Hypertension in Rural Niger Delta of Nigeria: Frequency and Correlates

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Abstract: Background And Aim: Hypertension remains a major cardiovascular disease globally and in particular sub-Saharan Africa including Nigeria. The challenge of control is the continuous monitoring of prevalence, risk factors and institution of primary prevention measures and adequate treatment programmes. This study reports the frequency of hypertension and its correlates in a rural adult population. **Methods:** A descriptive survey of adult population of a rural farming community, Umuobiri Odufor Etche in the Niger Delta, Nigeria, for hypertension and other cardiovascular risk factors. Data was analysed using SPSS version 17.0. **Results:** A total of three hundred adults aged 18 to 100 years were screened during the study. The mean age was 40.55 ± 17.30 years, mean body mass index BMI was 21.0 ± 4.06 Kg/m², mean systolic blood pressure was 120.02 ± 15.99 mmHg and mean diastolic blood pressure was 71.74 ± 11.18 mmHg. Fifty or 16.7% of all the adults surveyed had hypertension, 5% were obese and 12.3% were overweight. There were 160 females (53.7%) and 140 males (46.3%) with mean ages 43.8 ± 16.8 years and 36.8 ± 17.1 years, respectively. Mean total cholesterol was 4.2 ± 0.7 mmols/L in males and 4.4 ± 0.7 mmols/L in females, while mean fasting blood sugar was 4.9 ± 0.8 mmols/L and 4.8 ± 1.0 mmols/L in males and females, respectively. **Conclusion:** The frequency of hypertension in this rural community in the Nigeria's Niger Delta is high, so also are the frequency of other cardiovascular disease risk factors, especially tobacco use.

Key words: Hypertension, frequency, rural, Niger Delta, correlates.

1. Introduction

Hypertension is a major cardiovascular disease risk factor globally, affecting one billion people and causing 7.1 million deaths annually [1]. The effect of hypertension as a strong risk factor for cardiovascular disease is continuous, graded and independent of other risk factors [2]. The prevalence of hypertension varies widely depending on the population studied. Systolic blood pressure rises with age throughout life, while diastolic blood pressure rises with age, but plateaus at about 60 years of age and may decline there after [3]. Hence, there is a continuous rise in the prevalence of hypertension [4], especially isolated systolic hypertension such that between the ages of 65 and 85

years, prevalence is up to 70% to 85% [5] depending on the population. There has not been any large scale national survey in Nigeria in the last ten years, but previous figures of 8–10% and 10–12% in rural and urban populations respectively [6] using 160/90 mmHg as cut off for hypertension is likely to have changed significantly as a result of several factors. Epidemiological transition at variable rates in different parts of the country has a significant role in these changes. In terms of prevalence and incidence, there is wide variation depending on the population studied. Recent studies from eastern Nigeria showed hypertension prevalence rates of 42.2% [7] in a market population. Similar high prevalence rate has also been documented in other Africa countries [8, 9]. In the United States, prevalence is about 20% and an estimated fifty million (50 m) Americans require treatment for hypertension and African Americans

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have higher prevalence, incidence and more severe complications [10]. The demographic transition taking place in Sub-Saharan Africa including Nigerian imposes an increased burden of non-communicable diseases especially hypertension on the health systems. Also blood pressure detection, treatment and control remain poor in the sub-region [11, 12]. This study aims to document the current situation in the rural Niger Delta of Nigeria and contribute to the national data for planning of preventive measures at the community level.

2. Methods

This study was conducted in Umuobiri Odufor, a rural farming town in Etche Local Government Area of Rivers State, Nigeria. A consecutive sample of all adults aged 18-years and above who gave informed verbal consent for the study were recruited from a resident adult population of about 1000. Community mobilization and due consent were obtained from the community leaders, traditional head and chairman of the community development committee (CDC). Ethical approval for the study was obtained from the ethics committee of the College of Health Sciences of the University of Port Harcourt.

2.1 Data Collection

All the adults who were recruited were duly examined at the study center set up by the investigators after obtaining their social and demographic data. Blood pressure was measured with mercury sphygmomanometers in both arms and the mean calculated while observing standard protocol [13]. Waist and height circumferences were measured with standard tape measure, while weight was measured with a Dana^R bathroom scale standardized daily with a 10.0 kg steel weight.

2.2 Sample Collection and Analysis

Fasting venous blood samples (10 mls) were collected from all subjects each morning and

transported in cooling boxes to the University of Port Harcourt Teaching Hospital for laboratory analysis. Serum lipids were analysed using enzyme substrate method with the Randox[®] test kit for cholesterol estimation [Randox laboratories. 55 Diamond Road Crumlin, Country Antrim BT29 4QY, United Kingdom]. Fasting blood sugar was estimated by the glucose oxidase method.

