Hypertension in a Rural Community in Rivers State, Niger Delta Region of Nigeria: Prevalence and Risk Factors

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ABSTRACT

Background: Hypertension, a known independent and major risk factor for cardiovascular disease which was initially considered to be rare in sub Saharan Africa (SSA), is now a serious endemic threat and an important public health issue. Different studies in SSA have reported higher prevalence of hypertension in urban compared to rural areas. However more recent studies from the rural areas show an increasing pattern in hypertension prevalence. This may be attributed to the rapid 'westernization' of lifestyle in the rural Africa. Only few rural surveys have been conducted in the Nigeria oil-rich Niger Delta region necessitating this study with the aim of determining the hypertension prevalence and risk factors.

Methods:This was a rural community-based cross-sectional study involving 500 adults. A questionnaire administered by face-to-face interview was used to assess socio-demographic characteristics of the subjects. Medical history such as prior knowledge of blood pressure status and family history of hypertension were all elicited by the questionnaire. Height and weight measurement were done and body mass indices (BMI) calculated as weight in kilogram divided by the square of height in meters.

Results: There were 156 males and 344 females with male to female ratio of 1:2.3. The overall mean age was 41.32±17.0. The mean age for males was 42.84±17.8 and that for females was 40.62±16.6.The prevalence of hypertension in this rural community was 20.2 %. The mean systolic blood pressure was 120.46±21.59mmHg (Males 123.57±20.41mmHg; females 119.05±22.36 mmHg; p= 0.04) and the mean diastolic blood pressure was 73.86±12.63mmHg (Males 75.52±13.03mmHg; females 73.25±12.3 mmHg; p=0.502). The prevalence was found to be higher in males than females though not statistically significant (Males 20.5%; Females 20.1%; X^2 0.651; p = 0.72). There was a progressive increase of hypertension prevalence with age. (X^2 for trend = 69.434; p < 0.001). Pearson and Spearman' rho correlation analysis revealed that age, marital status, occupation, educational status and BMI correlated with hypertension in the study subjects while logistic regression analysis showed that BMI and age were the only positive predictors of hypertension in this study.

Conclusion: Hypertension and its risk factors, initially rare in the rural sub Saharan Africa, is now on the increase in addition to high burden of communicable diseases in this region. The increasingly high 'westernisation of lifestyle' may be part of the explanation for this. Hence there is need for an organised and deliberate health campaign and regular screening with adequate management in order to both reduce the incidence of

INTRODUCTION

Hypertension, a known independent and major risk factor for cardiovascular disease which was initially considered to be rare in sub Saharan Africa, is now a serious endemic threat and an important public health issue.[1] Across the world, there is an increasing prevalence of hypertension with a projected prevalence rate of

29.2% by 2025 affecting about 1.54 billion individual's globally.[2]

The Non Communicable Disease (NCD) survey carried out in Nigeria about two decades ago revealed a hypertension prevalence of 11.2%(9.8% and 14.6% in rural and urban settlements respectively).The Nigerian NCD studies however defined hypertension using a blood pressure cut off of ≥ 160/95 mmHg which was the definition at the time.[3] More recent studies have shown a much higher prevalence rates.[4-10] However most of these studies done in Nigeria were urban dominated and those involving rural areas were largely conducted in the South West, South- East and Northern Nigeria with only few rural surveys conducted in the Nigeria oil-rich Niger Delta region necessitating this study and need for more studies.

Many studies in SSA have reported higher prevalence of hypertension in urban compared to rural areas.[1,3,11] However more recent studies from the rural and semi-urban areas show an increasing pattern in hypertension prevalence[6-7]. This may be attributed to the rapid 'westernization' of lifestyle in the rural African community. With rapid industrialization and urbanization going on in Rivers State, Niger Delta region of Nigeria largely due to activities of multinational oil companies and particularly the proposed plan of Rivers State Government to create new cities out of the rural areas, this study will serve as a baseline for future studies since the rural community of study falls within the neighbourhood of this proposed city.

Major target-organ complications of hypertension, such as left ventricular hypertrophy,[128] diastolic dysfunction, congestive heart failure, ischemic heart disease, stroke, and renal failure, have been documented by various researchers in Nigeria and hence the need for their prevention by identifying the at-risk population and implementation of blood pressure control measures.[12-17] This study aims to determine the prevalence rate and risk factors of hypertension among adults in a rural community of Rivers State, Niger Delta region of Nigeria.

