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Cardiovascular Risk Factors Among Private Primary School Teachers in Onitsha North Local Government Area, Anambra State

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ABSTRACT

Background: Prevalence of cardiovascular risk factors has continued to increase due to changes in dietary practices and increased physical inactivity among the adult population.
Objective: This study was designed to assess the prevalence of cardiovascular risk factors among private primary school teachers in Onitsha North Local Government Area, Anambra State, Nigeria.
Subjects and methods: A cross-sectional survey design was employed and a multistage sampling technique was used to select 400 respondents used in the study. Questionnaire was used to obtain information on the sociodemographic characteristics, dietary habits, physical activity level, and lifestyle characteristics of the respondents. Anthropometric indices (body mass index and waist-hip ratio), blood pressure, blood glucose, and lipid profile of the respondents were obtained using standard procedures. Data obtained were coded and entered into the computer and analyzed using SPSS for windows version 21. Chi-square was used to determine the relationship existing among variables. Significance was accepted at $p < 0.05$.
Results: Results showed that the majority (90%) of the respondents were females while a few (9.8) were males. Most (69.5%) of the respondents skipped meals while some (30.5%) did not skip meals. A high prevalence of central obesity (57.0% WC, 47.5% WHR), hypertension (20.0%), impaired plasma glucose (30.0%), diabetes mellitus (2.5%), low HDL-cholesterol (37.5%) and hypertriglycerideamia (15%) was observed among the respondents. Female respondents were significantly ($p < 0.05$) more centrally obese (60.0% WC, 51.55% WHR) than males (40.0% WC, 28.6% WHR). No significant ($p > 0.05$) relationship was found between gender and blood pressure, blood glucose level, and lipid profile of the respondents.
Conclusion: The study concluded that the prevalence of cardiovascular risk factors was high among the respondents.

Keywords: anthropometry, blood glucose, blood pressure, cardiovascular risk factors, teachers.

Introduction

Over the years, cardiovascular disease (CVD) is the number one leading cause of death of all non-communicable diseases (1). CVD accounts for over 17.9 million lives of people every year out of 13% of all global death (2). More than 75% of deaths occur in low-and-middle-income countries and of all the CVD death, 85% are due to heart attacks and stroke (3). According to WHO (1), 17.3 million death resulted from cardiovascular disease worldwide in 2008, and the number is expected to reach 23.3 million by 2030. Urbanization, modern lifestyle, and change in dietary patterns contribute immensely to the prevalence of CVD risk factors such as dyslipidemia, hypertension, obesity, diabetes mellitus, reduced physical activities, anxiety, and depression (4). Worldwide, diabetes has reached epidemic proportions. In Nigeria, the current prevalence of diabetes among adults aged 20 -69 years is reported to be 1.7 % (5). Hypertension is an increasingly important medical and public health issue worldwide. High blood pressure is estimated to have caused 7.6 million premature deaths (13% of the total) and contributed 92 million disability adjusted life years worldwide in 2007 (6) Epidemiological studies on hypertension in Africa have shown the increasing alarming rate of hypertension in the region. In Nigeria the prevalence of hypertension is on the increase rating 30.6% among men and 25.0% among women (7). In Nigeria, obesity is gradually assuming an epidemic dimension among adults Nigerian. A study conducted at Issele-Uku Aniocha North Local Government Area of Delta State, showed that obesity is 21.4% in males and 23.5% in females (8). In South-East zone, the prevalence of obesity in also on the increase. A study conducted at Aba in Abia state by Chukwuonye *et al.* (9) presented a vivid picture on the prevalence of obesity in low, middle- and upper-income groups as 12.2%, 16% and 20% respectively. Also, the prevalence of obesity among individuals with no formal education; primary, secondary and tertiary education were 6.3%, 14.9%.10.9% and 17.7% respectively. Dyslipidemia is a risk factor for diabetes and obesity. CVD risk screening in Nigeria is sub-optimal, even though evidence indicates early onset of disease burden which could be responsible for low life expectancy and quality of life of Nigerians (10). Teaching in a primary school is a sedentary job coupled with the fact that most private schools do not have compounds where sporting activities can be carried out. Most private primary school teachers are not well paid and this could affect their choice of foods especially those of them who have children and other dependents to cater for. This study, therefore, assessed the prevalence of cardiovascular risk factors among private primary school teachers in Onitsha North Local Government Area, Anambra state, Nigeria.

