terminated married'. 'The latter group was made up of the divorced, separated and widowed individuals. Clinical and social history obtained from participants included previous diagnosis of hypertension or diabetes, family history of hypertension and diabetes, history of alcohol ingestion and tobacco intake.

The second part of the interview involved clinical assessment of participants. Weight was assessed using a weighing scale after removal of shoes and wearing light clothing only and

recorded in kg. Height was measured using a stadiometer and recorded in metres. The body mass index (BMI) was calculated from the formula: weight/height² and recorded in kg/m². BMI was classified into underweight, normal weight, overweight and obese categories according to the WHO classification.¹⁴

Waist circumference (WC) was measured at a level midway between the lower rib margin and the iliac crest with the tape around the body in a horizontal position to the nearest 0.1 centimeter. Waist circumferences of >80.0cm and >94.0cm were considered as 'increased' for women and men respectively while lesser values were considered normal.¹⁵ With the measuring tape positioned along the widest diameter of the hips, the hip circumference was measured and read to the nearest 0.1cm. Waist hip ratio(WHR) was obtained by dividing the waist circumference by the hip circumference. Values of >0.8 and >0.9 were considered as increased for men and women respectively and lesser values considered normal.¹⁶

Blood pressure (BP) was measured by an Accoson mercury sphygmomanometer. Participants must have avoided alcohol, cigarette smoking and coffee for at least 30 minutes before the measurement. They sat on a chair with their feet flat on the floor and arm resting on a table such that the arm cuff was at their heart level. The cuff was securely applied to the upper arm of the participants using the fastener strip. BP was taken from the left arm

after at least 10 min of rest using appropriate cuff size. The mean of two readings taken at least 2 min apart was determined. Hypertension was defined as BP >140/90mmHg or previous diagnosis on anti-hypertensives.¹⁷ Stage I hypertension was defined as systolic blood pressure (SBP) between 140 and 160mmHg and/or diastolic blood pressure (DBP) of between 90 and 110mmHg while stage 2 hypertension was defined as SBP >160mmHg or DBP>110mmHg. Prehypertension was defined as BP >130/80mmHg but

less than 140/90mmHg. BP of less than 130/80mmHg was considered normal.¹⁷ For those with a previous diagnosed of hypertension, control of hypertension was defined as pharmacological treatment of hypertension associated with an average SBP <140mmHg and an average DBP <90mmHg.¹⁸ Random blood glucose was also assessed for each participant using an Accucheck glucometer. Hyperglycaemia was defined as any value >7.8mmol/l.¹⁹

Table 1: The socio-demographic and clinical data of participants.

Data	Male	Female	Total	X ²	P
Age (yrs)					
<40	16 (43.2)	21 (56.8)	37 (100.0)	3.85	0.15
40-60	26 (41.3)	37 (58.7)	63 (100.0)		
> 60	7 (22.6)	24 (77.4)	31 (100)		
Marital status					
Single	12 (80.0)	3 (20.0)	15 (100.0)	31.18	<0.001*
Married	36 (44.4)	45 (55.6)	81 (100.0)		
Terminated	1 (2.9)	34 (97.1)	35 (100.0)		
Education					
None	3 (6.5)	43 (93.5)	46 (100.0)	35.058	<0.001
Primary	8 (33.3)	16 (66.7)	24 (100.0)		
Secondary	16 (38.1)	26 (61.9)	42 (100.0)		
Tertiary	12 (63.2)	7 (36.8)	19 (100.0)		
Job class					
Unemployed	8 (53.3)	7 (46.7)	15 (100.0)	13.906	0.002*
Lower lower	21 (25.6)	61 (74.4)	82 (100.0)		
Lower middle	19 (57.6)	14 (42.4)	43 (100.0)		
Upper middle	1 (100.0)	0 (0.0)	1(100.0)		
Alcohol					
Yes	38 (48.1)	41 (51.9)	79 (100.0)	9.73	0.001*
No	11 (21.1)	41 (78.9)	52 (100.0)		
Smoking					
Yes	18 (81.8)	4 (18.2)	22 (100.0)	22.28	0.001*
No	31 (28.4)	78 (71.6)	109 (100.0)		
BMI					
<18.5	2 (28.6)	5 (71.4)	7 (100.0)	4.92	0.178
18.5-24.9	28 (35.9)	50 (64.1)	78 (100.0)		
25.0-29.9	16 (51.6)	15 (48.4)	31 (100.0)		
>30	3 (20.0)	12 (80.0)	15 (100.0)		
Hyperglycaemia					
Yes	5 (38.5)	8 (61.5)	13 (100.0)	0.0069	0.934
No	44 (37.3)	74 (62.7)	118 (100.0)		
Family Hx of HTN					
Yes	4 (44.4)	5 (55.6)	9 (100.0)	0.651	0.452
No	45 (36.9)	77 (63.1)	122 (100.0)		
Hx of Diabetes					
Yes	5 (83.3)	1 (16.7)	6 (100.0)	5.665	0.017*
No	44 (35.2)	81 (64.8)	125 (100.0)		
Family Hx of DM					
Yes	3 (60.0)	2 (40.0)	5 (100.0)	0.362	0.270
No	46 (36.5)	80 (63.5)	126 (100.0)		

