

Cardiovascular risk factors in a population of rural women in South-East Nigeria

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Abstract

Background: Cardiovascular Diseases are a big challenge to low and middle income countries like Nigeria because they are more exposed to risk factors like tobacco and do not have prevention programmes and health care services like in high income countries. An upsurge of cardiovascular diseases has been reported in women. Studies on cardiovascular risk factors and disease in women in our environment appear to be few. Cultural and religious practices in Nigeria suggest that risk factors such as tobacco and alcohol consumption may be negligible in women. However, National data on cardiovascular diseases in Nigerian women is presently lacking mainly due to poor research funding. The available data are from hospital-based studies. This study sought to determine the prevalence and pattern of the various cardiovascular risk factors in a cohort of apparently healthy women living in a rural part of Nigeria.

Method: The study was a descriptive cross-sectional study of 137 apparently healthy women residing in a rural community Anambra state. Questionnaires were used to obtain demographic data. Physical activity was assessed with a modified World Health Organization (WHO) Step questionnaire⁹. Anthropometric measurements were taken for each subject. Fasting plasma glucose and serum total cholesterol levels were measured.

Result: It was found that prevalence cardiovascular risk factors are high in rural communities in South East Nigeria. The risk is high even in middle-aged pre-menopausal women. Obesity and hypertension were found to be the driving force behind this increase.

Conclusion: It is suggested that a current national survey for cardiovascular risk factors be done urgently as there appears to be an explosive increase in the prevalence of risk factors for CVD.

Résumé

Contexté: Les maladies cardiovasculaires sont un grand défi pour les pays à revenu faible et moyen comme le Nigeria parce qu'ils sont plus exposés à des facteurs risques comme le tabac et n'ont pas des programmes de prévention et des services de soins de santé pareille aux pays à revenu élevé. Une augmentation des maladies cardiovasculaires a été rapportée chez les femmes. Les études sur les facteurs risque cardio-vasculaires et les maladies chez les femmes dans notre environnement semblent être peu. Les pratiques culturelles et religieuses au Nigeria suggèrent que des facteurs de risque tels que le tabac et la consommation d'alcool peuvent être négligeables chez les femmes. Toutefois, les données nationales sur les maladies cardiovasculaires chez les femmes nigérianes sont actuellement manquant principalement attribuable au pauvre financement des recherches. Les données disponibles sont des études en milieu hospitalier. Cette étude a cherché à déterminer la prévalence et les tendances des différents facteurs risque cardiovasculaire dans une cohorte de femmes apparemment en bonne santé vivant dans une région rurale du Nigeria.

Méthode: L'étude était une étude de cross-section descriptive de 137 femmes apparemment en bonne santé résidant dans une communauté rurale de l'Etat d'Anambra. Des questionnaires ont été utilisés pour obtenir des données démographiques. L'activité physique a été évaluée avec une modification du questionnaire d'Étape de l'Organisation Mondiale de la Santé (OMS). Les mesures anthropométriques ont été prises pour chaque sujet. La glycémie à jeun et les niveaux de cholestérol total ont été mesurés.

Résultat: Il a été constaté que la prévalence des facteurs de risque cardiovasculaire est élevée dans les communautés rurales du Sud-est Nigeria. Le risque est élevé même parmi les femmes pré-ménopausées d'âge moyen. L'obésité et l'hypertension ont été trouvés à être la force motrice de cette augmentation.

Conclusion: Il est suggéré qu'une actuelle enquête nationale sur les facteurs de risque

cardiovasculaires soit faite de toute urgence car il semble y avoir une augmentation explosive de la prévalence des facteurs de risque des maladies cardiovasculaires.

Introduction

Cardiovascular diseases (CVDs) remain a major cause of morbidity and mortality worldwide, being the number one cause of death globally^[1]. The major cardiovascular diseases include coronary artery disease, stroke, peripheral artery disease etc. The various risk factors that predispose to the development of cardiovascular disease have been studied and include increasing age, tobacco use, physical inactivity, hypertension, obesity and dyslipidaemia. Visceral fat has also been shown to be metabolically active and abdominal obesity is known to increase cardio-metabolic risk^[2]. The prevalence of these risk factors are said to be lower in rural areas than in urban areas.

