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Assessment of the Prevalence of Some Cardiovascular Risk Factors among the Ogonis and Ikwerres in Rivers State, Nigeria

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Abstract: The prevalence of some cardiovascular risk factors among the Ogonis and Ikwerres in Rivers State, Nigeria was assessed in two hundred subjects. Well structured questionnaires were used to assess smoking status, duration of diabetes, age, weight, and height from the participants. Measurement of blood pressure was done to ascertain the blood pressure of the subjects. Analysis of fasting blood sugar was done to confirm diabetes status of participants. Body mass index (BMI), was calculated from the height and weight. The mean age of males in the study was higher than that of the females ($P=.05$). Mean SBP and DBP values were significantly higher ($P=.05$) among the Ikwerres and Ogonis. BMI was significantly higher for Ogonis than Ikwerres ($P=.05$). In the various categories of risk, BMI for males was diabetics (47.89), smokers (44.73) and hypertensives (45.37) for type III obesity which shows a higher risk for cardiovascular disease.

Keywords: Cardiovascular risk factors; Ogonis; Ikwerres; Diabetes; Smokers.

1. Introduction

Cardiovascular disease are the most common and yet one of the most preventable causes of deaths. Moreover, the risk of premature cardiovascular disease varies by ethnic group. White subjects, Afro-Caribbean and people of Africa descent have high incidence of stroke, and end stage renal failure [1]. South Asians, (from the Indian subcontinent and from East Africa) have a higher incidence of coronary heart disease[2].

Environmental and modification factors relating to diet and life style play an important role [3]. In 1991, the British government set new targets for the health of the nation, with coronary heart disease and stroke as key areas. The objectives are to reduce the levels for ill health and death caused by coronary heart disease and stroke, and risk factors associated with them. Different strategies were set up, for instance, to reduce blood cholesterol concentrations and smoking rates, with the major focus on the populations, mostly white of England and Wales.

Smoking cessation and reductions in cholesterol levels and blood pressure have been shown to be effective strategies in the prevention of cardiovascular disease [4]. However, these major classic cardiovascular risk factors and such non-modifiable risk factors as age, sex and family history cannot fully explain why some person develop myocardial infarction, stroke, and other cardiovascular disease, but other persons do not. Other factors may also increase the likelihood of developing cardiovascular disease and contributes to atherogenesis. Modifiable risk factors include dyslipidemia, hypertension, smoking, diabetes mellitus, obesity, physical inactivity, alcohol consumption and psychological factors [5].

Current guideline jointly accepted by the American Association and the American College of Cardiology are divided into two groups, namely: major independent risk factors and other risk factor⁶. The major and independent risk factors for cardiovascular heart disease are cigarette smoking of any amount, elevated blood pressure, elevated serum total cholesterol (LDL-C), low serum high-density lipoprotein cholesterol (HDL-C), diabetes mellitus, and advancing age. Other factors associated with increased risk for cardiovascular heart disease are obesity, abdominal obesity, physical inactivity, family history of premature coronary heart disease, ethnic characteristics, psychosocial factors, conditional risk factors and predisposing risk factors. The conditional risk factors are associated with increased risk for cardiovascular heart disease, although their causative, independent and quantitative contributors to cardiovascular heart disease have not been well documented[6].

Approximately eight million people belong to these two ethnic groups (Ikwerre and Ogoni). These groups are concentrated in and around inner cities. Morbidity and mortality from vascular disease and use of health care delivery are likely to be high in such areas, and the health of the Nation's strategies may not apply to these groups for which more tailored preventive strategies may be needed.

Cardiovascular disease refers to the class of disease that involve the heart and (or blood vessels (arteries and veins) while the term technically refers to any disease that affects the cardiovascular system. It is usually used to refer to those related to atherosclerosis (arterial disease). These conditions have similar causes, mechanisms and treatments to cardiovascular disease in a general diagnostic category consisting of several separate diseases of the heart and circulatory system. In 1997 alone, nearly 1 million people died of cardiovascular disease, which was about 40 percent of all deaths[7]. The two most important components are urinary heart disease and cerebrovascular disease, with 460,390 dying of coronary heart disease and 158,060 dying of cardiovascular disease in 1998. In 2000, it was estimated that cardiovascular disease carried health expenditure cost of \$186 billion and an additional indirect costs of \$190 billion, making these disease a continuing major contributor to the escalating cost of health care in the United States[7].