Hx = history, HTN= hypertension, DM= diabetes mellitus

Data analysis

The Statistical Package for Social Sciences (SSPS Inc., Chicago, IL, USA) version 20.0 statistical software was used for data storage and analysis. Descriptive data were presented as frequencies and percentages. Mean and standard deviation were analyzed for continuous variables. Inferential statistics were analyzed with chi-square test and univariate logistic regression to define the

association between hypertension and potential risk factors. Factors that were found to be associated with hypertension on univariate analysis were fed into multivariate logistic regression model to identify factors which were independently associated with hypertension.

RESULTS

Socio-demographic data

Table 2: Association of hypertension with socio-demographic and clinical factors.

Risk factor	Hypertension (%)		Total (%)	X ²	P
	Yes	No			
Age					
<40	7(18.9)	30(81.1)	37(100.0)	20.475	<0.001*
40-60	39(61.9)	24(38.1)	63(100.0)		
> 60	20(64.5)	11(35.5)	31(100.0)		
Marital status					
Single	7(46.7)	8(53.3)	15(100.0)	0.329	0.870
Married	40(49.4)	41(50.6)	81(100.0)		
Divorced	19(54.3)	16(45.7)	35(100.0)		
Separated					
Education					
None	25(54.3)	21(45.7)	46(100.0)	2.680	0.444
Primary	11(45.8)	13(54.2)	24(100.0)		
Secondary	18(42.9)	24(57.1)	42(100.0)		
Tertiary	12(63.2)	7(36.8)	19(100.0)		
Job class					
Unemployed	4(26.7)	11(73.3)	15(100.0)	5.066	0.139
Lower lower	42(51.2)	40(48.8)	82(100.0)		
Lower middle	19(57.6)	14(42.4)	43(100.0)		
Upper middle	1(100.0)	0(0.0)	1(100.0)		
Alcohol					
Yes	42(53.2)	37(46.8)	79(100.0)	0.617	0.432
No	24(46.2)	28(53.8)	52(100.0)		
Smoking					
Yes	17(77.3)	5(22.7)	22(100.0)	7.648	0.006*
No	49(45.0)	60(55.0)	109(100.0)		
BMI					
<25	35(42.2)	48(57.8)	83(100.0)	6.779	0.034*
25-29.9	22(68.8)	10(31.2)	32(100.0)		
≥30	9(56.2)	7(43.8)	16(100.0)		
WHR					
Raised	53(58.2)	38(41.8)	91(100.0)	7.365	0.007*
Normal	13(32.5)	27(67.5)	40(100.0)		
Hyperglycaemia					
Yes	10(83.3)	2(16.7)	13(100.0)	5.738	0.030*
No	56(47.1)	63(52.9)	118(100.0)		
Family Hx of HTN					
Yes	5(55.6)	4(44.4)	9(100.0)	0.103	1.000
No	61(50.0)	61(50.0)	122(100.0)		
Hx of Diabetes					
Yes	6(100.0)	0(0.0)	6(100.0)	6.193	0.028*
No	60(48.0)	65(52.0)	125(100.0)		
Family Hx of DM					
Yes	4(80.0)	1(20.0)	5(100.0)	1.824	0.365
No	62(49.2)	64(50.8)	126(100.0)		

*statistically significant, Hx=history

One hundred and thirty one (97.0%) out of a total of 135 participants completed the study. There were 49(37.4%) males. The mean age of participants was 48.4+14.9 yrs with a range of 20-90 yrs. Majority, 90(68.7%) were 40 years old and above. Eighty one (61.8%) participants were currently married. Majority, 82 (62.6%) of the participants were in the lower lower job class. Only very few, (19/131) had attained a tertiary level of education. The male participants had a higher level of education (p<0.001) and occupied a higher job class (p=0.002) compared with the female folks. More men as compared with females also took alcohol and tobacco (p=0.001 each). While five (10.2%) males had a previous history of DM, only one female (1.2%) had a previous history (Table 1).