The differences in the impact and presence of various cardiovascular risk factors in diverse populations are being reported. As more studies emerge in Africa and Nigeria, it is becoming clear that the prevalence of each of these risk factors differ by ethnicity, gender and geography. For example, studies on metabolic syndrome in African populations have suggested that hypertension and obesity rather than elevated triglycerides are the major components of the syndrome in this population^[3].

In addition, an upsurge of cardiovascular diseases has been reported in women. Studies on cardiovascular risk factors and disease in women in our environment appear to be few. Cultural and religious practices in Nigeria suggest that risk factors such as tobacco and alcohol consumption may be negligible in women. National data on cardiovascular disease in Nigerian women is presently lacking mainly due to poor research funding. In addition, a lot of the available data are hospital-based studies.

This study sought to determine the prevalence and pattern of the various cardiovascular risk factors in a cohort of apparently healthy women living in a rural part of Nigeria.

Methods

Study design

A descriptive cross-sectional study was done in

Ezi-Owelle, a rural community in Idemili-North Local Government Area of Anambra State in South-Eastern Nigeria. We recruited 137 apparently healthy women who were attending 'August meeting' which is a women's general meeting held yearly in all the states in the South-Eastern part of Nigeria. The meeting usually lasts between 4 to 7 days. All women from the community including those resident in other towns are expected to participate in the meeting.

Ethical considerations:

Ethical approval for the study was obtained from the Health Research Ethics Committee of University of Nigeria Teaching Hospital. Informed written consent was obtained from the subjects at the onset of the study.

Data Collection

A sensitization was done to inform the women about the study prior to the study day. This was done by announcements in the local churches and by the use of the women community leaders about two weeks to the study day. The women were informed to come fasting on the day of the study. Sampling was done by consecutive recruitment of women aged 18 years and above who gave informed written consent. Pregnant women and those already on statins were excluded from the study.

Facilitators were recruited from the women and these included nurses and those that had been educated and trained earlier on administration of questionnaires and measuring weight, height and waist circumference. Blood pressure measurements and blood tests were carried out only by medically qualified personnel. Informed written consent was obtained from each of the women after educating them on the nature and purpose of the study.

Study Procedure

Questionnaires were used to obtain demographic data including age, physical activity, alcohol and tobacco intake.

Physical activity was assessed with World Health Organization (WHO) Step questionnaire⁴ which was modified to fit into the activities peculiar to the rural community where the study was done. The activities were categorized into occupational, commuting and recreational.

Level of physical activities were

categorized into vigorous-intensity activities (which included activities that cause large increases in breathing or heart rate, sweating such as carrying or lifting heavy loads, digging or construction work, farming manually, chopping fire wood, wrestling etc); moderate-intensity activities (which included activities that cause small increases in breathing or heart rate such as brisk walking, pounding, cycling, dancing etc) and sedentary activities (included sitting or reclining for most work time, story-telling, watching television, traveling most times by motor bike, car, bus etc).

For the purpose of this study, the following definitions were applicable, physical inactivity was defined as:

1. Activity at work or leisure that is not vigorous or moderate in intensity for at least 10 minutes continuously for ≥ 3 days in a week OR
2. Not commuting by foot or use of bicycle (cycling) for at least 10 minutes continuously for ≥ 3 days in a week.

Anthropometric measurements (weight, height, as well as waist and hip circumferences) were taken for each patient. Weight and height were measured with standard scales. Waist circumference was measured using WHO midpoint method i.e. midpoint between inferior margin (lowest point) of the last rib and the crest of the ilium (top of the hip bone)⁵. Hip measurement was taken around the maximal circumference over the hip and both were recorded to the nearest 0.1cm and with one wrapper on.

Blood pressure was measured with a standard sphygmomanometer with an appropriately sized cuff; and the average of two readings taken at least ten minutes apart was recorded. Subjects were seated quietly for at least 5 minutes in a chair with arm supported at heart level and feet on the floor.

Fasting plasma glucose samples were measured using an Accucheck® glucometer. The glucometer had been calibrated in the laboratory. Fasting serum total cholesterol levels were measured using Cardio Chek® PA blood analyzer.

