Original Article

Profile of Nonhypertensive Cardiovascular Risk Factors among Traders in the Calabar Metropolis, Nigeria

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Abstract

Background: The global burden of cardiovascular diseases (CVDs) is mainly driven by modifiable risk factors, with sub-Saharan Africa as the region to bear the brunt of the increasing burden. Emphasis has been on hypertension while side-lining the others to variable extents. Furthermore, the work environment, which plays an important role in the social life of adults has received less attention. This study aimed to identify nonhypertensive modifiable cardiovascular risk factors among traders in an urban market in Calabar metropolis, Nigeria. **Materials and Methods:** In this cross-sectional study, we collected data on demographic characteristics and cardiovascular risk profile from eligible traders at Marian market, using a structured interviewer-administered questionnaire. The anthropometric and blood sugar measurements of the participants were duly obtained. **Results:** A hundred and fifty-one traders comprising 97 (64.2%) females and 54 (35.8%) participated in the study. Physical inactivity (58.3%), obesity (33.1%), risky alcohol consumption (17.9%), diabetes (9.9%), and cigarette smoking (2%) were the identified modifiable cardiovascular risk factors. A greater proportion of the females was obese compared to the males (P = 0.009), whereas the males had greater proportions with physical inactivity (P = 0.003), risky alcohol consumption (P = 0.026), and cigarette smoking (P = 0.022). **Conclusion:** The proportion of nonhypertensive cardiovascular risk factors was high in the traders, with physical inactivity, obesity, and risky alcohol consumption identified as the most prevalent. Preventive measures to mitigate the increasing burden of CVDs should be extended to traders.

Keywords: Cardiovascular disease, diabetes, inactivity, noncommunicable diseases, nonhypertensive, obesity

Introduction

Currently, in low- and middle-income countries, about 80% of the burden of noncommunicable diseases (NCDs) is already occurring.[1,2] Cardiovascular diseases (CVDs) make up a large portion of the global burden of NCDs.[3,4] Fewer than 10% of all deaths worldwide were attributed to CVD at the onset of the 20th century. By the 21st century, it was implicated in about half of all deaths in the developed world and one-quarter in the developing world; by 2020, 25 million deaths are projected to occur annually, surpassing infectious diseases as the foremost cause of death and disability globally.[5-7]

It has been projected worldwide, that CVD would rapidly increase to become the foremost cause of death worldwide accounting for up to a third of all deaths in 2023. CVD is the foremost cause of death in persons older than 45 years in sub-Saharan Africa and accounts for most deaths in all the developing regions.[8] Globally, CVD is mainly driven by modifiable risk factors such as smoking, sedentary lifestyle, unhealthy diet, hypertension, obesity, dyslipidemia, and excess alcohol intake.[8] The increasing trend in the occurrence of CVD in sub-Saharan Africa is likely a consequence of the rising prevalence of some of these modifiable risk factors.[8]

Progressively, the burden of CVD in developing countries is huge, the concerning trends in cardiovascular risk profiles of adults and adolescents, and rising incidence in CVD in developing countries brings to the fore the urgent need to maximize treatment and prevention efforts.[9] This is imperative

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in Africa particularly in Nigeria, the most populous country in Africa, where the health-care expenditure per capita is a mere 4.6% of total Gross Domestic Product.[10] Prominence has been laid on hypertension, and rightly so, being the most common modifiable cardiovascular risk factor; sometimes at the risk of downplaying or side-lining the other risk factors.

Nigeria is projected to be the third most populous country in the world by 2050 resulting in an unbearable burden on the existing but overstretched health system, loss of effective manpower, and the workforce of adults in their prime, bringing about a steady decline in the standard of living.[11] Given the sheer size of the Nigerian population, the burden of the relatively less prominent nonhypertensive modifiable cardiovascular risk factors is expected to be enormous too.

The work environment, despite often being under-emphasized, plays a significant role in the social life of adults as they spend much of their waking hours performing activities related to their occupation which could be demanding, constraining, and stressful.[12] In Nigeria, urban market traders form a part of the informal labor sector, usually self-employed with no health insurance plans unlike the workers in multinational corporations and government-owned establishments. They often do not have the benefits of pre-employment medical screening and periodic medical checks. The nature of their job imposes time constraints for needed breaks and timely visits for medical checks, during work hours, as their absence from their stalls would lead to loss of income; thus, predisposing them to obesity, hypertension, stroke, and other CVDs. The aforesaid makes this set of the population a good target for focused preventive measures.