Subjects and methods

The study adopted a cross sectional study design.
Study area: The study was carried out in Onitsha North Local Government Area, Anambra state. There were 18 private primary schools in the study area.
Sample size and sampling technique:
Using Yamane (11) formula $n = \frac{N}{1+N(E^2)}$

$$n = \frac{628}{1 + 628\ (0.0025)}$$

= 399.32
Where N = total population (which is 628 teachers in the study area)
E = marginal error taken to be 0.05.
n= required sample size.
5% of the sample size was added to make up for drop outs and incorrectly filled questionnaire and the value was approximated to 420 respondents.
Multistage sampling technique was used to select the respondents. First, ten schools were selected from the eighteen private primary schools using simple random sampling without replacement. Second, proportionate sampling was used to select the number of respondents per school. Third, simple random sampling without replacement was used to select the respondents in each of the selected schools. The research protocol for this study was approved by the Health Research Ethics Committee, Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Amaku Awka (Formerly Anambra State University Teaching Hospital) (COOUTH/CMAC/Eth.c/VOI.1/0099). The written informed consent each of the respondents was obtained after a thorough explanation of the research protocol and they agreed to participate in the study.

Data collection

Questionnair**e:** Semi-structured questionnaire was used to obtain information on the socioeconomic characteristics, dietary habits and lifestyle characteristics of the respondents. The questionnaires were self-administered since the respondents were literate enough though they were guided by the researchers.

Anthropometry:

The height and weight measurements were done according to the method described by Okeke, Onyechi and Ibeanu, (12). The respondents' weights were measured with a bathroom (Hanson's salter) scale of 120kg capacity. The respondents were asked to stand at the center of the scale with no shoes on, and with minimal clothing. Without leaning or touching anything, their heads were held erect and hands hanging by the side and reading was taken to nearest 0.5kg. The respondents' heights were measured with Microtoise height meter rule. Each respondent was asked to stand erect, with no shoes on, on a plane surface with feet together. With head erect and arms by the sides, buttocks and back of the head touching the measuring stick on which the tape is firmly attached, the headpiece was lowered gently to come in direct contact with the head. Then the readings were taken to the nearest 0.5cm.

The body mass index (BMI) of each respondent was calculated as the respondent's weight in kilogram divided by his/her height in meter squared. The respondents' waist and hip circumferences were measured according to WHO (13) guidelines. The respondents' waist circumferences were measured with a non-stretchable measuring tape. Each respondent was asked to stand erect and relax his/her stomach; the waist circumference was measured round the navel line of the stomach region and the reading was taken to the nearest 0.5cm. Hip circumference of each respondent was measured with a non-stretchable measuring tape at the point of greatest circumference around the hip. Each respondent stood erect with arms at the side and feet together. The measurement was taken with the tape in close contact with the skin but without indenting the soft tissue. The readings were recorded to the nearest 0.5 cm. The waist hip ratio (WHR) was calculated as the relationship of waist circumference to hip circumference. The BMI and WHR values were compared to WHO (14) classification standards.
Biochemical analysis

Fasting blood glucose: The respondents' fasting blood glucose levels were measured using an Accu-chek active glucometer of 600 mg/dl (33.3 mmol/l) capacity. An Accu-chek active glucose test strip was inserted into the glucometer. This automatically switches the glucometer on. Cotton wool was used to apply methylated spirit on the subjects' fingertips

(usually the thumb) to sterilize the area. An Accu-chek softclix lancet was inserted into the Accu-chek softclix. This was used to prick the subjects on their fingertips. When a dropping sign was seen on the display of the glucometer, a small drop of the subjects' blood was applied in the middle of the orange-coloured, square application area of the test strip. The glucometer then measured and displayed the level of glucose in the subjects' plasma.
A fasting blood glucose between 110 mg/dl and 126 mg/dl was classified as pre-diabetes and values above 126 mg/dl were classified as diabetes.

Lipid profile: The lipid profile of the respondents was analyzed using the Randox kit (by Randox Laboratories Ltd). The strip was first inserted into the cholesterol meter. The respondent's finger was cleaned with methylated spirit and waited till it dried. The finger selected was pierced with safety lancet and blood was collected to avoid spilling out. The result, showed the total cholesterol first, then the high-density lipoprotein (HDL), triglyceride. Total cholesterol and the high-density lipoprotein ratio (TC: HDL) and finally low-density lipoprotein (LDL). The HDL result obtained from the kit was recorded. VLDL was obtained using Friedewald formula i.e. TG/5=VLDL. The values were classified according to the Lipid Research Clinic Program (15) classifications.