The qualitative relationship between these risk factors and urinary heart disease risk has been elucidated by the Framingham Heart study and other studies, which show that the major risk factors are addictive in predictive power. Accordingly, the total risk of a person can be estimated by a summary of the risk imparted by each of the major risk.

Type 2 diabetes is of particular concern because it is also common and usually occurs in persons of advancing age, when multiple other risk factors co-exist. There is a growing consensus that most patients with diabetes mellitus, especially those with type 2 diabetes, belong to a category of high short-term risk when the risk factors of diabetic patients are summed, their risk often approaches that of patients (established) coronary heart disease [8].

Cigarette smoking has been established as a risk factor met only for lung cancer, emphysema, and bronchitis but also for coronary cerebral and peripheral vascular disease [7]. This association has been in many countries, among widely diverse ethnic groups, in both sexes, and across various adult age groups. In industrialized nations, cigarette smoking is a principal cause of preventable disease and premature death. Cigarette smoking is firmly established as a risk factor for coronary heart disease, peripheral vascular disease and stroke. One explanation for this relationship is that smoking is known to increase atherosclerosis. Atherosclerotic cardiovascular disease is the chief contributor to most death from smoking [9].

High blood pressure is a powerful risk factor for cerebrovascular disease as well as for coronary heart disease. An estimated 50 million people have high blood pressure, defined as a level equal to or greater than 140mmHg systolic pressure or 90mmHg diastolic, or as being on a regimen of antihypertensive medication [10].

Lipid profile is a lipid test that measures the levels of lipids such as total cholesterol, triglyceride (TG), high-density lipoprotein (HDL), low density lipoprotein (LDL) and very low density lipoprotein (VLDL) to assess risk of cardiovascular disease. Low density lipoprotein (LDL), an important risk factor for coronary heart disease, is made up of particles of various sizes and densities. Clinical studies have established that individuals with a small, dense LDL sub-fraction profile are likely to develop coronary heart disease [3]. These small dense LDL sub-fractions are more susceptible to oxidations than large, lighter ones and once oxidized, promote foam –cell formation, initiate endothelial dysfunction and thereby promote atherogenesis in a variety of ways.

The aim of this work was to assess the prevalence of some cardiovascular risk factors among Ogoni and Ikwerre ethnic groups in Rivers State, Nigeria; and to provide an appropriate guideline or intervention for the risk reduction in the region. Also, to monitor progress in maintaining good health in the region.

2. Materials and Methods

2.1. Study Area

The sample was collected from subjects of Ogonis and Ikwerres in Rivers State, Nigeria. The subjects consisted of males and females who were randomly sampled from Ogonis and Ikwerre ethnic groups. The sampling from Ogonis ethnic group was done at Elele. A total of 100 subjects were sampled amongst the Ogoni subjects while the Ikwerre subjects were 100 in number.

2.2. Physical Measurements

Height was measured without shoes to the nearest cm using ruler attached to the wall, weight was measured to the nearest 0.1kg on an electronic scale with the subject wearing light indoor clothing and no shoes.

The body mass index (BMI) was calculated as weight (kg) divided by the square of the height (m). After the subject had rested for at least 10 minutes in a supine position, systolic and diastolic blood pressure were taken three times, with two minute intervals between measurement, using an automatic ultrasound sphygmomanometer (Arteriosound), Roche Products, Welweyn Garden City, UK) (PH). Blood pressure was measured in the left arm using cuts of a size appropriate to the arm circumference; the average of the last two readings was used for the analyses.

2.3. Collection of Blood Sample

Blood was collected by venepuncture. Blood for glucose was collected into fluoride oxalate bottle. The plasma for glucose determination was done by glucose oxidase method.