Effective preventive and intervention measures are informed by having a good grasp of the scope and burden of the prevalent CVD risk factors in a given setting. There are available studies on CVD risk factors in Nigeria, with a few on traders, which identified physical inactivity, obesity, and hypertension to be among the most common modifiable cardiovascular risk factors.[12,13] However, not much has been done on the prevalence of cardiovascular risk factors among traders in the oil-rich Niger Delta region of Nigeria.

This study was designed to identify and determine the prevalence of some cardiovascular risk factors, with a deliberate emphasis on factors besides hypertension, among traders in a major urban market in Calabar, in the Niger Delta region of southern Nigeria, to provide guidance for purposeful intervention and policies toward mitigating the menace of CVDs. This will also enrich current literature on the subject with the peculiarities of the experience from our region.

Materials and Methods

Study area

This study was conducted among traders in Marian market, an open urban market in Calabar; a tourist city in south-south Nigeria. The city with a population of 375,196 inhabitants, during the last national population census, serves as the administrative capital of Cross River state.[14] Marian market, which is the predominant urban market in the Calabar municipality council, was built over three decades ago within the central and commercial part of town close to the major entrance of the city ensuring easy access to and from the market. The market was estimated to have as many as 900 stalls and open shades where a variety of goods and services are sold by men and women between the hours of 6 am and 6 pm daily.

Study design and population

In this study, a descriptive cross-sectional study design was adopted among traders in the aforementioned urban market.

Eligibility criteria

Inclusion criteria:

- Those aged 18 years and above
- Traders who own and actively operate stalls and open shades within the market
- Those who have been selling in the market for a minimum of six months
- Those who spend up to 40 h a week in the market
- Those who gave informed consent.

Exclusion criteria:

- Shop assistants, mobile traders, and hawkers
- Pregnant women.

Sample size determination

An estimated minimum sample size (n) of 142 was derived using the formula $n = Z^2\ pq/d^2$ where Z is equal to 1.96, $P = 0.103$ based on previous study,[15] $q = (1 - p)\ 0.897$ and the margin of error (d) = 0.05.

Accounting for a possible maximum nonresponse rate of 10% in the study,

$q = 100/100\text{-}F$

Where q is the adjustment factor and F represents the estimated nonresponse rate.

$q = 100/100\text{-}10$

$= 1.11$

$= 142 \times 1.11$

$= 157.6$ approximately 158.

Sampling technique

There are two major markets in Cross River namely - the Watt and Marian Markets market and Marian market. One market was randomly selected by balloting-Marian market.

All eligible traders who met the inclusion criteria were serially recruited into the survey (health promotion outreach) between November 4 and 5, 2019, until the sample size was met.

Data collection

Data were collected by three trained research assistants who were at least National Diploma holders. The purpose of the research was explained to the participant and the questionnaire

was administered only to those who agreed to participate. Each consenting participant was comfortably seated and taken through a well-structured interviewer-administered questionnaire. The questionnaire consisted of two sections with items on the sociodemographic characteristics of the participants including their current health status and those assessing the participants' level of physical activity, and other cardiovascular risk factors. At the end of the interview, each of the participant's weight was measured in kilograms using a bathroom scale set at the 0 point (Hop on a Hanson Model 89, Hanson UK Ltd., Warwicks, England), with the participants wearing light clothing, looking straight ahead, and standing on the scale without shoes. Height was measured to the nearest 0.01-m using a measuring tape pinned to the wall. These readings were taken by two research assistants to ensure reliability. Random blood sugar estimation was done by measuring the capillary blood glucose with a glucometer (Accu Check, Aviva Plus model, USA), after a needle prick on the tip of the left ring finger.

Definition of terms

In this study, the adopted definitions were as follows:

Diabetes mellitus

Participants with random blood sugar value of 200 mg/dl (11.1 mmol/L) and above, or previously diagnosed by a medical doctor as being diabetic and on anti-diabetic therapy.