Prevalence of hypertension and pre-hypertension

The prevalence of hypertension was 50.4%. Among the hypertensives, thirty eight had grade 1 hypertension while twenty nine had grade 2 hypertension. There was no significant difference in the prevalence rates of

hypertension between males and females (p=0.084). Twenty-one (16.0) were previously diagnosed hypertensive. Of this proportion that was previously diagnosed, blood pressure was poorly controlled in 13 (61.9%) of them.

Pre-hypertension was present in 54 accounting for 41.2 % of all participants. There was also no significant difference in the prevalence of pre-hypertension across gender (p>0.05). Only 11(8.4%) participants had normal blood pressure.

Association of risk factors with hypertension

Hypertension was more common in those with a previous diagnosis of DM (p=0.028) Table 2.

On univariate analysis, the following factors were associated with hypertension: Age (p <0.001), smoking (p=0.009), generalized obesity (p=0.038), WHR (p=0.008), and hyperglycemia (0.030) (Table 3).

Table 3: Univariate regression analysis of factors associated with hypertension.

Variable	OR	CI	P
Age			
<40	1		<0.001*
40-65	6.964	2.648-18.319	<0.000
>65	7.792	2.584-23.496	<0.001
Gender			
Male	1		
Female	2.407	0.277-1.161	0.121
Level of Education			
None	1		0.450
Primary	0.711	0.264-1.914	0.556
Secondary	0.630	0.271-1.463	0.499
Tertiary	1.440	0.480-4.317	0.283
BMI(kg/m²)			
<25	1		0.038*
25-29.9	3.017	1.270-7.167	0.012
>30	1.763	0.599-5.190	0.303
WHR			
Normal	1		
Raised	2.897	1.325-6.331	0.008*
Smoking			
No	1		
Yes	4.163	1.434-12.091	0.009*
Alcohol			
No	1		
Yes	1.324	0.656-2.672	0.433
Hyperglycaemia			
No	1		
Yes	5.625	1.182-26.776	0.030*

*statistically significant

However, on multivariate analysis, only age ($p=0.004$) and tobacco smoking ($p=0.037$) remained significantly associated with hypertension. Compared with those less than 40 years of age, participants that were between 40 and 65 years old and those above 65 years old had 6 and 7 times higher odds for hypertension. Similarly, the odd for hypertension among smokers was about 4 times higher than for non-smokers (Table 4).

Table 4: Multivariate regression analysis of factors associated with hypertension.

Variable	OR	CI	P
Age			
<40	1		0.004*
40-65	5.946	1.983-17.830	
>65	7.683	1.978-39.836	
Hx of DM			
No	1		0.999
Yes	0.000	0.000	
BMI			
Normal	1		0.508
Overweight	1.770	0.473-6.627	
Obesity	1.686	0.592-4.796	
WHR			
Normal	1		0.677
Raised	1.230	0.464-3.261	
Smoking			
No	1		0.037*
Yes	3.610	1.080-12.068	
Hyperglycaemia			
No	1		0.625
Yes	1.452	0.325-6.497	

* statistically significant

DISCUSSION

The prevalence of hypertension in this rural community was alarmingly high. This finding is in keeping with recent trends in prevalence of hypertension. Hypertension has been reported to be on the increase in both urban and rural setting in Nigeria as in the case in most countries in sub-Saharan Africa. The prevalence of hypertension is higher than that reported in earlier studies in urban communities in the same state. Egbi et al, reported a prevalence of 27.8% among civil servants and 21.3% among urban hospital employees in Yenagoa, Bayelsa State.^{20,21} The rate is also higher than older reports from neighbouring rural communities in the Niger Delta. Onwuchekwa et al, reported a prevalence of 18.3% in Kegbara-Dere in Rivers State, Ofili et al, 44% in Delta State, Isara et al (37.8%) in Edo state and Akpan et al, (44.3%) in Akwa-Ibom.²²⁻²⁵ This wide margin may suggest an upsurge in prevalence of hypertension in recent years. It also suggests that rural communities are not left out in this rampaging scourge. Akpan et al, reported an even higher prevalence of hypertension in

rural communities (44.3%) compared with urban cities in Akwa-Ibom. Also worrisome is the high prevalence of pre-hypertension in this study. Similarly, Okwonu et al, reported a prevalence of pre-hypertension of 45.5% among apparently healthy adults in south-east Nigeria. In that same study, the prevalence of hypertension was 37.8%.²⁶ Pre hypertension is known to generally increase the risk for cardiovascular disease.²⁷ This calls for urgent attention and intervention.