2.4. Determination of Fasting Blood Sugar

Fasting blood sugar was determined by enzymatic colorimetric method.

2.4.1. Principle

Glucose oxidase catalyses the oxidation of glucose to give hydrogen peroxide and gluconic acid. In the presence of hydrogen peroxidase the hydrogen peroxide is broken down and the oxygen released reacts with 4-aminophenrazone and phenol to form quinoneimine. The colour intensity determined by absorbance is proportional to the glucose concentration.



2.4.2. Procedure

The blood samples were transferred into tubes and centrifuged for five minutes at 12000rpm using Gallenkamp centrifuge. The supernatants (plasma) were separated and arranged accordingly to the number on the tubes. Three set of test tubes were arranged in test tube rack and 20µl of standard, plasma and distilled water were transferred into separate test-tube that contained 2.0ml of glucose reagent each using micropipette, then, the contents were mixed and incubated in water bath for 10 minutes at 37°C. Thereafter, the absorbance of the samples was read against the reagent blank at 530nm using labtek electronic controlled photo colorimeter.

Calculation – the concentration of fasting blood sugar was calculated using the formula.

$$\text{Glucose concentration} = \frac{A_{\text{sample}}}{A_{\text{standard}}} \times \text{standard concentration}$$

Where

A_{sample} = charge in absorbance of sample

A_{standard} = charge in absorbance of standard

Standard concentration = 5.5 Mmol/L

Reference range = 3.3-5.5 Mmol/L

2.4.3. Statistical Analysis

From the population study, statistical analysis such as calculating mean, standard deviation, analysis of variance, t- test and risk score were done.

3. Results

Results were obtained from a total of 200 subjects for fasting blood sugar and body mass index (BMI). 100 were Ikwerre and 100 Ogonis.

These subjects had a history of diabetes type 2, and hypertension and smoking. The sub groups among the subjects were smokers, non-smokers, hypertensive, non-hypertensive, diabetes and non diabetes.

Among the Ikwerre subjects, 66 (66%) were males and 34 (34%) were females; while among the Ogoni subjects, 62 (62%) were male and 38 (38%) were females. The ages for Ogoni males were between 35 years and 75 years, while that for the females was between 35 years and 69 years.

The ages for Ikwerre males were between 35 years and 75 years. Among the Ogoni subjects, 22 were diabetics, 10 non-diabetics, 25 hypertensive, 23 smokers, 10 non-smokers, and 10 non-hypertensive. Among the Ikwerre subjects, 20 were diabetics, 11 non-diabetics, 19 smokers, 8 non-smokers, 32 hypertensive and 10 non-hypertensive.

Means and SD of all physical parameters for Ogoni male and female. The analysis of the means and standard deviation of age, weight, height, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), pulse rate, Body Mass Index (BMI) are shown in Table 1.

There were 62 male subjects with mean age of 59.09 ± 9.08 years and 38 female subjects with mean age of 50 ± 7.58 years. The mean age of the male subjects was significantly higher than the female subjects at ($P > .05$).

The mean weight and height of male subjects were 68.66 ± 13.7kg and 1.57 ± 0.19 meters, while the females were 71.48 ± 11.97 and 1.59 ± 0.12m respectively. There were not significant differences in means between the male and female Ogoni subjects at ($P > .05$).

The mean SBP and DBP of male subjects were 127.61 ± 32.93 mmHg and 94.19 ± 23.44 mmHg while the female subjects were 119.87 ± 29.8 mmHg and 86.19 ± 18.72 mmHg.

The mean pulse rate of male was 74.53 ± 12.57 beats per minute while female was 75.47 ± 10.28 beats per minute respectively.

The mean BMI for female and male subjects were observed to be 26.36 ± 6.74 and 26.38 ± 10.01 Kg/m². BMI were also not significantly different at $P > .05$ between the male and female subjects.