Body mass index classification

Obesity, body mass index (BMI) >30 kg/m^2; overweight, BMI of 25–29.9 kg/m^2; normal, BMI of 18.5–24.9 kg/m^2, underweight, BMI < 18.5 kg/m^2.

Physical activity

Engaging in moderate exercise such as brisk walking, jogging, or running lasting 30 min/day and for at least five days a week.

Physical inactivity

Self-reported lifestyle history of not engaging in physical exercises up to 30 min per day, for at least five days a week.

Smoker

Any participant who is currently smoking or had just stopped within the past one year.

Alcohol consumption risk

Low-risk alcohol consumption was defined as up to 21 units per week for men and 14 units per week for women. High-risk alcohol consumption was defined as any amount above 21 units per week for men and 14 units per week for women. The percentage of alcohol by volume was used to determine the quantity of alcohol consumption. In this study, 10 g of alcohol is counted as one unit of alcohol.

Data management

Questionnaires were manually sorted and coded before entry and cleaned following the entry into EXCEL 2016. version 22 of the statistical package for social sciences (SPSS) software (IBM Corp., Armonk, N.Y., USA), data analysis was done using descriptive statistics (frequency, proportions, means, and standard deviation) to summarize variables. For inferential statistics, the Chi-square test was used to test the significance of the association between two categorical variables and the Student's *t*-test to test significance between continuous variables. $P < 0.05$ was adopted as the level of significance in this study.

Ethical consideration

Ethical approval for the study was obtained from the Ethics and Research Committee of the State Ministry of Health. Permission to use the market was sought from the head of the task force team and informed consent was obtained from the participants. Furthermore, confidentiality was assured and the benefit of the study was explained. Participants whose blood pressure and blood sugar levels were found to be elevated were noted and managed by counseling on dietary and lifestyle modification as well as referrals to nearby welfare clinics or health facilities. The identified participants were followed up on subsequent visits.

Results

A total of 151 traders completed the study, giving a response rate of 95.6%. Females accounted for 97 (64.2%) of participants, whereas males made up 54 (35.8%) of them. The ages of participants ranged from 18 years to 72 years. The mean ages were 43.4 ± 14.22 years and 39.7 ± 12.28 years for the male and female participants respectively, with an overall mean age of 41 ± 13.08 years. This is demonstrated in Table 1.

There was a statistically significant relationship between sex and a family history of stroke. Four (7.4%) of the male traders reported a family history of stroke in a first-degree relative, compared to two (2.1%) of the females ($P = 0.007$). Two (3.7%) of the male traders had suffered a stroke in the past, whereas none of the females reported having had a stroke ($P = 0.06$). Five (5.15%) of the females and 1 (1.85%) of the males self-reported to be diabetic; constituting a total of 6 (3.97%) traders ($P = 0.319$).

Overall, physical inactivity (58.3%), obesity (33.1%), risky alcohol consumption (17.9%), diabetes mellitus (9.9%), family history of stroke (4%), cigarette smoking (2%), and previous stroke (1.3%) were the identified modifiable cardiovascular risk factors among the traders. Further details of the modifiable cardiovascular risk factors identified in the participants are shown in Table 2.

Furthermore, there was no statistically significant relationship between exposure variables such as smoking, alcohol use, and physical inactivity and outcome variables (diabetes mellitus, hypertension, and stroke).

Discussion

We observed that there were more female traders than males, mirroring earlier reports by Odugbemi *et al*. in the