Hypertension was defined using the JNC7 guidelines [14] [as systolic BP ≥ 140 and/or diastolic BP ≥ 90 mmHg] and obesity was based on the quality index, as BMI ≥ 30 Kg/m², as well as waist circumference ≥ 102 cm in men or ≥ 88 cm in women. All the data obtained were entered into the questionnaire designed for the study and analysed using SPSS version 17.0. Results were expressed as either mean $\pm$ standard deviation or percentages. Comparisons were done using student's t-test for continuous variables and chi-square test for categorical variables, while association was determined with Pearson's correlation test. A p-value of < 0.05 was considered statistically significant.

3. Results

A total of 300 adults participated in the study, 140 males (46.7%) and 160 females (53.3%) aged 18 to 100 years. The mean age in the group was 40.55 ± 17.30 years while in the males it was 36.81 ± 17.09 years and in the females it was 43.82 ± 16.86 years. Table 1 shows the age distribution and Table 2 shows the mean values for the descriptive statistics. Of the participants 57.3% (n = 172) were farmers, 25% (n = 75) were students and 17.7% (n = 53) were traders or civil servants.

The mean systolic blood pressure was 120.02 ± 15.99 mmHg and mean diastolic blood pressure was 71.74 ± 11.18 mmHg. Of all the adults surveyed, 16.7% (n = 50) had hypertension and none was aware of being hypertensive and none was receiving any form of treatment for hypertension. The mean BMI was 21.30 ± 4.06 Kg/m² and 82.66% (n = 248) of the subjects had normal body mass index, (BMI ≤ 24.9 kg/m²), 12.34% (n = 37) were overweight (BMI =

25.0–29.9 24.9 kg/m²) and 5.0% (n = 15) were obese (BMI $\geq$ 30.0 24.9 kg/m²); 94.7% had normal waist circumference, while 5.3% had high waist circumference.

The mean total cholesterol was 4.28 $\pm$ 0.68 mmol/L in all subjects, but 4.2 $\pm$ 0.7 mmols/L in males and 4.4 $\pm$ 0.7 mmols/L in the females. The mean LDL

cholesterol was 2.78 $\pm$ 0.62 mmol/L, while the mean total triglyceride was 1.33 $\pm$ 0.28 mmol/L and mean HDL cholesterol was 0.92 $\pm$ 0.18 mmol/L. A total of 6.3% of all the subjects had total cholesterol of >5.2 mmol/L. The mean fasting blood glucose in all subjects was 4.85 $\pm$ 0.93 mmol/L, while it was 4.9 $\pm$ 0.8 mmols/L in males and 4.8 $\pm$ 1.0 mmols/L in females.

Table 1 Age and sex distribution of subjects.

Age Range [Years]	Male		Female		Total	
	Number	Percent	Number	Percent	Number	Percent
<20	13	4.3	7	2.3	20	6.7
20-29	55	18.3	30	10.0	85	28.3
30-39	21	7.0	25	8.3	46	15.3
40-49	16	5.3	35	11.7	51	17.0
50-59	15	5.0	30	10.0	45	15.0
60-69	14	4.7	18	6.0	32	10.7
70-79	3	1.0	8	2.7	11	3.7
80-89	2	0.7	5	1.7	7	2.3
$\geq$ 90	1	0.3	2	0.7	3	1.0
Total	140	46.7	160	53.3	300	100.0

Table 2 Gender comparison of means.

Parameter	All Subjects	Male	Female	Mean Difference	95% Ci	P-Value
	Mean $\pm$ Sd	Mean $\pm$ Sd	Mean $\pm$ Sd			
Age [years]	40.55 $\pm$ 17.30	36.81 $\pm$ 17.09	43.82 $\pm$ 16.86	-7.01	-10.88 To -3.15	$\leq$ 0.001
BMI [Kg/M²]	21.30 $\pm$ 4.06	21.81 $\pm$ 4.32	20.86 $\pm$ 3.77	0.95	0.03 To 1.88	0.044
WC [cm]	73.86 $\pm$ 13.07	74.49 $\pm$ 13.8	73.31 $\pm$ 12.35	1.17	-1.83 To 4.18	0.440
SBP [mmhg]	120.02 $\pm$ 15.99	120.09 $\pm$ 14.85	119.1 $\pm$ 16.9	2.00	-1.61 To 5.61	0.277
DBP [mmhg]	71.74 $\pm$ 11.19	72.7 $\pm$ 10.7	70.9 $\pm$ 11.5	1.83	-0.70 To 4.36	0.155
FPG [Mmol/L]	4.85 $\pm$ 0.93	4.9 $\pm$ 0.8	4.8 $\pm$ 1.0	0.12	-0.09 To 0.33	0.262
TCH [Mmol/L]	4.28 $\pm$ 0.68	4.2 $\pm$ 0.7	4.4 $\pm$ 0.7	-0.15	-0.30 To 0.01	0.064

BMI- body mass index; WC- waist circumference; SBP- systolic blood pressure; DBP- diastolic blood pressure; FPG- fasting plasma glucose; TCH- total cholesterol; CI- confidence interval.