Definition of Cardiovascular Risk Factors:

Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood

pressure ≥ 90 mmHg or previously on treatment for hypertension. Also the 7th Joint National Committee classification⁶ was used to classify the subjects who were not previously

Table 1: Classification of Hypertension

STAGE	SYSTOLIC BP mmHg	DIASTOLIC BP mmHg
Normal	<120s	and <80
Prehypertension	120-139	or 80-89
Stage 1	140-159	or 90-99
Stage 2	≥ 160	or ≥ 100

hypertensive as follows in Table 1

pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg or previously on treatment for hypertension. Also the 7th Joint National Committee classification⁶ was used to classify the subjects who were not previously hypertensive as follows in Table 1

Diabetes mellitus (DM) was defined as fasting blood glucose level (FBG) ≥ 7 mmol/L or a previous history and current treatment of reported diabetes mellitus.

Overweight and generalized obesity were defined as body mass index (BMI) ≥ 25 and 30 kg/m², respectively. Abdominal obesity was defined as waist circumference of ≥ 80 cm using International Diabetes Federation criteria which is regarded as suitable for use in Africans⁷. Elevated total cholesterol was defined by using the National Cholesterol Education Programme Adult Treatment Panel III (NCEP ATP III) cut-off points to identify participants with desirable, borderline high and high levels of lipoprotein risk factors as follows; Total cholesterol (TC): ≤ 4.9 mmol/L, $5.0-5.9$ mmol/L and ≥ 6.0 mmol/L respectively⁸.

Data Analysis

Statistical analysis was done using SPSS v 17. Data was summarized using means, standard deviation and percentages. Differences between categorical variables were assessed using Pearson's chi square or Fisher's exact test as appropriate, while differences in means of continuous variables were assessed with the Students T test or One Way Analysis of Variance (ANOVA). A p value of <0.05 was considered significant.

Results

The prevalence of hypertension was 49.6% in this population of rural women and it was the most common cardiovascular risk factor. However, only 26(38.2%) of those with hypertension were previously known to have hypertension, while 42(32.1%) women had hypertension and were unaware of their condition. The mean systolic blood pressure was 139.1±21.3mmHg while the mean diastolic blood pressure was 80.8±10.5mmHg. Isolated systolic hypertension was present in 37(56.9%) of those not previously known to be hypertensive. Out of all those who knew they had hypertension, 23 of them had BP ≤ 140/90mmHg.

The mean BMI was 26.3 ±5.5 kg/m², while 30.7% of the women were overweight, 24.8%

were obese. The mean waist circumference was 88.3±12.0cm and 100(73%) had abdominal obesity. There was a significant positive correlation between BMI and waist circumference ($r=0.90, p<0.001$).

Diabetes mellitus was present in 12(8.8%) women and was reported to be previously present in 9(6.6%) women.

The mean total cholesterol was 4.9±1.2mmol/l and the risk categories for elevated total cholesterol are as shown in Table 2

The cardiovascular risk factors present in the subjects are as shown in Table 2 below.

Many of the women 57(41.6%) were aged between 40 and 59 years, 59(43.1%) were aged between 18 and 39 years while 21(15.3%) were greater than 60 years. Their mean age was 56.4±9.9 years.

Table 2: Cardiovascular risk factors of the study population according to age group

Characteristic	18-39years (N=59) no(%)	40-59years (N=57) no(%)	≥60years (N=21) no(%)	Total (N=137) no(%)	P
Known hypertensive	5(8.5)	16(28.1)	5(23.8)	26(18.9)	0.014*
Hypertension present	18(30.5)	35(61.4)	15(71.4)	68(49.6)	<0.001*
Stages of hypertension**					0.013*
Normal	20(37)	9(22)	1(6.3)	30(27.1)	
Prehypertension	20(37)	11(26.8)	5(31.3)	36(32.4)	
Stage 1	10(18.5)	17(41.5)	5(31.3)	32(28.8)	
Stage 2	4(7.4)	4(9.8)	5(31.3)	13(11.7)	
Known DM	1(1.7)	5(8.8)	3(14.3)	9(6.6)	0.06
BMI classes					0.39
Normal	22(37.3)	25(43.9)	14(66.7)	61(44.5)	
Overweight	21(35.6)	16(28.1)	5(23.8)	42(30.7)	
Obese	16(27.1)	16(28.1)	2(9.5)	34(24.8)	
Abdominal obesity	29(49.2)	29(50.9)	7(33.3)	65(47.4)	0.36
Total cholesterol					0.15
Desirable	41(69.5)	31(54.4)	9(42.9)	81(54.7)	
Borderline high	8(13.6)	13(22.8)	8(38.1)	29(21.2)	
High	10(16.9)	13(22.8)	4(19)	27(19.7)	