Table 1: Sociodemographic variables of the respondents by sex

Variables	Female (*n*=97), *n* (%)	Male (*n*=54), *n* (%)	Total (*n*=151), *n* (%)	Statistics χ^2	*P*
Age group (years)					
<30	17 (17.53)	9 (16.67)	26 (17.22)	7.36	0.12
30-39	32 (32.99)	14 (25.93)	46 (30.46)		
40-49	31 (31.96)	12 (22.22)	43 (28.48)		
50-59	7 (7.22)	11 (20.37)	18 (11.92)		
≥60	10 (10.31)	8 (14.81)	18 (11.92)		
Highest educational level					
No formal education	16 (16.49)	4 (7.41)	20 (13.25)	4.71	0.32
Primary	14 (14.43)	11 (20.37)	25 (16.56)		
Secondary	36 (37.11)	22 (40.74)	58 (38.41)		
Tertiary	20 (20.62)	14 (25.93)	34 (22.52)		
Postgraduate	11 (11.34)	3 (5.56)	14 (9.27)		
Average monthly income					
<10,000	16 (16.49)	10 (18.52)	26 (17.22)	1.07	0.95
10,000-19,999	20 (20.62)	9 (16.67)	19 (19.21)		
20,000-29,999	10 (10.31)	7 (12.96)	17 (11.26)		
30,000-39,999	11 (11.34)	8 (14.81)	19 (12.58)		
40,000-49,999	12 (12.37)	6 (11.11)	18 (11.92)		
≥50,000	28 (28.87)	14 (25.93)	42 (27.81)		

Table 2: Distribution of cardiovascular risk factors of traders by sex

Variables	Female (*n*=97), *n* (%)	Male (*n*=54), *n* (%)	Total (*n*=151), *n* (%)	Test statistics χ^2	*P*
Previous stroke					
Yes	0 (0.0)	2 (3.7)	2 (1.3)	0	0.06
No	97 (100)	52 (96.3)	149 (98.7)		
Family history of stroke					
Yes	2 (2.1)	4 (7.4)	6 (4.0)	2.025	0.007
No	95 (97.9)	50 (92.6)	145 (96)		
BMI (kg/m^2)					
Underweight (<18.5)	1 (1.0)	3 (5.6)	4 (2.7)	11.63	0.009
Normal (18.5-24.9)	21 (21.7)	23 (42.6)	44 (29.1)		
Overweight (25-29.9)	38 (39.2)	12 (22.2)	50 (33.1)		
Obese (≥30)	37 (38.1)	16 (29.6)	53 (35.1)		
Level of activity					
Physical activity	49 (50.5)	14 (25.9)	63 (41.7)	8.626	0.003
Physical inactivity	48 (49.5)	40 (74.1)	88 (58.3)		
Cigarette smoking					
Nonsmokers	97 (100)	51 (94.4)	148 (98.0)	5.498	0.019
Smokers	0 (0.0)	3 (5.6)	3 (2.0)		
Alcohol consumption					
None	78 (80.4)	34 (63.0)	112 (74.2)	7.299	0.026
Low risk	4 (4.1)	8 (14.8)	12 (7.9)		
High risk	15 (15.5)	12 (22.2)	27 (17.9)		
Diabetes mellitus					
Yes	11 (11.3)	4 (7.4)	15 (9.9)	0.6	0.439
No	86 (88.7)	50 (92.6)	136 (90.1)		

BMI: Body mass index

south-western region of Nigeria who noted that females constitute a majority of traders in the urban markets.[13] This could also be a reflection of the observed trend among Nigerian communities that females are more inclined to participate in health screening exercises than males.[16,17]

CVDs are diseases that affect the heart and blood vessels, the majority of which are heart failure, cerebrovascular diseases, coronary artery disease, rheumatic heart disease, hypertension, and peripheral vascular diseases.[18] Any attribute, exposure, or characteristic of an individual, which increases the chances

of developing a disease is defined as a risk factor.[19] The importance of efforts aimed at mitigating the burden of these conditions is particularly heightened in the sub-Saharan Africa region based on the reports indicating that deaths from CVDs such as heart attack and stroke among Africans surpass the rates for other ethnic groups.[20]

We observed a sedentary lifestyle (physical inactivity) to be the most prevalent cardiovascular risk factor among the traders, with an inclination toward the male gender. The other risk factors we identified include obesity, risky alcohol consumption, diabetes mellitus, and cigarette smoking; in descending order of prevalence. The high level of physical inactivity among the participants corroborated a similar report by Odugbemi *et al*. which also identified physical inactivity to be the most prevalent cardiovascular risk factor among the urban market traders in Lagos.[13] The high rate of physical inactivity among the traders was not surprising considering the nature of their daily itinerary within the market place. Most of them sit in their stalls from 6.00 am to 6.00 pm daily, with minimal opportunity for break periods, as failure to remain consistently available within their stalls could result in loss of potential revenue from intending buyers whose visits are usually unpredictable. A curious observation is that the rate of physical inactivity was higher among the males than in the female participants, whereas the reverse was noted for obesity.

