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RESEARCH ARTICLE

PREVALENCE OF CARDIOVASCULAR DISEASE RISK FACTORSIN SEMI-URBAN COMMUNITIES OF NORTH-CENTRAL NIGERIA

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Abstract

Background: Several studies have estimated the prevalence of cardiovascular disease risk factors (CRFs) in various communities in Nigeria. However, few have investigated the prevalence patterns in semi-urban communitiesof North-Central Nigeria. We aim to determine the prevalence patterns of CRFs in this geographical location, as a result of the growing incidence of Sudden Cardiac Death (SCD) and Heart Failure (HF) in Nigeria.

Methods:A cross-sectional epidemiological study was conducted. The study was conducted across nine (9) local government councils in the southern part of Benue state, one of the six (6) states that make up the North-Central region of Nigeria. Overall, 108 participants aged > 18 years participated in the study. Risk factors were estimated by collecting information about the participants' age, weight, height, Body Mass Index (BMI), waist circumference, waist-hip ratio, systolic blood pressure, diastolic blood pressure, total cholesterol,HDL-cholesterol, triglyceride cholesterol, LDL-cholesterol, and fasting blood glucose. Questionnaires, results of laboratory and instrumental diagnosis were used to collect information about the variables.

Results: The overall mean of age was 50.35 ± 22.02 years. Findings showed that the prevalence of the examined cardiovascular disease risk factors was as follows: hypertension – 55(52.4%), generalized obesity (BMI > 30) – 10(9.26%)abdominal obesity –35 (32.4%) diabetes –9 (8.3%), hypercholesterolemia – 17(15.7%). The result also indicated an increase in the prevalence of hypertension with an increase in age; the indices of obesity increased significantly with age but later decreased slightly among the elderly.

Conclusion: Findings from the study revealed that about half of the population were hypertensive. Other key risk factors were also prevalent in this population. There is a call on relevant stakeholders for important preventive and control initiatives for awareness, as this population is at high risk of the complications that arise from the underlying disease conditions.

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Introduction:-

Background:

Worldwide, cardiovascular diseases (CVDs) are the number one cause of death [1], as more people die annually from cardiovascular diseases than from other noncommunication diseases. An estimate of 17.9 million people died from CVDs in 2016, representing 31% of all global deaths [7]. Among these deaths, an estimate of 7.4 million resulted from coronary heart disease and 6.7 million resulted from stroke [2]. Most of CVD deaths take place in low- and middle-income countries and occur almost equally in men and women [3]. Out of the 17.9 million premature deaths (under the age of 70) due to non-communicable diseases in 2015, 82% were in low- and middle-income countries, and 37% were caused by CVDs[4].Most CVDs can be prevented by addressing modifiable risk factors such as; cigarette smoking, poor diet, obesity, lack of exercise, and alcohol abuse using population-wide strategies [5].There is a need for prompt screening and management of people with cardiovascular disease or who are at high risk due to the presence of one or more risk factors such as hypertension, diabetes, hyperlipidemia, or already established disease.Hypertension represents about 9.4 million (16.5%) of all deaths, including 51% of deaths from stroke and 45% of deaths from coronary artery disease[6]. The World Health Organization (WHO) predicts that the number of people who die from CVDs (mainly from heart disease and stroke) will to rise to 23.3 million if no preventive measures are put in place by 2030[7], and CVDs are projected to remain the single leading cause of death [8].There is a high burden of CVDs in developing countries, which can be attributed to the increasing prevalence of atherosclerotic diseases. The upward trend of CVDs in developing countries is driven by urbanization and increasing levels of modifiable risk factor levels[9]. These risk factors include cigarette smoking, lack of physical activity, poor diet, high intake of fatty foods, high salt intake, hypertension, dyslipidemia, visceral obesity, and excess alcohol intake [10]. The rapid increase of CVDs in sub-Saharan Africa is likely a result of the increasing prevalence of some of these modifiable risk factors [11].Children, illiterates, semi-illiterates, and retirees (who returned from cities after retirement), all of whom usually belong more to the low- and middle-socioeconomic class, are the dominant inhabitants of semi-urban communities. CVD risk factors among semi-urban dwellers have been thought to be intermediate in occurrence between the rural and urban communities due to integration between westernized and traditional lifestyles amongst the inhabitants [10, 11].It is paramount to estimate the proportion of the population at the high overall risk of CVDs, in order to provide an evidence-based context for government and health policy stakeholders, to facilitate a competent health care planning and resource management. This study was therefore carried out to estimate the prevalence of major cardiovascular risk factors amongst men and women who are 18 years and older, living in a semi-urban area of Nigeria.