MATERIALS AND METHODS

This was a cross-sectional survey involving adults in a typical rural community of Rivers State, Niger Delta region of Nigeria. The community is mainly inhabited by children and their young and middle-aged mothers as well as the elderly men and women most of who have retired from active work whereas most of the young and middle aged men are affected by rural-urban migration.

The majority of the population in the community were involved in low-scale farming. Non-agricultural workers were mainly teachers in the primary and secondary schools in the community, and a few Local Government staff. Some inhabitants engaged in crafts such as welding, carpentry, moulding of blocks. Many were also engaged in petty trading but this was mainly limited to selling their farm products.

The conduct of the study fell into 3 stages (i.e. community mobilization which included meeting with the community Chiefs and general familiarization tour of the community.(ii) staff and instrument preparation which included recruitment and training of field assistants, preparation of questionnaire and assembly and check of instruments. (iii) data collection including administration of questionnaire and clinical measurement). There was an overlap between stages I and II. Stage I was useful in gaining the confidence of the leadership and people of the community and enhancing their acceptance of the research team.

A questionnaire was designed to elicit demographic and social information including age, gender, occupation, educational level, cigarette smoking, alcohol consumption and level of physical activity. Medical history such as prior knowledge of blood pressure status and family history of hypertension were all elicited by the questionnaire. Administration of questionnaire was by face-to-face interview by the researcher and field assistants who had been previously trained on this. Anthropometric and blood pressure measurements were done in a standardized manner. Participants were weighed barefooted using Hanson's weighing scale with

readings taken to the nearest 0.1 kg and their heights measured without foot wear and headdress to the nearest 0.1cm.

Body mass index (BMI) was calculated as weight in kilogram divided by the square of height in meters. WHO classification of BMI was used in this study to grade BMI.[18] Under weight- < 18.5 Kg/m^2; Normal Weight- 18.5 to 24.9 Kg/m^2; Overweight- 25 to 29.9 Kg/m^2; Obesity- > 30 Kg/m^2 .

The uppermost border of the iliac crest and the lower border of the costal margin (rib cage) were located and the midway between these points was identified and served as the position for measuring waist circumference.[19]Waist circumference ≥102cm for males and ≥88cm for females was regarded as abdominal obesity.[20]

Auscultatory method using Mercury Sphygmomanometer and appropriately sized cuff was employed in measuring blood pressure.[21]Sitting blood pressure was measured after subject had been comfortably seated for five minutes and the backand arm supported, such that the middle of the cuff on the upperarm was at the level of the right atrium (the mid-point of thesternum) and the legs uncrossed.[22]The blood pressure was read to the nearest 2mmHg with the first (korotkoff phase I) and last (korotkoff phase V) audible soundstaken as systolic anddiastolic pressure.[23]Hypertension is defined in the JNC 7 (Joint National Committee on Prevention, Evaluation, and Treatment report) criteria as blood pressure ≥ 140/90 mmHg or self-reported anti hypertensive medication use .[24]

Informed consent was duly obtained from the village Chiefs. Consent from each subject was obtained for the study. Approval of the Ethics committee of the University of Port Harcourt Teaching hospital was also obtained.

Data analysis: Statistical analysis was done using Statistical Package for Social Sciences (SPSS Inc, Chicago,IL) version 17. Results were expressed as either mean values (standard deviation) or proportions. Comparison for statistical significance was by student's t test for continuous variables and chi-square analysis for categorical variables. Epi info statistical package version 3.5.1 was used for chi-square for trend analysis.Pearson and Spearman' rho correlation test were used to determine the relationship between hypertension and its possible risk factors**.** Multivariate logistic regression was also done. A p-value of <0.05 was considered statistically significant.

RESULTS

Data collected from five hundred subjects were analyzed**.** There were 156 males and 344 females with male to female ratio of 1:2.3. The overall mean age was 41.32±17.0. The mean age for males was 42.84±17.8 and that for females was 40.62±16.6.

