



**ASSESSMENT OF BODY MASS INDEX, BLOOD PRESSURE AND LIPID PROFILE
AMONG BANK EMPLOYEES OF SOME SELECTED COMMERCIAL BANKS IN
YENAGOA CITY, NIGERIA**

Onitsha Enebrayi Nelson*, Okutu Jackson Borobuebi¹ and Bannerman-Warikoru Sonia Ebimobo²

¹Department of Medical Laboratory Science, Faculty of Basic Sciences, College of Health Science, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria.

²Directorate of Nursing Service, Hospital Management Board, Ministry of Health Bayelsa State, Nigeria.

***Corresponding Author: Onitsha Enebrayi Nelson**

Department of Medical Laboratory Science, Faculty of Basic Sciences, College of Health Science, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria.

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ABSTRACT

Background: Obesity has been known as a risk factor to several metabolic diseases including cardiovascular disease. **Objective:** The present study was aimed at assessing the Body Mass Index, Blood pressure and Lipid profile among bank employees of some selected commercial banks in Yenagoa, Nigeria. **Method:** A total of sixty apparently healthy bank employees within the age range of 25-45years were recruited for the study. Body Mass Index and Blood Pressure were determined, while the fasting plasma total cholesterol, High-Density Lipoprotein and triglyceride were measured using enzymatic methods. **Results:** The result revealed that the prevalence of underweight, overweight and obese subjects was 20.0%, 21.7% and 21.3% respectively with more females affected than male. The prevalence of pre-hypertension and hypertension was 28.3% and 13.3% respectively with more effect on male than female. The mean value of BMI in female subjects (22.08 ± 3.21) is higher than in male (21.65 ± 3.83). Total cholesterol, Low Density-Lipoprotein, and triglyceride levels were higher in the overweight and obese subjects, while High Density Lipoprotein level was lower as compared with normal and underweight subjects. Furthermore, total cholesterol levels in females were significantly ($p < 0.05$) higher than in male subjects. The mean values of Diastolic blood pressure and Systolic blood pressure were significantly ($P < 0.05$) higher in overweight and obese subjects as compared with the normal and underweight subjects. **Conclusion:** The present study had shown that the studied bank workers have abnormal lipid profile, particularly the female subjects, which may predispose to cardiovascular disease in later life.

KEYWORDS: Body Mass Index, Blood Pressure, Cardiovascular diseases, Lipid Profile.

INTRODUCTION

Cardiovascular diseases (CVDs) continue to be one of the chief causes of morbidity and mortality in low- and middle-income countries^[1] (Waris and Tabinda, 2013). It is now perceived as an emerging public health challenge in developing countries,^[2] accounting for 80% and 87% of death and related disability respectively reported in low-income countries. It is reported that globally about 17.3 million people died from CVDs yearly, and the death rate is expected to increase to 23.6 million by 2030.^[3,4] Recent studies have documented that CVD in low and middle-income countries leads to twice as many deaths caused by HIV, tuberculosis and malaria combined.^[5] Hypertension and Atherosclerosis are the major risk factor alongside smoking and sedentary life styles causing an increase in the trend of this major threat.^[1]

As a result of industrialization and urbanization, the high standard of living lingers particularly in low and middle-income countries. People work in some industries and institutions that required them to spend over 8-10 hours daily mostly in a sitting position that does not constitute a physical exercise. This has led to increase in body mass and obesity, which poses a grave threat to the health of citizens.^[6] Obesity is defined as Body Mass Index (BMI) ≥ 30 kg/m².^[7] It is characterized based on body mass index (BMI); a Body Mass Index (BMI) of 18.5–24.9 kg/m² is acknowledged as normal, BMI values between 25 and 29.9 kg/m² are over-weight, BMI values between 30 and 39.9 kg/m² are obese, and those with values of 40 kg/m² and more are accepted as morbid obese.^[8] Several studies have reported that obesity is associated with elevated systolic blood pressure (SPB) and Diastolic Blood Pressure (DBP), dyslipidemia.^[9,10] These factors have been established to be the main risk factors for the advancement of cardiovascular diseases (CVDs).