Methods:-

Study area:

Nigeria, a sub-Saharan country, represents the most populous country in Africa, with an estimated population of about 190 million people [12]. The country is made up of six (6) geopolitical zones with a total of 36 States and the Federal Capital Territory in Abuja. One of the geopolitical zones - the north-central zone, is comprised of 6 states (Benue, Kogi, Kwara, Nasarawa, Niger, and Plateau) and the Federal Capital Territory (FCT Abuja).Although, each statecomprises of several tribes, with their respective language(s), however, Hausa language is a universal language in this region. The study was conducted in Benue state. Benue state is divided into three senatorial districts (Benue South, Benue North-East, and Benue North-west). The study area was Benue south, which is made up of nine (9) local government areas. A total of eight(8) communities (all semi-urban) were randomly selected.

Study population:

Benue State is tagged with a slogan of "Food basket of the nation," as farming and food production is the principal occupation in this state. Most of the inhabitants in these communities are of low socioeconomic status. They are mainly farmers, traders, and artisans. The state at large consists of two tertiary health care institutions; The Benue State University Teaching Hospital (BUTH) and the Federal Medical center (FMC), Makurdi.Most individuals in these communities rarely visitthe clinic (which is usually far, even if one exists). Hence, most depend on alternative medicine and traditional care homes. Residents of this area also patronize native doctors and healers, patent medicine dealers, and non-qualified practitioners for their medical needs. A convenient sample of 108 participants aged between18 years and 74 years were recruited for this study from medical records of the selected communities.Prior notices and permissions were obtained from the medical directors of these health centers.As the routine method of investigations at health centers include both subjective and objective clinical examinations, therefore, the results of laboratory and clinical assessments were easily extracted from medical records of primary health care centers in the communities. Extracted medical data include: fasting blood glucose, blood pressure

measurements, weight, height, hip and waist circumference, total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides (TG).

The WHO STEPS II questionnairewas utilized [13].The questionnaires were administered to some of the patients that were reachable for interviews.

Definition of risk factor:

Hypertension in an individual was defined as systolic blood pressure(SBP) greater than or equal to 140 mmHg and diastolic blood pressure (DBP) greater than or equal to 90 mmHg, or being on pharmacological treatment for hypertension[14]. The grades of hypertension were divided into; mild (systolic 140-159mmHg and diastolic 90 - 99 mmHg), moderate(160-179mmHg and diastolic 100-109 mmHg), and severe hypertension (greater than or equal to systolic 180mmHg and diastolic 110 mmHg). A fasting plasma glucose (FPG) level > 7.0 mmol/L, a reported history of diabetes, or the use of glucose-lowering drugs were the criteria used for diagnosing Diabetes Mellitus. Pre-diabetes or impaired fasting glycemia (IFG) was defined by FPG, ranging from 6.1 to 6.99 mmol/L. Patients found to have DM or IFG were reported to have abnormal glucose tolerance (dysglycemia). Body Mass Index (BMI) > 25kg/m^2 was defined as overweight, and BMI > 30kg/$m^2$was defined as generalized obesity. Abdominal obesity in men was defined as a waist circumference >94 cm and in women, a waist circumference >80 cm. Lipid abnormality was determined using a TG level > 1.7 mmol/L or being on a specific treatment for TG abnormality, reduced HDL-Cholesterol < 1.03 mmol/l in males 40 years and above and in females above 60 years. Waist-Hip Ratio (WHR) as an abnormality was defined as >0.90 for men and >0.85 for women. Concerning lifestyle risk, alcohol consumption was assessed by the number of drinks of beer per day; <2bottles or >2 bottles of drink.Tobacco use was determined by collecting data for the questions, ever smoked, currently smoking, and never smoked. Salt as a risk factor was determined by the addition of extra salt to the meal at the table. Ten-year risk of developing cardiovascular events were classified into mild, moderate, and severe risks, using the Framingham score.Analyses of data were performed with the use of the Statistical Package for Social Sciences (SPSS). Statistical analyses were conducted by expressing continuous variables as means ±standard deviation (SD) and categorical variables as frequencies and percentages.