Table-1. Results of the mean \pm SD of all physical parameters for Ogoni males and females

Perimeters	Ogoni Males n=62 Mean \pm SD	Ogoni females n=38 Mean \pm SD	t-stat	t - critical two- tail	P-value
Age (years)	59.09 \pm 9.08	50 \pm 7.58	5.398975977	1.986977622	1.23654806 S
SBP (mmHg)	124.61 \pm 32.93	119.87 \pm 29.8	1.211434094	1.988610165	0.239809895 NS
DBP (mmHg)	94.19 \pm 23.44	86.19 \pm 18.72	1.883311094	1.986377356	0.077342133 NS
HT (m)	1.57 \pm 0.19	1.59 \pm .12	-1.527620644	1.984467417	0.171815719 NS
WGT (Kg)	68.66 \pm 13.19	71.84 \pm 11.97	-1.240403326	1.988610165	0.228603005 NS
Pulse Rate(mms)	74.53 \pm 12.57	75.47 \pm 10.28	-0.40793794	1.986672942	0.698288119 NS
BMI (Kg/m ²)	26.38 \pm 10.09	26.36 \pm 6.74	0.008877181	1.984722076	0.993563054 NS

SBP – Systolic Blood Pressure; DBP – Diastolic Blood Pressure; HT – Height; WGT – Weight; BMI – Body Mass Index; NS – Not Significant; S – Significant

3.2. Mean and SD of Physical Parameters Measured for Ikwerre Male and Female

The analysis of the means and standard deviation of age, weight, height, SBP, DBP, pulse rate and BMI measured for Ikwerre male and female are shown in table 2. There were 66 male subjects with mean age of 59.55 \pm 9.75 years and 34 female subjects with mean age of 52.21 \pm 7.26 years. The mean age of the male subject was significantly higher than the female subjects at ($P < 0.05$). The mean weight and height of male subjects were 67.97 \pm 14.41kg and 1.59 \pm 0.13cm, while the female were 71.38 \pm 10.28kg and 1.54 \pm 0.27cm respectively. The mean SBP and DBP for males subjects were 112.96 \pm 32.17 and 89.55 \pm 23.82 mmHg and SBP, DBP for female were 112.94 \pm 31.33 and 86.62 \pm 23.51 units regularly. The pulse rate for males was 73.92 \pm 13.79 beats per minute while for females, it was 73.24 \pm 16.39.

Analysis of the blood measure revealed that the blood pressure in the (SDP and DBP) male subject were not significantly different from their female counterpart. However, the mean BMI for female and male subjects were observed to be 21.13 \pm 6.69 and 20.26 \pm 5.55kg/m² respectively.

They are also not significantly different at $P = .05$.

Table-2. Mean and SD of physical parameters measured for Ikwerre males and females

Perimeters	Ikwerre Males n-66 Mean \pm SD	Ikwerre Female n-34 Mean \pm SD	t-start	t - critical	P-value
Age	59.55 \pm 9.75	52.21 \pm 7.26	4.243506183	1.9882691	$P = .05$ NS
SBP	112.96 \pm 32.17	112.94 \pm 31.53	0.001994817	1.99546776	$P = .05$ NS
DBP	89.55 \pm 23.82	86.62 \pm 23.57	0.587309989	1.99546776	$P = .05$ NS
HT	1.59 \pm 0.13	1.54 \pm 0.27	0.289090328	1.99394435	$P = .05$ NS
WGT	67.95 \pm 14.41	71.38 \pm 10.28	1.373492784	1.9872914	$P = .05$ NS
Pulse	73.92 \pm 13.79	73.24 \pm 16.39	0.209841507	2.00171598	$P = .05$ NS
BMI	20.26 \pm 5.55	21.13 \pm 6.69	0.648637525	2.00246632	$P = .05$ NS

SBP – Systolic Blood Pressure; DBP – Diastolic Blood Pressure; HT – Height; WGT – Weight; BMI – Body Mass Index; NS – Not Significant; S - Significant

Table-3. Comparison of SD of physical parameters measured in the various Categories of CAD risk factors among Ogoni subjects