Blood pressure measurement

The blood pressure of the respondents was measured using Accoson sphygmomanometer whose lowest and highest calibrations were 0 mmHg and 300 mmHg respectively. The respondents were made to sit down with two arms rested comfortably. The cuff was wrapped around the left upper arm, the bulb was pumped until the radial pulse disappear. The bulb valve was gently released and the heart-thumping sound was listened to with the stethoscope. The first thumping is the systole pressure (12). When the heart-thumping sound turns to a whooshing sound, this indicates the closure of the cardiac valves. Whenever the thumping fades to silence, the diastolic pressure is taken. The blood pressure of subjects was classified according to the National High Blood Pressure Education Program (16).

Statistical analysis

Data obtained from the study were analyzed using Statistical Product for Service Solution, SPSS (version 21). The general characteristics of the respondents were analyzed using descriptive statistics and results were presented as frequencies and percentages. Chi-square was used to ascertain the relationship among variables. Significance was accepted at $p<0.05$.

Results

Table 1 shows the socioeconomic characteristics of the respondents. The Majority (90.2%) of respondents were females while the rest were males (9.8%). About half (49.3%) were within the age bracket of 41 – 60 years old while only 5% of them were aged 61 years and above. Most (75%) of the respondents attended tertiary education. Many (56.8%) of the respondents spent less than eight hours at work while less than half (43.2%) spent more than eight hours at work. Only 12% of the respondents trekked to work.

Table 2 presents the dietary habits of the respondents. Some (37.3%) of the respondents lived in a household with 4 to 6 persons. More than half (61%) of them spent between ₦2000 and ₦4000 on food weekly. Majority (69.5%) of the respondents reported to have skipped meals. Breakfast was skipped occasionally by 52.9% of the respondents. About 46% of the respondents reported that they skipped breakfast because they have no money.

Table 1: Socio-economic characteristics of the respondents

Variables	Frequency	Percentage
Sex		
Male	39	9.8
Female	361	90.2
Total	**400**	**100.0**
Age in years		
21-40	183	45.7
41-60	197	49.3
61 and above	20	5.0
Total	**400**	**100.0**
Total	**400**	**100.0**
Educational level		
Secondary education	88	25.0
Tertiary education	312	75.0
Total	**400**	**100.0**
Hours at work		
<8	227	56.8
≥8	173	43.2
Total	**400**	**100.0**
Means of transportation to work		
Car (commercial and private)	224	56.0
School bus	83	20.7
Trek to work	48	12.0
Cycling	45	11.3
Total	**400**	**100.0**

Table 2: Dietary habits of the respondents

Variable	Frequency	Percentage
Numbers in a family		
2-3	127	31.8
4-6	149	37.3
>6	124	31.0
Total	**400**	**100.0**
Amount spend on food weekly (₦)		
2000-4000	244	61.0
4100-5000	100	25.0
Above 5000	56	14.0
Total	**400**	**100.0**
Do you skip meals?		
No	122	30.5
Yes	278	69.5
Total	**400**	**100.0**
Frequency of skipping breakfast		
1-3 times/wk	34	12.2
Occasionally	147	52.9
Never	97	34.9
Total	**278**	**100.0**
Reasons for skipping breakfast		
Inadequate time	22	7.9
Not hungry	70	25.2
No food	29	10.4
Loss of appetite	29	10.4
No money	128	46.1
Total	**278**	**100.0**

Table 3 shows the cross-tabulation of the anthropometric indices of the respondents according to sex. Female respondents were more obese (12.5%) than their male counterparts (7.5%). More central obesity (42.5%) was recorded in females than the males (5%). It was also shown that more female respondents (50%) had greatly increased risk of disease than the males (7%).

Table 3: Cross-tabulation of anthropometric parameters of the respondents according to sex

Variables	Males F(%)	Females F(%)	Total F(%)
Body mass index (kg/m²)			
Underweight (> 18.5)	0(0.0)	70(17.5)	70(17.5)
Normal (18.5-24.5)	30(7.5)	120(30.0)	150(37.5)
Overweight (25-29.5)	10(2.5)	90(22.5)	100(25.0)
Obesity (30 and above)	30(7.5)	50(12.5)	80(20.0)
Total	**70(17.5)**	**330(82.5)**	**400(100.0)**
	$\chi^2 = 4.156$	**df = 3**	**p= 0.245**
Waist-hip-ratio			
Normal (W= <0.85; M= < 0.90)	50(12.5)	160(40.0)	210(52.5)
High risk (W= ≥0.85; M= ≥0.90)	20(5.0)	170(42.5)	190(47.5)
Total	**70(17.5)**	**330(82.5)**	**400(100.0)**
	X^2**=10.411**	**df = 1**	**p= 0.048***
Waist circumference (cm)			
Normal (W= ≤88; M= ≤102)	42(10.5)	130(32.5)	172(43.0)
High risk (W= >88; M= >102)	28(7.0)	200(50.0)	228(57.0)
Total	**70(17.5)**	**330(82.5)**	**400(100.0)**
	X^2**=46.279**	**df=1**	**p=0.010***

x^2=chi-square, p=probability, w=women, m=men, * = statistically significant ($p < 0.05$).