Results:-

Baseline characteristics of participants:

The study was coducted on a total of 108 samples.There were 59females (54.63%) and 49 males (45.37%). The overall mean of age was 50.35 ± 22.02 years. Table 1 summarizes the distribution and characteristics of demographic variables among the group.

Table 1:- Basic socio-demographic characteristics of thestudy population.

Parameter	Male N (%)	Female N(%)	Total N (%)
Sex	49 (45.37)	59 (54.63)	108 (100.0)
MARITAL STATUS			
Single	13 (12.04)	5 (4.63)	18 (16.67)
Married	30 (27.78)	41 (37.96)	71 (65.74)
Widowed	5 (4.63)	10 (9.26)	15 (13.89)
Divorced	1 (0.93)	3 (2.77)	4 (3.70)
EDUCATION			
None	21 (19.44)	30 (27.78)	51(47.22)
Primary	18 (16.67)	15 (13.89)	33(30.56)
Secondary	6 (5.56)	8 (7.40)	14(12.96)
Tertiary	4 (3.70)	6 (5.56)	10(9.26)

EMPLOYMENT STATUS			
Unemployed	7 (6.48)	9 (8.33)	16 (14.81)
Trading	3 (2.78)	26 (24.07)	29 (26.85)
Farming	25(23.15)	12 (11.11)	37 (34.26)
Unskilled labor	8 (7.41)	4 (3.70)	12 (11.11)
Professional	4 (3.70)	6 (5.56)	10 (9.26)
Others	2 (1.85)	2 (1.85)	4 (3.70)
CIGARETTE SMOKING			
Yes	9 (8.33)	0 (0)	9 (8.33)
No	40 (37.04)	59 (54.63)	99 (91.67)
ALCOHOL INTAKE			
Yes	38 (35.18)	6 (5.56)	44 (40.74)
No	11 (10.19)	53 (49.07)	64 (59.26)
EXCESSIVE SALT INTAKE			
Yes	14 (12.96)	11 (10.19)	25 (23.15)
No	35 (32.41)	48 (44.44)	83 (76.85)
INTAKE OF FRUITS AND VEGETABLES			
Do not take	2 (1.85)	5 (4.63)	7 (6.48)
<3 days/week	31 (28.70)	42 (38.89)	73 (67.59)
>3 days/week	16 (14.81)	12 (11.11)	28 (25.93)
FAMILY HISTORY OF HYPERTENSION			
Yes	4 (3.70)	6 (5.56)	10 (9.26)
No	45 (41.67)	53 (49.07)	98 (90.74)
FAMILY HISTORY OF DIABETES			
Yes	3 (2.78)	5 (4.63)	8 (7.41)
No	46 (42.59)	54 (50.00)	100 (92.59)
INTENTIONAL PHYSICAL INACTIVITY			
Yes	1 (0.93)	4 (3.70)	5 (4.63)
No	48 (44.44)	55 (50.93)	103 (95.37)

71(65.74%)of the sample were married. The level of education showed that almost half of the study sample (47.22%) indicated no formal education. The most prevalent type of employment in this population is farming (34.26%). 91.67% of the study sample indicated that they do not smoke cigarettes or use tobacco. 59.26% of the population indicated that they consume alcoholic drinks while 76.85% add more table salt to their meals after preparation. More than half of the population (67.59%) eat fruits and vegetables less than three times a week. Inquiriesabout the family history of diseases revealed that 9.26% had a family history of hypertension, while 7.41% had a family history of diabetes. Lastly, information about physical activity indicated that only 4.63% were physically active.

The prevalence of the different cardiovascular disease risk factors among groups by gender, age, and sexare summarized in Tables 2–4.

Table 2:- Distribution of CVD risk factors of the study population by gender.