*Denote significant values

** In those not previously known to have hypertension(N=111)

Table 3: Characteristics of the study population

Characteristic	18-39years (N=59) No(%)	40-59years (N=57) No(%)	>60years (N=21) No(%)	Total(%)	P
Physically inactive	33(55.9)	31(54.4)	10(47.6)	74(54)	0.80
Excessive salt	15(25.4)	11(19.3)	6(28.6)	32(23.4)	0.61
Alcohol	5(3.6)	8(5.8)	2(1.5)	15(10.9)	0.62
Tobacco use	3(5.1)	11(19.3)	5(23.8)	19(13.9)	0.80
Family HTN history	6(10.2)	6(10.5)	1(4.8)	13(9.8)	0.79
Family DM History	8(13.6)	9(15.8)	1(4.8)	18(13.6)	0.51

Physical inactivity was noted in 74(54%) of the women, however alcohol and tobacco intake were uncommon; 10.9% and 13.9% respectively. The subjects were also classified according to the number of cardiovascular risk factors they had. The middle aged and elderly women had higher frequency of multiple risk factors than the young women ($p=0.003$). This is shown as a chart in Fig 1.

Discussion

This was a cross sectional study carried out in a cohort of rural women to ascertain the presence of various cardiovascular risk factors in them. There was a high prevalence of various cardiovascular risk factors in this population of rural women with hypertension having the highest prevalence.

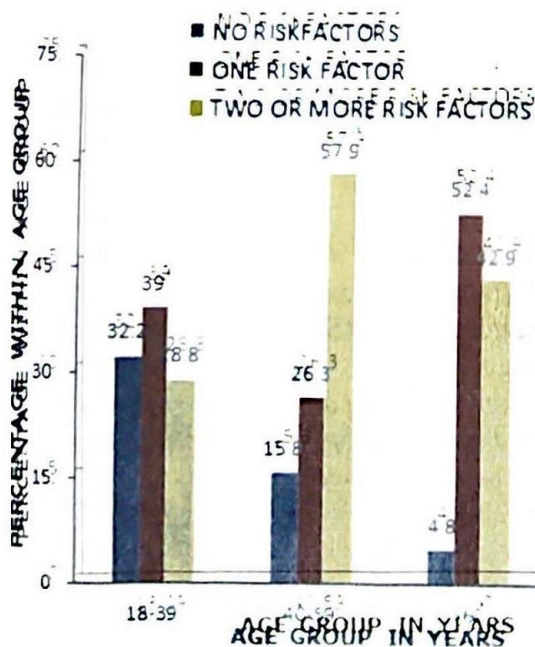


Fig 1: Bar chart showing number of cardiovascular risk factors in women

betes mellitus was the least common risk factor and although the frequency of cardiovascular risk factors increased with increasing age, the middle aged women had a higher percentage of persons with two or more risk factors.

Almost half of the subjects were middle-aged women. Physical activity was adequate in only 46% of the population despite the fact that they lived in a rural community.

Overweight and obesity were common risk factors involving 30.7% and 24.8% of the women respectively which is similar to the rates of 38.5% and 20.7% respectively in a previous study in women in South-East Nigeria^[9]. In a study done in South African women aged between 15-95 years, black women had the highest prevalence (58.5%) of overweight and obesity in comparison with other races^[10].

The high prevalence of overweight and obesity in our study may be attributed to the low level of physical activity, rapid westernization of the lifestyle and changes in dietary habits of these women in the rural community. This demonstrates that sedentary life styles are becoming increasingly prevalent even in our rural populations.

A comparison with studies in other region of Nigeria showed that cardiovascular risk factors such as obesity and hypertension appear to be lower in prevalence in Northern Nigeria than in either South East or South West regions. Sabir et al reported a prevalence of 10.4% and 3.8% for overweight and obesity respectively in the women in a rural area in Sokoto; Northern Nigeria^[11].