Parameters	DM N=22	Non Dm n=10	Smokers n=23	Non smokers n=16	Hypertensive n=15	Non-hypertensive n=10	P-value
Age	55.06 ±10.34	57.44 ±6.12	60.13 ±10.15	54.66 ±9.58	55.90 ±10.31	55.95 ±9.52	P=.05 NS
SBP	147.66 ±22.54	87.97 ±1.55	103.78 ±34.24	132.86 ±32.02	154.22 ±8.89	87.43 ±11.65	P=.05 NS
DBP	120.7 ±18.32	77.78 ±9.29	90.87 ±28.67	109.55 ±23.61	125.35 ±11.23	77.5 ±9.45	P=.05 NS
HT	1.613 ±0.12	1.57 ±0.12	1.57 ±0.13	1.61 ±0.12	1.61 ±0.12	1.58 ±0.13	P=.05 NS
WGT	71.8 ±13.84	72.03 ±9.26	70.69 ±8.24	72.23 ±13.34	72.85 ±11.16	70.55 ±13.83	P=.05 NS
Pulse	78.98 ±10.86	74.72 ±11.69	80.48 ±11.59	76.55 ±11.12	79.12 ±10.98	75.14 ±11.45	P=.05 NS
BMI	28.44 ±6.54	28.71 ±6.44	29.32 ±5.80	28.31 ±6.68	28.45 ±6.70	28.66 ±6.23	P=.05 NS

SBP – Systolic Blood Pressure; DBP – Diastolic Blood Pressure; HT – Height; WGT – Weight; BMI – Body Mass Index; NS – Not Significant; S – Significant

The analysis of the means and SD of age, weight, height, SBP, DBP, pulse rate and BMI are shown in Table 3. The mean ages for diabetics, non-diabetics, smokers, non-smokers, hypertensive and non-hypertensive were significant at ($P=.05$). SBP, DBP, height, weight and BMI had no level of significance.

Table- 4. Comparison of means and SD of physical parameter measured in the various categories of CAD RFactors. among Ikwerre subjects

Parameter	Diabetics n=20	Non- diabetics n=11	Smokers n=19	Non- smokers n=8	Hypertensive n=32	Non- hypertensive n=10	P-value
Age	57 ±9.19	57.25 ±10.00	60.06 ±11.99	56.51 ±9.92	58.82 ±8.30	56.37 ±10.18	P=.05 NS
SBP	140.89 ±1 9.29	90.00 ±19.17	107.22 ±33.13	110.43 ±31.23	150 ±9.16	90.96 ±17.0	P=.05 NS
DBP	113.72 ±23.73	78.03 ±12.26	87.77 ±23.09	92.87 ±25.54	124.69 ±12.89	76.54 ±8.74	P=.05 NS
HT	1.59 ± 0.15	1.59 ±0.42	1.47 ±0.17	1.58 ±0.14	1.61 ±0.16	1.54 ±0.14	P=.05 NS
WGT	70.74 ±10.92	69.72 ±11.70	66.94 ±13.41	70.82 ±10.82	70.31 ±11.10	70.03 ±11.56	P=.05 NS
Pulse	76.87 ±10.57	68.46 ±20.09	72.56 ±19.33	71.56 ±17.14	77.13 ±9.36	69.21 ±19.73	P=.05 NS
BMI	24.72 ±6.55	24.67 ±8.02	19.94 ±9.98	25.73 ±6.38	23.61 ±6.50	25.20 ±7.84	P=.05 NS

SBP – Systolic Blood Pressure; DBP – Diastolic Blood Pressure; HT – Height; WGT – Weight; BMI –Body Mass Index; NS – Not Significant; S – Significant

The analysis of the means and SD of age, weight, SDP, DBP, pulse BMI, are shown in Table 4. The mean age of diabetics, non-diabetics, smokers, non-smokers, hypertensive and non-hypertensive are 57 ± 9.19 , 57.25 ± 10.00 , 60.06 ± 11.99 , 56.51 ± 9.92 , 58.82 ± 8.30 and 56.37 ± 10.18 years. The means of SBP and DBP were significant at ($P=.05$).