Table 1 shows the socio-demographic characteristics of the study subjects with or without hypertension. About 75% of the study

Parameters	Hypertension		Total N (%)	X^2; P value
	Yes N (%)	No N (%)		
Gender				
Male	32(20.5)	124(79.5)	156(31.2)	0.651; 0.72
Female	69(20.1)	274(79.9)	344(68.8)	
Marriage				
Single	05(3.9)	122(96.1)	127(25.4)	33.441;
Married	81(24.7)	247(75.3)	328(65.6)	<0.001
Widow/widower	15(36.6)	26 (63.4)	41(8.2)	
Separated /divorce	0(0)	04(100)	04(0.8)	
Occupation				
Farmer	70(27.9)	181(72.1)	251(50.2)	
Students	03(3.1)	93(96.9)	96(19.2)	30.256;
Government staff	10(25.6)	29(74.4)	39(7.8)	<0.001
Trader /others	18(15.8)	96(84.2)	114(22.8)	
Education level				
No Education	12(41.4)	17(58.6)	29(5.8)	
Primary Education	42(24.3)	131(75.7)	173(34.6)	
Secondary Education/ TdC	38(15.3)	210(84.7)	248(49.6)	14.556;0.002
Tertiary Education	09(18)	41(82)	50(10)	
Family history of hypertension	15(23.9)	48(76.1)	63(12.6)	
Yes	66(19.4)	274(80.6)	340(68)	
No	20(20.6)	77(79.4)	97(19.4)	0.472; 0.79
Do not know				
Alcohol consumption	61(21.6)	222(78.4)	283(56.8)	
Non drinker	08(17.4)	38(82.6)	46(9.2)	
Exdrinker	32(18.7)	139(81.3)	171(34.2)	0.991; 0.69
Current drinker				
Smoking Status	98(21.0)	368(79)	466(93.2)	
Non smoker	02(11.1)	16(88.9)	18(3.6)	
Ex- smoker	01(6.3)	15(93.7)	16(3.2)	3.216; 0.20
Current smoker				
Physical activity	10(25.6)	29(74.4)	39(7.8)	
Sedentary	91(19.7)	370(80.3)	461(92.2)	
Non sedentary				0.715; 0.39

TdC= trade certificate

As shown in figure 1, among those found to be hypertensive, 36.6% had a correct prior knowledge of their hypertension status while 43.6% had a wrong prior knowledge of their status. 19.2% of the hypertensive's in this study did not have prior knowledge of their blood

Figure 1: Prior knowledge of hypertension status among the study subjects and among hypertensives

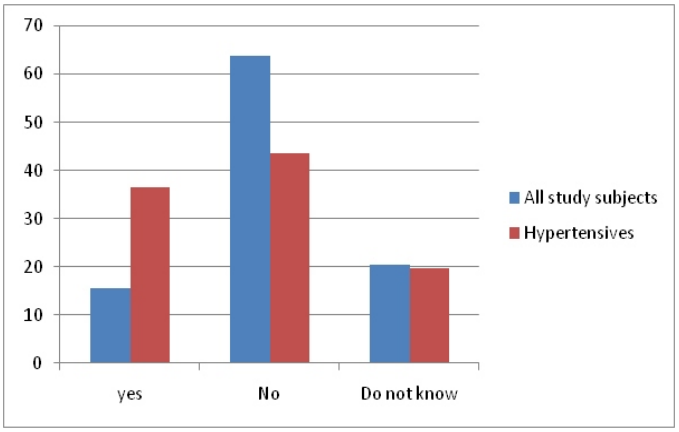
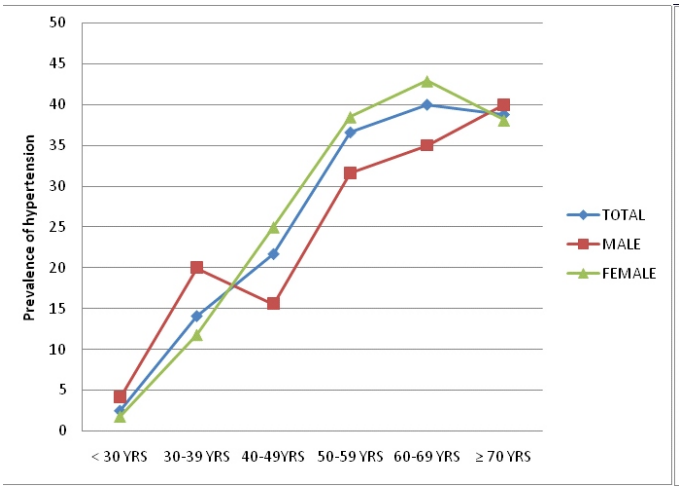


Table 2 shows that the mean systolic blood pressure was 120.46±21.59mmHg (Males 123.57±20.41mmHg; females 119.05±22.36 mmHg; p= 0.04) andcrude prevalence of hypertension in this study was found to be 20.2%.There was however, no significant gender difference in the prevalence of hypertension in this study (males 20.5%; females 20.1%; X^2 0.651; p = 0.72). Analysis also showed that 5.9% and 25.7 % of those diagnosed with hypertension had obesity and overweight respectively. While 15.8% of those with hypertension had high WHR, 6.8% of those with hypertension had an abnormal waist circumference (Males ≥ 102cm; females≥88cm).