Dyslipidaemia is becoming more common in low-and middle-income countries including Nigeria. It is a major risk factor for coronary heart disease (CHD) and refers to abnormalities in cholesterol: elevated total cholesterol (TC), low density lipoprotein cholesterol (LDL-C) and reduced levels of high-density lipoprotein cholesterol (HDL-C), hypertriglyceridemia, and high levels of lipoprotein (a).^[11] The World Health Organization estimated dyslipidemia to be associated with more than 50% of cases of ischemic heart disease globally and more than four (4) million deaths per annum.^[2] In the early 1980s, dyslipidemia was described as rare among Nigerians.^[12] However, recently, the prevalence of dyslipidaemia amongst apparently healthy Nigerians has been reported to rise up to 60% with low HDL-C being the most common pattern of lipid anomaly.^[13] A survey conducted in Nigeria by Ugwuja *et al.*^[14] observed a 37.1% prevalence of high total cholesterol, 6.8% prevalence of elevated triglyceride, 37.1% prevalence of high low-density lipoprotein-cholesterol (LDL-C), 10.7% prevalence of elevated Atherogenic Index and 9.8% prevalence of elevated Coronary Risk Index amongst civil servants, with women being the most affected. This abnormal lipid metabolism has been connected with sedentary lifestyle, urbanization, and westernization.^[6]

Several surveys have been reported of plasma/serum lipid profile levels amongst different Nigerian Populace, but a report on lipid profile of Nigerian Bank Employees is uncommon, a population viewed to be susceptible to dyslipidaemia and other cardiovascular disease risk factors as a result sedentary lifestyle and consumption of diet rich in refined carbohydrates with high fatty contents. Thus, this study aims to investigate the prevalence of hypertension, obesity, and abnormal lipid profile as indicators for cardiovascular disease (CVD) among Bank employees in Bayelsa State, Nigeria.

MATERIALS AND METHODS

Study area: This study was carried out in Yenagoa, Bayelsa State, Nigeria. Yenagoa is the capital city of Bayelsa State. It lies between latitude 4° 50' to 5° 00' North and longitude 6° 11' to 6° 25' East. It is a small capital city, well-populated with very few industries, many commercial centers and schools, hospitals, banks, and residential buildings. The chief occupation of residents of the town is civil service. Other sources of livelihoods are farming, fishing and trading. There are numerous commercial banks that spread across the city. This study was carried out on employees of three commercial banks (First bank of Nigeria, Access Bank Plc and United Bank of Africa).

Study population: A total of sixty (60) apparently healthy subjects of both sexes between the ages of 25 – 45 years were recruited for the study. Of these 60 subjects, thirty-five (35) were female and twenty-five subjects were male who had worked in the bank for about two (2) to fifteen (15) years. Subjects who

consented to the study and without a medical history of any known metabolic disorders were included for the study. Subjects who did not consent to the study and with a medical history of known metabolic disorder were excluded from the study. Also excluded are cigarette smoker and chronic alcohol drinkers. Ethical approval was gotten from the management of various banks (First bank of Nigeria, Access Bank Plc and United Bank of Africa). Also, the individual consent of the bank workers was obtained before sample collection.

Blood specimen collection: Blood samples were collected from sixty (60) subjects after overnight fast. Venous blood was collected under sterile condition using venopuncture techniques. 5mls of blood sample was collected from the subject with sterile syringe from antecubital vein and dispensed into EDTA bottle. The samples were centrifuged at 3000rpm for 5minutes and the supernatant plasma was separated and transferred into a labelled plain bottle with the aid of micropipette. The plasma sample was stored at -20°C and analysis was carried out within 24 hours of sample collection.

Anthropometric measurements

Measurement of blood pressure: The Blood pressure measurements were taken in the morning at a designated area within the bank by a trained and licensed nurse, in agreement with the recommendations of European Society of Cardiology and European Society of Hypertension.^[15] Systolic and diastolic blood pressure readings were taken with a digital blood pressure machine (Omron Corp, Australia). Blood pressure was measured thrice at three-minute intervals and the average of the last two readings was taken. Hypertension was diagnosed based on the laid down criteria by the World Health Organization -International Society for Hypertension.^[16] Subjects who's last two readings of the systolic blood pressure of 140mmHg or greater and the diastolic blood pressure of 90mmHg or greater were labeled hypertensive according to World Health Organization -International Society for Hypertension.^[16]

Body mass index measurement: Height and weight readings were used to determine the Body Mass Index (BMI). The height was measured with a Stadiometer^[17], the subject standing erect without shoes, leg forming a V-shape and the back against a wall. This was recorded in meters to one decimal point. The body weight was measured using a known-weight standardized weighing scale; the participant stood on the scale without shoes and the weight was recorded in kilogram to one decimal point. The Body Mass Index of the subjects were calculated by dividing the weight of the subjects by their height in meters squared; $\text{Weight (kg)} / \text{Height(m)}^2 = \text{BMI (Kg/m}^2\text{)}$. Based on the values of BMI, the subjects were classified as underweight ($\text{BMI} < 18.5 \text{ kg/m}^2$), normal ($\text{BMI } 18.5\text{-}24.9 \text{ kg/m}^2$), overweight ($\text{BMI } 25\text{-}29.9 \text{ kg/m}^2$) and obese ($\text{BMI} \geq 30 \text{ kg/m}^2$).^[18]

Demographic and other questionnaire-based variables: A questionnaire form was developed to collect data for demographic characteristics and other variables. The demographic characteristics include gender, age, duration, physical exercise and social habit and diet etc. The questionnaire was filled by the consented bank workers and retrieved instantly.