The means of height and weight were not significant at ($P=.05$). The mean BMI was not significant at ($P=.05$)

3.5. Comparison of Mean and SD of All Physical Parameters for Ogoni and Ikwerre Ethnic Populations

The analysis of the physical parameters is shown Table 5. SBP and DBP are 126.17 ± 44.63 mmHg and 109.85 ± 31.34 mmHg and 105.25 ± 25.94 mmHg and 91.95 ± 24.70 mmHg. The blood pressure were significantly different ($P=.05$) between two populations. The mean age for Ogoni and Ikwerre are 55.94 ± 9.44 (years) and 57.15 ± 9.65 years respectively.

Height and weight are 1.60 ± 0.12 cm and 1.59 ± 0.34 kg and 71.88 ± 12.34 cm and 70.12 ± 11.36 kg respectively. The mean BMI were 28.54 ± 6.67 kg/m² for Ikwerre. The means were significantly different at $P=.05$ between the two populations.

The pulse rate for Ogoni and Ikwerre are 77.45 ± 11.29 beats per minute's and 73.8 ± 14.84 beats per minutes respectively. There was no significant different at $P=.05$ in the means between the two populations.

Table-5. Comparison of mean and SD of physical parameters measures for Ogoni and Ikwerre ethnic populations

Parameters	Ogoni n= 100	Ikwerre n=100	P-value
Age	55.92± 9.94	57.15±9.65	P=.05 NS
SBP	126.17± 34.63	109.85±31.34	P=.05 NS
DBP	105.25±25.94	91.95±24.76	P=.05 NS
HT	1.60± 0.12	1.59±0.34	P=.05 NS
WGT	71.88±12.34	70.12±11.36	P=.05 NS
Pulse	77.45±11.29	73.8±14.84	P=.05 NS
BMI	28.54±6.47	24.69±7.45	P=.05 NS

SBP – Systolic Blood Pressure; DBP – Diastolic Blood Pressure; HT – Height; WGT – Weight; BMI – Body Mass Index; NS – Not Significant; S – Significant

4. Discussion

This study evaluated cardiovascular risk profile of male and female among the Ogonis and Ikwerre in Rivers State. Several known risk factors were employed to assess the prevalence of some risk factors among the two ethnic groups. Notable among the factors were diabetes, hypertension, body mass index, age and smoking status.

Mean SBP and DBP were also significantly high at ($P=.05$), in the various categories of CAD risk factors among Ogoni and Ikwerre subjects.

BMI was significantly high for Ogonis (28.54 ± 0.47) than Ikwerre (24.69 ± 7.45) at ($P=.05$).

A high BMI scores indicates greater risk for developing serious health problems, such as heart disease, stroke and diabetes.

Mean BMI distribution of subjects according to various categories of risk factors for CAD in Ogoni males showed that there was a strong relationship between the BMI as a risk factor for the categories of risk factor such as diabetics, smokers and hypertensive.

In these categories, then mean BMI were as high as 47.89, 44.73 and 45.37 for type 3 obesity, which shows a high risk for cardiovascular disease.

The females were not much affected since none of them was classified as a smoker in this study, but a few of the hypertensive and diabetes were classified under the type II obesity; which shows that the males in Ogoni are more prone to CAD than the females. The reverse was the case among the Ikwerre ethnic group, the females had a higher mean BMI for diabetics and hypertensive (40.82) for type III obesity; as opposed to the males who had no value for type III obesity.

5. Conclusions

Based on this study, three categories of cardiovascular risk factors were assessed to determine the prevalence of some cardiovascular risk factors among the Ogonis and Ikwerres.

The mean values for glucose, body mass index, and age were all significantly high at ($P=.05$).

Application of the risk prediction score based on Framingham Heart Study showed that (186%) of the study populations were at high risk of developing cardiovascular disease. Smoking, hypertension, diabetes were observed to have significant effects when the body mass index was considered at ($P=.05$).

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