Table 4 shows the cross-tabulation of the vital signs and the biochemical parameters of the subjects according to sex. The majority (80.0%) of the respondents (both males and females) had normal blood pressure. There is no significant ($p > 0.05$) relationship between the blood pressure levels of the male respondents and their female counterparts. About 22% of the females were pre-diabetic and were more than the males (5.0%). More females (30.0%) also had low high-density lipoprotein cholesterol than the males (7.5%) and the relationship was not statistically significant ($p > 0.05$).

Table 4: Classification of vital signs and biochemical parameters of the respondents according to sex

Variables	Males F(%)	Females F(%)	Total F(%)
Blood pressure (mmHg)			
Normal (<130/85)	50(12.5)	270(67.5)	320(80.0)
Pre-hypertensive (130/85-139/89)	10(2.5)	40(10.0)	50(12.5)
Hypertensive (≥140/90)	10(2.5)	20(5.0)	30(7.5)
Total	**70(17.5)**	**330(82.5)**	**400(100.0)**
	X^2=0.421	**df=1**	**p=0.601**
Fasting blood sugar [FBS] (mg/dl)			
Normal (<100)	5(12.5)	23(57.5)	28(70.0)
Pre-diabetes (100 - 125)	2(5.0)	9(22.5)	11(27.5)
Diabetes (≥ 126)	0(0.0)	1(2.5)	1(2.5)
Total	**7(17.5)**	**33(82.5)**	**40(100.0)**
	χ^2 =0.218	**df = 2**	**p= 0.897**
Total cholesterol (mg/dl)			
Normal (<200)	6(15)	31(77.5)	37(92.5)
Borderline (200-239)	1(2.5)	2(5.0)	3(7.5)
High (≥240)	0(0.0)	0(0.0)	0(0.0)
Total	**7(17.5)**	**33(82.5)**	**40(100.0)**
	χ^2 = 0.563[a]	**df = 1**	**p= 0.453**
Low density lipoprotein (mg/dl)			
Normal (<100)	6(15.0)	27(67.5)	33(82.5)
Borderline (100-159)	0(0.0)	3(7.5)	3(7.5)
High (≥160)	1(2.5)	3(7.5)	4(10.0)
Total	**7(17.5)**	**33(82.5)**	**40(100.0)**
	χ^2 = 0.803	**df = 2**	**p= 0.669**
High density lipoprotein (mg/dl)			
low (<40)	3(7.5)	12(30.0)	15(37.5)
borderline (40-59)	4(10.0)	18(45.0)	22(55.0)
Normal (>60)	0(0.0)	3(7.5)	3(7.5)
Total	**7(17.5)**	**33(82.5)**	**40(100.0)**
	χ^2 = 0.708[a]	**df = 2**	**p= 0.702**
Triglycerides (mg/dl)			
Normal (<150)	7(17.5)	27(67.5)	34(85.0)
Borderline (150-199)	0(0.0)	1(2.5)	1(2.5)
High (≥200)	0(0.0)	5(12.5)	5(12.5)
Total	**7(17.5)**	**33(82.5)**	**40(100.0)**
	χ^2 =1.497[a]	**df = 2**	**p= 0.473**

x^2=chi-square, p=probability.

Table 5 shows the cluster of cardiovascular risk factors among the respondents. A good number (37.5%) of the respondents had the coexistence of elevated blood pressure and obesity. About 33% of them had obesity and dyslipidaemia. Seventeen-point five percent of them had elevated blood pressure, impaired fasting glucose and obesity. One-tenth of the respondents had all the parameters assessed which included elevated blood pressure, impaired fasting glucose, obesity, and dyslipidaemia.