Analysis of lipid profile

The plasma concentrations of the lipid profile parameters: total cholesterol (TC), High Density Lipoprotein Cholesterol (HDL-C), and Triglycerides (TG) were determined by the spectrophotometric methods using Agappe reagent kits. Plasma Total Cholesterol concentration was determined by enzymatic method as described by Tinder^[19] and modified by Richmond,^[20] and high-density lipoprotein-cholesterol (HDL-C) and low-density lipoprotein-cholesterol (LDL-C) were determined enzymatically after precipitation of other lipoproteins as described by Burstein *et al.*,^[21] and Assmann *et al.*,^[22] respectively, using Aggape reagent kits.

Statistical analysis

Results obtained from the biochemical estimations were analyzed with statistical package for social sciences (SPSS) version 21.0. Data were expressed as mean \pm Standard Deviation (SD). The difference among the means were analyzed by Student t-test. Pearson's correlation coefficient was utilized to find the relationship between lipid profile and BMI as well as blood pressure. P-value < 0.05 was considered significant.

RESULTS

Table 4.1 shows the general characteristics of the study population. Majority 31(51.7%) of the subjects were in the age group of 31-40 years and 23(38.3%) were within 20-30 years. It also showed that majority 35(58.3%) of the subjects are female, while 25(41%) were male. As regards duration of work, 37(61.7%) of the subjects had worked for a period of 1-6years, 18(30.0%) had worked for 6-10years, while 5(8.3%) had worked for 11 years and above. Also, majority 29(48.3%) of the subjects do not exercise, 16(26.7%) exercise once monthly, 8(13.3%) exercise twice weekly, while 7(11.7%) of the

subject exercise once in every week. In respect to social habits, majority 25(41.7%) of the subjects take alcohol, 8(13.3%) take tobacco, 10(16.7%) take both alcohol and tobacco, while 17(28.3%) of the subjects do not take alcohol or tobacco.

Table 4:2 shows the Body Mass Index (BMI) and Blood Pressure (BP) classification of the Bank Employees under study. Majority 27(45.0%) of the subjects had normal weight, 13(21.7%) were overweight, 12(20.0%) were underweight, while 8(13.3%) were obese. It also revealed that Majority 35(58.4%) of the subjects had normal blood pressure, 17(28.3%) were pre-hypertensive, while 8(13.3%) were hypertensive.

Table 4.3 shows the values of Body Mass Index (BMI), Blood Pressure (BP) and Lipid Profile of Male and Female Bank Employees. The result revealed that the values of Body Mass Index (BMI) was higher among female (22.08 ± 3.21) when compared with the male subjects (21.65 ± 3.83), but not statistically significant ($p>0.05$). The mean values of Diastolic Blood Pressure (82.01 ± 7.01) and Systolic Blood Pressure (121.01 ± 11.36) were significantly ($p<0.05$) higher in male subjects when compared with female (73.21 ± 6.56 ; 112.33 ± 10.31) respectively, and lower mean values for Total Cholesterol (4.34 ± 1.78) in male when compared with female subjects (5.98 ± 2.45). However, High Density Lipoprotein (HDL), Low-Density Lipoprotein (LDL) and Triglyceride (TG) in male subjects were higher compared with the female, but the differences were not statistically significant ($p>0.05$).

Table 4.4 shows the Comparison of Lipid profile and Blood Pressure in Relation to the Body Mass Index (BMI) of Banker Workers. The result revealed that subjects that were overweight and obese had higher mean values for total cholesterol ($P= 0.013$), Low Density-Lipoprotein (LDL) ($P= 0.025$) and triglyceride (TRIG) ($P= 0.001$), and lower mean values for High Density Lipoprotein (HDL) ($P=0.471$) when compared with normal and underweight subjects. The mean values of Diastolic blood pressure (DBP) and Systolic blood pressure (SBP) were significantly ($P<0.05$) higher in overweight and obese subjects as compared with the normal and underweight subjects.

Table 4:1 Demographic Characteristics and Other variables of the study population.

Parameters	Frequency (n=60)	Percentage (%)
Age (Years)		
20-30	23	38.3
31-40	31	51.7
41 and above	06	10.0
Sex		
Male	25	41.7
Female	35	58.3
Duration		
1-5years	37	61.7
6-10years	18	30.0
11years and above	05	8.3

Physical exercise		
Once weekly	07	11.7
Twice weekly	08	13.3
Once monthly	16	26.7
None	29	48.3
Social habits		
Cigarette	08	13.3
Alcohol	25	41.7
Cigarette and alcohol	10	16.7
None	17	28.3
Diet		
Refined carbohydrate	23	38.3
Fatty meal	28	46.7
Other meals	09	15.0

Table 4:2: Body Mass Index (BMI) and Blood Pressure Classification of the Bank Employees under Study.