The availability of new forms of communication and increasing ease of travel is

beginning to transform rural areas into semi-urban and indeed urban areas in terms of behavioral changes and increased adoption of western life styles. All these may occur without necessarily any attendant improvement in basic infrastructure. It is likely that this impacts on the life style of these rural dwellers and may silently contribute to the evolvement of new patterns of non-communicable diseases in these places and not necessarily due to any real urbanization per se. In addition, the main diet in these areas is usually dense in carbohydrates and fat with little protein. This will also result in obesity due to accumulation of fat. In a study by Ulasi *et al*^[12], the prevalence of metabolic syndrome doubled when a rural area was compared with a semi-urban area.

Alcohol and tobacco intake did not appear to contribute to the overall CVD risk in them. This may be due to cultural factors, as alcohol and tobacco use in women is not common in traditional Nigerian culture, especially in women in whom such practices are frowned upon.

There was a high prevalence of hypertension (49.6%) in this study with less than half being previously diagnosed. Indeed the prevalence of undiagnosed hypertension was high in this population. Studies in South Eastern Nigeria and also in other parts of the country have reported an increased prevalence of hypertension compared to earlier studies in the 70s and 80s. Hypertension was reported in 44.3% of women in a similar study done in another South-Eastern state^[10]. A study carried out in a rural community in Ekiti a town in South West Nigeria reported a prevalence of 66.4% in both males and females¹³. The prevalence in women was 43.7%, similar to that obtained in our study^[13]. It is notable that hypertension was high in our study population despite the fact that majority of the women were either young or middle-aged (84.7%). These figures demonstrate an increase in hypertension prevalence in rural areas. The National prevalence of hypertension in Nigeria (1997) was 11.2% for women^[14]. The marked difference between the prevalence of hypertension in this study in comparison with the national study is likely due to the time interval of these studies (2011 versus 1997). In addition, the National prevalence used a cut-off of 160/95mmHg instead of 140/90mmHg used in our study. The higher prevalence in this study could also be explained by the fact that more of the women

were middle-aged while the national prevalence study was done in all age groups. However, a more recent epidemiological survey conducted in all the geo-political zones of the country reported a National prevalence of 44.9%, with females having a higher prevalence than males (46.8% vs 42.6%, $p < 0.001$)^[15]. The study population in this study was predominantly rural (77.6%) with a mean age of 55.9 ± 12.4 years similar to our own study^[15].

The prevalence of diabetes in this study (8.8%) was higher than that reported by Ejim *et al* (3.3%)^[10] and also similar to 3.6% obtained in both sexes in a study in Abia State^[16] which is also in South East Nigeria. Although these 3 cohorts appear similar in age and obesity indices, a sedentary lifestyle was more common in our study and this may partly explain this difference in diabetes prevalence. Though the prevalence of diabetes appeared low, it was higher than the National prevalence (2.2%).

Hypercholesterolemia occurred in 35% of women. This correlates closely to that seen in a similar study by Osuji *et al* where the frequency of women with hypercholesterolemia was 31.4%^[17]. Higher numbers of risk factors were seen in the middle-aged and elderly women as expected due to the rise in CVD risk with age. These high estimates closely match with the current rising trends in risk factors for CVD with the underlying principal risk factor being overweight/obesity and low levels of physical activity. It thus appears from the study that the major risk factors for CVD in women in this locality are hypertension and obesity. Hypertension and obesity have been reported to be the main risk factors that contribute to metabolic syndrome in Africans.

Conclusion

This study has shown that cardiovascular risk factors seem to be on the increase even in rural communities in South East Nigeria. The risk is high even in middle-aged pre-menopausal women. Obesity and hypertension were found to be the driving force behind this increase. Urgent steps are necessary to stem this trend.

It is suggested that a current national survey for cardiovascular risk factors be done urgently as there appears to be an explosive increase in the prevalence of risk factors for CVD. New health policies may incorporate regular and compulsory risk factor screening in all adults. People at high

risk can be identified early in primary care, using simple tools like specific risk prediction charts and managed early.

Study Limitations

Only Serum total cholesterol was measured in the women. This may not be adequate to assess for the presence of dyslipidaemia as other lipid fractions such as HDL and LDL are important in assessing dyslipidaemia. However total cholesterol alone has been used alone in epidemiological surveys as a screening tool especially in places with resource constraints.

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