The factors associated with hypertension in this study in univariate analysis were age, BMI, waist hip ratio, smoking, history of diabetes, and hyperglycemia. Hypertension was noticed to be progressively more prevalent with increasing age ranging from less than 20% in those less than 40 to about 65% in those greater than 60 yrs old. Age was the most potent factor associated with hypertension in this study. This relationship of hypertension with age is an aged and well established one.²⁸ Therefore, the elderly should be primary target of hypertension prevention and control. Screening for hypertension, health education and intervention measures should be directed towards this vulnerable group.

In this study, WHR showed a stronger association with hypertension than BMI though in multivariate analysis, it didn't remain strong. WC and WHR are standard measures of abdominal adiposity while BMI measures overall adiposity. Excess intra-abdominal fat is associated with greater risk of obesity-related morbidity than is overall adiposity. Dalton et al identified WHR as the most useful measure of obesity to use to identify individuals with CVD risk factors.²⁹ Similarly, some reports have shown a positive association between WHR and hypertension.³⁰ However, Egbi et al found a better correlation between waist circumference and hypertension.²⁷

Smokers were four times more likely to be hypertensive compared with non-smokers in this study. The association between hypertension and smoking remained even after adjustment for other factors in multivariate analysis. Similarly, Ezekwesili et al reported a very strong association between hypertension and smoking.³¹ Ajayi et al, however found no significant association between smoking and hypertension even though the latter was more prevalent among smokers.³² This may have been due to several factors, including the relatively small number of smokers in their study.

The hypertensive group had a higher proportion of participants with hyperglycaemia compared with the normotensive group. Also, a personal history of DM was more rampant in the hypertensive group of participants compared with the normotensive group. However, the association became weaker on the final regression analysis. Significantly higher levels of blood sugar have been reported among hypertensive patients compared with normotensive controls.³³ Salmasi AM et al, reported a high prevalence of glucose abnormalities in

hypertensive patients attending a hospital hypertension clinic.³⁴ There is therefore need for regular screening of hypertensive patients for glucose abnormalities.

Education status and occupation did not have significant association with hypertension in this study. Similarly, Cushshieri et al, found that education and employment status had no significant association with hypertension on multivariate analysis though inconsistent with other reports where for instance, the level of education was found to have an inverse association with blood pressure.³⁵⁻³⁷

Alcohol intake was not associated with hypertension in our study. Similarly, Egbi et al found no significant association between alcohol and hypertension in their study.²¹ Conversely, chronic, heavy alcohol intake was associated with an increased incidence of hypertension among elderly Greeks.³⁸ Drinking was not however not graded in our study. It was simply dichotomized.

Limitations

The study is subject to recall bias. Some risk factors in this study e.g. tobacco and alcohol use were self-reported. This might cause an under- or overestimation of the actual levels of risks reported. In settings where certain behaviors are discouraged for instance, alcohol and tobacco consumption among women, there may be under reporting of such. Causality cannot be ascribed to any of the risk factors of hypertension studied, considering the cross-sectional design of the study. Some notable risk factors such as diet and sedentary lifestyle were not examined in this study. Since, blood pressure measurement was performed over a short period of time in a consultation room, one may not be able to exclude white coat hypertension.

CONCLUSION

In conclusion, the prevalence of hypertension and pre-hypertension were high in this rural population of Nigeria. Increasing age and positive history of smoking were independently associated with hypertension. Obesity and hyperglycemia were also positively related to hypertension though the relationship was weaker when compared to effect of age and smoking. The findings of this study thus suggest a need for regular, targeted screening of individuals especially the more elderly and those with other risk factors like smoking for hypertension. Hypertension when detected should be optimally treated in order to obviate possible complications. Individuals found to have pre-hypertension may need to be commenced on lifestyle modification therapy.

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