	All subjects N= 500	Male N= 156	Female N=344	P value
Mean BMI (kg/m^2)	22.10±3.67	21.80±3.05	22.40±3.84	<0.001
Mean WC(cm)	71.68±9.94	72.55±8.78	71.36±9.90	<0.001
Mean HC(cm)	76.39±10.06	76.90±9.07	76.15±9.87	<0.001
Mean WHR	0.94±0.57	0.94±0.58	0.94±0.57	<0.001
Mean SBP(mmHg)	120.46±21.59	123.57±20.41	119.05±22.36	0.04
Mean DSP(mmHg)	73.86±12.63	75.52±13.03	73.25±12.30	0.50

SBP = systolic blood pressure; DBP= diastolic blood pressure**;** BMI= Body mass index; WC = Waist circumference; HC= Hip circumference; WHR= Waist-hip-ratio; N= number**;** **P*** = Significant

Figure 2 shows that, there is a progressive increase of hypertension prevalence with age. (X^2 for trend = 69.434; p < 0.001). This pattern was seen in both sexes especially in the females. In the entire study subjects, hypertension prevalence increased through the age group ranging from 2.5% in the age of less than 30 years to 40% in the age group of 60-69 years, before showing a slight dip in those ≥70 years.



Pearson and Spearman' rho correlation test (Table 3) of hypertension and its possible risk factors revealed that age, marital status, occupation, educational status and BMI correlated with hypertension in the study subjects. The logistic regression analysis done (Table 4) showed that BMI and age were the only positive predictors of hypertension in this study. The other variables did not predict the presence of hypertension among the study subjects.

Table 3: Pearson and Spearman' rho correlation analysis of hypertension and its possible risk factors.

Variable	r	P value
Age	-0.339	<0.001
Gender	-0.020	0.652
Marital status	-0.220	<0.001
Family history ofhypertension	0.018	0.694
Occupation	0.158	<0.001
Educational status	0.145	0.001
Alcohol	0.039	0.382
Cigarette smoking	0.079	0.076
Physical activity	0.038	0.399
BMI	-0.128	0.004
WHR	-0.002	0.966

Table 4: Logistic regression analysis of hypertension and variables (risk factors)

Variable	B	SE	P value	95%CI
Age	0.612	0.113	0.000	1.4792.299
Gender	-0.159	0.346	0.645	0.4331.680
Marital status	0.337	0.271	0.214	0.8232.384
Occupation	-0.027	0.098	0.782	0.8031.179
Educational status	0.120	0.199	0.548	0.7631.666
Alcohol	-0.107	0.144	0.454	0.6781.190
Cigarette smoking	-1.073	0.577	0.063	0.1101.060
Physical activity	-0.068	0.346	0.879	0.3902.241
BMI	0.683	0.202	0.001	1.3332.943
WHR	0.144	0.394	0.715	0.5332.502
Constant	-4.075	1.780	0.022	

DISCUSSION

The crude prevalence of hypertension of 20.2% found in this study is similar to the 20.3% reported in the study by Giles et al in a rural West African community but higher than the 15.4% reported in rural Maiduguri villages, North-Eastern Nigeria by Okesina et al and 17.3% in a rural community of India.[26,10,27] This lower prevalence in the rural Maiduguri and India studies may be related to the fact that whereas the present study included the elderly age group of over 70 years, the Indian study did not include this elderly age group who are more prone to hypertension. It is however lower than the prevalence of 46.4%[7], 30%[8] and 40.8%[5] reported in a rural community in Enugu state ,South-Eastern Nigeria , a rural community, South-Western part of Nigeria and an urban city in the Niger Delta region of Nigeria respectively. The higher prevalence obtained in the studies in Enugu and South-Western Nigeria may be attributable to the fact that whereas this present study included the young adults of less than forty years of age, the Enugu and the South-Western Nigerian studies were of adults from 40 years and 55 years respectively. This higher age cut off may explain the higher prevalence of hypertension found in those studies since it has been found that hypertension is commoner in the middle age and elderly.[3]

The urban study was done in Port Harcourt, a metropolitan highly industrialised city; this may explain the high prevalence here as there is increasing rate of westernisation affecting lifestyle including diet in the city which have been found to predispose to cardiovascular disease.[3] Earlier reports one to two decades ago from rural communities in Sub-Saharan Africa gave a significantly lower prevalence of ≤10% , which may be attributable to the fact that they used a higher blood pressure cut off value of 160/95mmHg unlike 140/90mmHg value used in this present study.[28] From the above, it is obvious that the burden of hypertension has assumed a rising trend even in the rural communities of Sub-Saharan African.