Table 5: Cluster of cardiovascular risk factors among the respondents

Variables	Frequency	Percentage
**Elevated blood pressure + central obesity	150	37.5
*Elevated blood pressure + impaired fasting glucose	8	20
*Impaired fasting glucose + central obesity	11	27.5
*Impaired fasting glucose + dyslipidaemia	8	20.0
*Central Obesity + dyslipidaemia	13	32.5
*Elevated blood pressure + dyslipidaemia	8	20.0
*Central obesity + impaired fasting glucose + elevated blood pressure	7	17.5
*Central obesity + impaired fasting blood glucose + dyslipidaemia	10	25.0
*Elevated blood pressure + impaired fasting glucose + dyslipidaemia	5	12.5

**N = 400, *N = 40.

Discussion

There were more female respondents than males in this study. This finding is similar to that obtained in a study by Sani *et al.* (17) where primary school teachers in Sokoto state Nigeria were found to be mostly females. A good number of the respondents skipped meal. Lunch was reported to be the most frequently skipped meals in this study. This is at variance with the findings of Zeballos and Todd (18) who reported that breakfast was the mostly skipped meals among American young adults. Skipping of meals among the teachers was mainly attributed to inadequate time and not hungry at the time of the meal in question. Consequently, meal skipping may be linked to weight gain, ultimately resulting in overweight and obesity (19). A high prevalence of overweight and obesity were observed in this study. It has been noted that the respondents skipped meals which makes one likely to over eat in the next meal time thereby predisposing the individual to overweight and obesity. The prevalence of generalized obesity found in this study is similar to the findings of Olawuyi and Adeoye (20) who reported 26.1% obesity among civil servants in Ibadan, Oyo state, Nigeria. However, the obesity prevalence is lower than that reported by Adienbo, Hart and Oyeyemi (21) amongst adult civil servants in Asaba, Delta state Nigeria. The discrepancies could stern from multiple factors like monthly income of the respondents, the availability and affordability of foods and how well informed the respondents were of the risk factors of obesity.

The prevalence of central obesity (depicted by waist circumference) in this study was similar to 54% reported among school teachers in Ogbomoso, South West, Nigeria by Akintunde, Salawu and Opadijo (22) but significantly higher than 39.6% central obesity reported among civil servants in a metropolitan city in Northern Nigeria by Awosan *et al.* (23). Females were significantly more centrally obese compared to the male counterparts while males were more generally obese than the females. The higher prevalence of central obesity among females than males could be attributed to the fact that women tend to have more fat deposit than males as they grow older. According to Prasad, Kabir, Devi, Peter and Das (24), females are two and half times as likely to be centrally obese compared to males in South Asian Cohort following simultaneous adjustment of relevant cardio metabolic and socio-demographic determinants. The implication is that females are more at risk of developing cardiovascular diseases more than the males as waist circumference has been shown to be a better predictor of cardiovascular diseases than body mass index.

Hypertension was seen more in females than in males in this study. This is in contrast to the findings of Ayogu and Nwobodo (25) who reported more hypertension in males (22.3%) than females (16%). The discrepancy could be attributed to the fact that the number of the female respondents in this study far outweigh that of the males. Hypertension is the most common modifiable risk factor of coronary heart diseases, stroke and chronic kidney failure. The implication is that more females are prone to cardiovascular diseases due to hypertension than males amongst the study participants.

More females had prediabetes than the males. The prevalence of diabetes mellitus in this study was slightly higher than 1.5% reported by Akintunde *et al.* (22) but lower than 9.5% reported by Awosan *et al.* (26). Disparity in findings could be attributed to lifestyle characteristics, dietary habits and diabetes knowledge of the study population. In relation with gender, females had higher pre-diabetic condition than their male counterparts. This discrepancy in gender could be attributed to higher centralized obesity prevalence amongst the female respondents. Raised LDL-cholesterol reported in the present study was lower than 48.1% reported by Akintunde *et al.* (27) among teaching staff of Ladoke Akintola University of technology, Ogbomoso, Nigeria. The high dyslipidaemia (low HDL and hypertriglyceridaemia) reported in this study could be attributed to the prevalence rate of obesity and impaired blood glucose level in the study population. In comparison with sex, males had higher levels of low HDL-cholesterol and high LDL-cholesterol while the females had hypertriglyceridaemia than their male counterparts.

Conclusion

There was a high rate of overweight and central obesity among the teachers, especially among the females. The study also showed a high prevalence of elevated blood pressure, impaired fasting blood sugar, hypertriglyceridaemia, and low HDL-cholesterol among the respondents. These conditions may reduce their productivity and also predispose them to cardiovascular diseases later in life.

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Ethics approval and consent to participate: The research protocol for this study was approved by the Health Research Ethics Committee, Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Amaku Awka (Formerly Anambra State University Teaching Hospital) (COOUTH/CMAC/Eth.c/VOI.1/0099). The informed consent (written) of each of the respondents was obtained after a thorough explanation of the research protocol and they agreed to participate in the study.

Conflict of interests: The authors declare that there is no conflict of interest.

Author contributions: Afiaenyi IC designed the study, analysed and interpreted the data as well as drafted the manuscript. Nwagwu CC acquired the data, and participated in data interpretation, drafting, and revising of the manuscript.

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