Variable	Male N=49 (%)	Female N=59 (%)	P-value
Age	27 (55.10)	36 (61.10)	0.279
Smoking	9 (18.37)	0 (0)	<0.001
Hypertension	26 (53.06)	29 (49.15)	0.847
Low HDL cholesterol	26 (53.06)	32 (54.24)	0.441
Elevated total Cholesterol	5 (10.20)	12 (20.34)	< 0.001
Elevated LDL	18 (36.73)	21 (35.59)	0.004
Overweight	24 (48.98)	18 (30.51)	0.021
Generalized obesity	3 (6.12)	7 (11.86)	<0.001
Abdominal obesity	13 (26.53)	22 (37.29)	<0.001
Impaired Fasting glucose	6 (12.24)	4 (6.78)	<0.001
Diabetes mellitus	3 (6.12)	6 (10.17)	< 0.001

Table 3:- Prevalence of cardiovascular risk factors by age group.

Age group	N	HTN N (%)	Overweight N (%)	Generalized obesity N (%)	Abdominal obesity N (%)	IFG N (%)	DM N (%)	↑ TG N(%)	↑Cholesterol N(%)	P-value
<30 years	6	1 (16.67)	1 (16.67)	1 (16.67)	2 (33.33)	1(16.67)	1(16.67)	0 (0)	0(0)	<0.001
31-40 years	4	2 (50.00)	1 (25.00)	1 (25.00)	2 (50.00)	1(25.00)	2(50.00)	0(0)	0(0)	<0.001
41-50 years	15	7 (46.67)	8 (53.33)	2 (13.33)	7 (46.67)	1 (6.67)	1 (6.67)	7 (46.6)	6 (40.0)	<0.001
51-60 years	19	9 (47.37)	10 (52.63)	2 (10.53)	8 (42.11)	2(10.53)	2(10.53)	3 (15.7)	6 (36.84)	<0.001
61-70 years	29	14(48.28)	11 (37.93)	2 (6.90)	11 (37.93)	3(10.34)	1(3.45)	9 (31.0)	3 (10.34)	<0.001
>70 years	35	22(62.86)	11 (31.43)	2 (5.71)	5 (14.29)	2(5.71)	2(5.71)	8 (22.8)	2 (5.71)	<0.001

Table 4:- Category of 10-year absolute cardiovascular risk by sex (using Framingham risk score).

Variable	Male N=49	Female N=59
Low risk	38 (77.55)	45 (76.27)
Intermediate risk	9 (18.37)	11 (18.64)
High risk	2 (4.08)	3 (5.09)

The prevalence of the different cardiovascular disease risk factors among the 108 samples were as follows: hypertension– 55cases(50.93%), generalized obesity (BMI > 30) – 10 (9.25%), abdominal obesity –35 (32.4%), diabetes – 9 (8.3%), hypertriglyceridemia – 27 cases (25%), hypercholesterolemia –17 cases (15.7%). Findings showed that most people in the population were physically active. 55(50.9%) of participants had hypertension, 9 (8.3%) had diabetes, and 10(9.25%) had pre-diabetes. Regarding those with hypertension, 34(61.8%) had stage I, while 21 (38.2%) had stage II. The prevalence of hypertension in the population increased with age, while indices of

obesity also increased significantly with age but later decreased slightly among the elderly.The results of clinical and biochemical diagnosis are summarized in Table 5.

Table 5:- Clinical and biochemical profile of the study population (± Standard Deviation).

Variable	Male N=49	Women N=59	Total N=108	P-value
Age	45.86 (19.55)	54.08 (23.39)	50.35 (22.02)	0.279
Weight (kg)	58.60 (11.64)	56.10 (12.54)	57.35(12.10)	0.028
Height (m)	1.62 (0.11)	1.55 (0.10)	1.59 (0.12)	<0.001
BMI (kg/m)	22.33 (4.98)	23.35 (5.01)	22.84 (5.02)	0.019
Waist circumference	84.31 (9.06)	85.64 (10.49)	84.98 (9.75)	<0.001
Hip circumference	88.51 (6.62)	92.83 (8.87)	90.67 (7.67)	<0.001
Waist hip ratio	0.95 (0.03)	0.92 (0.38)	0.935 (0.18)	0.026
Systolic BP (mmHg)	143.41(27.73)	142.60 (27.62)	143.01(27.55)	0.764
DiastolicBP(mmHg)	82.13 (13.60)	82.42 (13.74)	82.28(13.58)	0.478
Total cholesterol(mmol/l)	4.48 (0.86)	4.36 (1.16)	4.42 (1.12)	0.013
HDL-Cholesterol(mmol/l)	1.28 (0.33)	1.09 (0.46)	1.19 (0.37)	0.025
Triglyceride cholesterol(mmol/l)	0.82 (0.22)	0.94 (0.48)	0.88 (0.31)	0.044
LDL-cholesterol(mmol/l)	1.76 (1.09)	1.93 (0.84)	1.85 (0.94)	0.052
Fasting blood glucose(mmol/l)	4.73 (2.98)	4.45 (2.50)	4.60 (2.66)	0.067