Table 3 Gender differences in prevalence of hypertension and other cardiovascular disease risk factors.

Risk factors for CVD	Male N = 140	Female N = 160	Total N = 300	X ²	P-Value
	Number [%]	Number [%]	Number [%]		
Hypertension	21 [7.0]	29 [9.7]	50 [16.7]	0.525	0.469
Overweight	18 [6.0]	19 [6.3]	37 [12.3]	0.067	0.796
Obesity by BMI	9 [3.0]	6 [2.0]	15 [5.0]	1.128	.0303
Abdominal obesity	4 [1.3]	12 [4.0]	16 [5.3]	3.188	0.074
Hyperlipidemia	10 [3.3]	9 [3.0]	19 [6.3]	0.290	0.590
Hypertriglyceridemia	21 [7.0]	13 [4.3]	34 [11.3]	3.512	0.061
High LDL-Dyslipidemia	3 [1.0]	2 [6.7]	5 [1.7]	0.363	0.547
Low HDL-Dyslipidemia	102 [34.0]	155 [51.7]	257 [85.7]	35.078	$\leq$ 0.001
Diabetes	6 [2.0]	6 [2.0]	12 [4.0]	0.056	0.813
Smoking	34 [11.3]	-	34 [11.3]	-	-

Among the subjects surveyed, 75.3% ($n = 226$) did not use tobacco in any form, while 13.3% ($n = 40$) used tobacco as snuff and 11.3% ($n = 34$) were current cigarette smokers. Among the 11.3% of the population who smoked, 75.3% smoked less than ten sticks of cigarette per day, while 24.7% smoked more than ten sticks of cigarette daily. All current smokers were males.

3.1 Hypertension and Its Correlates

Of the variables analyzed, only smoking and HDL showed significant and strong direct correlation with hypertension ($r = 0.162$, $p = 0.005$ and $r = 0.151$, $p = 0.009$, respectively). When hypertension was classified, systolic hypertension had a direct and significant correlation with total cholesterol, HDL and LDL ($r = 0.132$, $p = 0.022$; $r = 0.143$, $p = 0.013$; and $r = 0.118$, $p = 0.042$ respectively), while diastolic hypertension correlated with age ($r = 0.128$, $p = 0.027$) and smoking ($r = 0.150$, $p = 0.009$).

4. Discussion

The frequency of hypertension in this rural farming population (16.7%) was lower than the rate from other small scale studies from rural areas in Nigeria and Africa [8–10] that used 140/90 mmHg as cut off for the definition of hypertension, but higher than the value for the entire country about a decade ago [6]. The reasons for this can be deduced from the data which showed that majority of the subjects were farmers usually engaged in regular moderate physical activity and majority had normal body mass indices. Sedentary life style and obesity are well known risk factors for the development of hypertension [11] and the frequency of these were low in the subjects surveyed, hence the relatively low frequency of hypertension. It thus appears that while cardiovascular disease incidence is generally rising due to epidemiological transition in the country, rural farming communities are transiting slowly and therefore show relatively low frequency of hypertension and obesity. This is also reflected in the

mean total cholesterol in the subjects which was within the normal range, though the figures are higher than the mean total cholesterol for the country [6]. Also majority of the subjects had normal body mass indices and the incidence of obesity using BMI or the waist circumference was low at 5.0% and 5.3% respectively. These lower values are probably due to the high level of physical activity and the nature of the farming occupation. This is in contrast to studies from urban parts of the country which showed high prevalence of obesity and hypercholesterolemia [14–17]. The frequency of cigarette smoking in this rural farming community is relatively low and much lower than figures from some other parts of the world and in the country in general [6, 18]. There is however, high frequency of tobacco use in the form of snuff (smokeless tobacco) which also carries an increased risk of heart disease and low birth weight babies [19]. This high tobacco use rate is most probably fuelled by ignorance and lack of tobacco control measures. Thus in this predominantly farming population, cardiovascular disease risk factors such as hypertension, obesity and dyslipidemia is rising slowly in contrast to reports from other parts of the country, while the frequency of tobacco use is unusually high. However, the reason for the high prevalence of tobacco use, mainly in the form of snuffing or chewing, could not be identified. The strong correlation between hypertension and tobacco use and the high prevalence of tobacco use indicate that cardiovascular risk may rise sharply in the future.

5. Conclusion

The frequency of Hypertension in this rural farming community in the Nigeria's Niger Delta is high and other cardiovascular risk factors such as tobacco use and hypercholesterolemia also show high prevalence and strong correlation with hypertension.

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