The high rate of obesity among the traders is in agreement with outcomes of prior studies exploring the cardiovascular risk factor in various adult populations.[11-13] The sedentary nature of their occupation, as alluded to above, may be a contributing factor for obesity. Moreover, the market environment provides unfettered access to foods of diverse variety. Obesity was more prevalent among the female traders compared to the males in the index study, contrary to the pattern reported among urban traders in Lagos, which found no difference between males and females, although there was an overall high prevalence rate.[13] However, Afolabi *et al*., who studied traders in the same region as Odugbemi demonstrated a higher rate of obesity among female traders.[11]

As stated earlier, a puzzling finding was the observed high rate of obesity among the female traders in our study despite their lower rate of physical inactivity compared to the males. This may be linked to possible under-reporting or over-reporting of the level of physical activity on the part of the male and female participants, respectively. To some extent, the observation brings up some of the controversies surrounding the appropriateness of the use of BMI as a measure of obesity. Regarding obesity as cardiovascular risk, the android (apple-shaped) pattern is of more clinical relevance compared to the gynecoid (pear-shaped) pattern of obesity which is even regarded as beneficial.[21] Thus, the anticipated benefit of physical activity to bodyweight reduction is aimed at reducing the development of the android pattern of obesity. However, the BMI which relies on the absolute value of measured bodyweight does not give information on the body site distribution of fat, and unable to differentiate central (android) from peripheral (gynecoid) obesity.[21] It also does not distinguish between body lean mass and body fat mass.[22] This has called to question, the usefulness of the BMI and led to calls for the use of some other anthropometric measurements such as the waist circumference and waist–hip ratios as better measures of obesity.[23] Despite the issues raised, it is noteworthy that the study relied on self-reported information by the participants in determining the presence or absence of physical inactivity; a method which is fraught with the risk of recall bias.

Expectedly, the rate of high-risk alcohol consumption and cigarette smoking was higher in the males than among the females, in agreement with the pattern of alcohol consumption and cigarette smoking habits seen from the outcome of previous studies.[13,24] Of recent, no amount of alcohol consumption is regarded to be entirely safe. Alcohol consumption, especially high-risk intake, has been linked with various disease conditions such as stroke, heart failure, dyslipidemia, cancers, and hypertension.[25]

Diabetes mellitus is a widely acknowledged major contributor to the burden of CVDs. The global prevalence of diabetes is currently put at 9.3% with the rates in the developed nations higher than those from the developing countries.[26] Within the last two decades, various studies across the country have yielded prevalence rates ranging between 2% and 12%.[27-30] The prevalence rate for diabetes that we found among the traders mirrors the pooled prevalence rate of 9.8% for our region as reported by the meta-analysis from a systemic review on the prevalence of diabetes in Nigeria.[31] The systematic review identified our part of the country to have the highest prevalence of diabetes.[31] Advancing age, sedentary lifestyle, urbanization, and poor dietary habits are some of the identified risk factors for diabetes in Nigerians.[31]

Limitations

Our study did not assess lipid profiles and some other biochemical parameters identified as markers of cardiovascular risk. Moreover, the participants were recruited from traders who were in attendance during a health promotion campaign on CVDs conducted at the market; a circumstance which likely posed some degree of selection bias in favor of participants with cardiovascular-related conditions who are expected to naturally show more interest in the cardiovascular health promotion campaign.

Conclusion

Our study revealed a high rate of nonhypertensive modifiable cardiovascular risk factors among the traders; with physical inactivity and obesity as the top two most prevalent. Indeed, obesity was identified to be among the cardiovascular risk factors that showed the most increase in the sub-Saharan region in recent decades.[32] Preventive and intervention measures to mitigate the increasing burden of CVDs should be extended to traders for whom the markets serve as a workplace. Health

posts should be sited in proximity to urban markets to enhance ready access to health-care service delivery by busy traders. Moreover, we recommend further studies aimed at exploring the socioeconomic, behavioral, and other possible predictors of these common risk factors as identified in our study.

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Conflicts of interest

There are no conflicts of interest.

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