Similar to the findings in other studies, this study also showed a higher prevalence of hypertension in males (20.5%) than in females (20.1%) with hypertension rising with increasing age similar to what was reported in previous studies both globally and within the country of study.[7,10]

Correct knowledge of blood pressure status can be regarded as the first step in the prevention of the cardiovascular complications of hypertension as such knowledge can serve as a platform for making necessary health decisions and developing adequate healthy behaviour and lifestyle. In this study only 36.6% of the hypertensive had a correct prior knowledge of their hypertension status. This is similar to the recent findings in a study of hypertension prevalence and awareness in a market population.[4] It is also a worldwide finding.[29-30] The reason for this low knowledge of blood pressure status may be associated to the absence of health care facilities in this rural community and hence little to no health education for this rural populace. Even where health facilities exist, it has been found in a Nigerian study that there is poor education of patients by their health care givers.[31]

As documented by various other researchers, this study have also revealed that hypertension prevalence was significantly higher in those with primary education and below than in those with secondary education and above (p=0.002).The importance of education in relation to blood pressure management cannot be overemphasized.This study have also shown that hypertension prevalence was highest among widows and widowers. This may be associated to the psychosocial stress faced by this group of people. Psychosocial factors can affect the entire neuroendocrine system.[32] Only students in this study group had a low hypertension prevalence (3.1%).This may be because most of the students were in the younger age group who are less prone to hypertension. Family history of hypertension is an important risk factor for hypertension and as depicted in this study, study subjects with family history of hypertension had higher hypertension prevalence compared to those with no family history. This is consistent with the findings reported by other workers.[33-35] This further underscores the importance of

early, regular blood pressure checks and lifestyle modification by this at-risk group.

Although it has been reported that regular and long time cigarette smoking is associated with higher blood pressure, this study did not show any statistically significant difference between smokers and non-smokers(p=0.20).[36-37] Cigarette smoking makes blood vessels and blood cells sticky, allowing cholesterol and other dangerous fatty material to build up inside them. This is called atherosclerosis.[38]This in turn can lead to raised blood pressure and clot formation. The finding in this study may be because only a small percentage of our study subjects smoked cigarette. Several intervention studies suggest a short-term (develops in days to several weeks) pressor effect of three to eight alcoholic drinks per day, and decreases in blood pressure upon abstention or marked reduction in alcohol intake.[39] Again, in this study, the relationship between alcohol consumption and hypertension was not significant(P=0.69). This may be because heavy alcohol consumption was uncommon in this poor rural community.

Different studies have demonstrated the importance of regular exercise as it has been established to reducethe incidence of hypertension.[40-41] In addition to preventing hypertension, regular exercise has been found to lower bloodpressure in hypertensive subjects. In this study 19.7% of subjects who were physically active had hypertension unlike 25.6% reported among those who were sedentary. This also further buttresses the importance of physical activity in lowering blood pressure.

The logistic regression analysis established a positive and significant relationship of hypertension with age (p<0.001) and BMI(p=0.001).This is consistent with the findings by Ulasi ea.al.[4] Increasing age, overweight and obesity are all known risk factors for hypertension. Hypertension is about 6 times more frequent in obese subjectsthan in lean men and women.[42] Not only is hypertension morefrequent in obese subjects than in normal-weight control subjects,but also weight gain in young people is a potent risk factorfor subsequent development of hypertension.

CONCLUSION

Hypertension prevalence is high (20.2%) in this rural community and only 36.6% of study subjects had a correct prior knowledge of their high blood pressure status. Hypertension, initially rare in the rural sub Saharan Africa, is now on the increase in addition to high burden of communicable diseases in this region. The increasingly high 'westernisation of lifestyle' may be part of the explanation for this. Hence there is need for an organised and deliberate health campaign and regular screening with adequate management in order to both reduce the incidence of hypertension and to prevent hypertension associated morbidity and mortality.

LIMITATION

Determining the ages of study subjects posed a challenge as some of the subjects had no birth certificate. Their ages however were determined using historic events.[43-44]

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