The range of blood glucose of all participants was between 5.0 and 17.5 mmol/L (mean: 5.60 ± 2.66 mmol/L). Results of grouping cardiovascular disease risk factors into age categories showed that the highest prevalence ofhypertensionwas found in the among people older than 70 years (p value<0.001). In contrast to this, the highest prevalence of overweight was found among people between the age of 41 and 50 years. Obesity (both general and abdominal), Impaired Fasting Glucose (IFG), and diabetes were found to have the highest prevalence among people between the age of 31 and 40 years(pvalues<0.001). The prevalence of hypertriglyceridemia and hypercholesterolemia were highest among people between age 41 and 50. Statistical significance exists between the age groups and the risk factors, as all p values are <0.001.

Discussion:-

Globally, NCDs are becoming a significant cause of morbidity and mortality, particularly for developing countries [15]. For the developing countries, it is estimated that by the year 2020, 70% of deaths will be attributed to Non-communicable diseases [2]. In developing countries, the gradual rise in CVD burden is mostly the result of an increase in the prevalence of risk factors [16]. Cardiovascular risks with insidious onset and a long period of asymptomatic phase are usually not diagnosed early and not managed optimally. There is gender bias in favor of females in the study. This bias may be explained by the nature of the community, which is mainly inhabited by young/middle-aged mothers as well as the older men and women; in contrast, the young/middle-aged people are affected by rural-urban migration. The patterns in this study showed a significant prevalence of major modifiable CVD risk factors in these semi-urban communities. These risk factors in the population statistically increased with age and have similar patterns between sexes. An exception is measures of obesity, HDL-C, and total cholesterol that are significantly higher in women than in men. Hypertension recorded the highest prevalence among the study subjects. Whereas obesity, dysglycemia, and hypercholesterolemia were still relatively low. Obesity was a common risk factor in this study; however, there was a decrease in its prevalence with age. This decrease could be due to a high level of physical activity of the rural dweller, relating to their occupation, involving farming activities and other household chores. As compared with men, women had a significantly higher prevalence of obesity indices; this agrees with the findings of other studies in Nigeria and elsewhere in Africa [17]. The high prevalence of obesity among women may be due to the sedentary types of occupations among women, compared with men who are mainly involved in occupations that require physical mobility. Another possible reason for the higher prevalence of obesity among women is the fact that obesity is still "fashionable" among Nigerian women as it is believed to depict wealth.Type 2 diabetes mellitus is prevalence in the study was 8.3%, which is about 6.3% higher than the prevalence

for Nigeria by the International Diabetes Federation (IDF)[18].The high prevalence of cardiovascular risk factors calls for the urgent need for more public health attention and reinforcement of primary preventive strategies. Those detected to have cardiovascular risks were referred to healthcare facilities for management, and those with a high risk of developing cardiovascular events were encouraged to adopt a healthy lifestyle.

Conclusion:-

There was a significant prevalence of cardiovascular disease risk factors in the population. Findings from the study revealed that about half of the population is hypertensive. Other risk factors as well are prevalent in this population; example is diabetes that is about 6.3% higher than the national prevalence. There is, therefore, calls for a national awareness as this population is at high risk of the complications that arise from these poor health conditions, such as stroke, cardiac arrest, and heart failure. Finally, this report should serve as a call on relevant stakeholders for important preventive and control initiatives.

Limitations:

A key limitation of the study is its relatively small sample size gotten from the hospital; this sample may not be a representation of the general population.The inability to get a full lipid profile record may have influenced the results obtained on the prevalence of hypertension and dyslipidemia. The gender differences may also have been affected by the gender skew towards the female increase in number as there were more females than males in the study sample.

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