Parameters/BMI	Frequency (n=60)	Percentage (%)
BMI (kg/m²)		
Underweight	12	20.0
Normal weight	27	45.0
Over-weight	13	21.7
Obese	08	13.3
Blood Pressure (mmHg)		
Normal Blood Pressure	35	58.4
Pre-hypertension	17	28.3
Hypertension	08	13.3

BMI = Body Mass Index

Table 4:3 Statistical Result of Body Mass Index (BMI), Blood Pressure and Lipid Profile of Male and Female Bank Employees.

Parameters	Male (n=25)	Female (n=35)	P-value
BMI (Kg/m ²)	21.65 ± 3.83	22.08 ± 3.21	0.891
Diastolic (mmHg)	82.01 ± 7.01	73.21 ± 6.56	0.001*
Systolic (mmHg)	121.01 ± 11.36	112.33 ± 10.31	0.023*
Cholesterol (mmol/l)	4.34 ± 1.78	5.98 ± 2.45	0.041*
HDL-c (mmol/l)	2.76±1.72	2.72 ± 2.01	0.361
LDL-c (mmol/l)	1.84 ± 1.11	1.82 ± 1.06	0.561
TRIG. (mmol/l)	1.95±1.90	1.93±1.14	0.421

Key: Values are represented as Mean ± SD. Value with superscripts asterisk* are statistically different at p<0.05.

Table 4:4 Comparison of Lipid profile and Blood Pressure in Relation to the Body Mass Index (BMI) of Banker Workers.

Parameters/ BMI	Underweight <18.5 (n=12)	Normal weight 18.5-24.5 (n=27)	Over-weight 25.0-29.9 (n=13)	Obese ≥30 (n=8)	P-value
Cholesterol (mmo/l)	3.88 ± 2.31	4.13 ± 2.14	4.34 ± 2.27*	5.63 ± 2.99*	0.013*
HDL-c (mmol/l)	1.77 ± 0.75	1.75 ± 0.70	1.72 ± 0.64	1.70 ± 0.54	0.471
LDL-c(mmol/l)	1.45 ± 1.31	1.56 ± 1.54	2.11 ± 1.50*	2.20 ± 1.62*	0.025*
TRIG (mmol/l)	1.89 ± 1.29	2.25 ± 1.9	2.50 ± 1.99*	2.55 ± 1.99*	0.001*
Diastolic (DBP)	72.01 ± 5.01	75.21 ± 6.56	79.01 ± 7.06*	82.11 ± 7.46*	0.034*
Systolic (SBP)	120.23± 10.96	124.52± 11.31	130.71± 11.81*	132± 11.99*	0.046*

Key: Values are represented as Mean ± SD. Value with superscripts asterisk* are statistically different at p<0.05.

DISCUSSION

Obesity has been a major universal epidemic affecting more than 300 million people across worldwide. Obese individuals are prone to several metabolic diseases such as cardiovascular disease, diabetes mellitus, disorders of fat, protein and carbohydrate metabolism.^[23] The current study demonstrated the prevalence of underweight, overweight and obesity to be 20.0%, 21.7% and 21.3% respectively, among bank employees. The prevalence of underweight (20.0%), overweight (21.7%) and obese (21.3%) documented in this present study are comparable to the rates of underweight (2.4%), overweight (34.2%) and obese (6.8%) subjects reported by Ugwuja *et al.*^[14] among civil servants in Abakaliki, Nigeria, and 33.4% for overweight/obesity reported among civil servants in Nepal.^[24]

Body Mass Index (BMI) is usually regarded as an ultimate marker of excess body fat in terms of overweight and obesity.^[25,26] It is considered as an ideal alternative for measuring fatness of body rather than body mass. BMI is widely recognized as one of the best indicators of nutritional status in adults.^[27] The importance of BMI has been recognized for assessing cardiovascular disease (CVD) risk, particularly due to their positive association with hypertension.^[28] In the present study, the result revealed that Body Mass Index (BMI) was higher among female subjects than male subjects. This observation is suggestive of obesity being more frequent in females than in males. This might be due to unwholesome lifestyle such as eating of “fast foods” and reduced physical activities as only 11.7% of the study population were involved in physical exercise. Our findings are in agreement with Shailesh *et al.*^[23] and Suman *et al.*^[29] who reported BMI to be higher among females as compared with males. This disagrees with the findings of Oghagbon *et al.*^[30] and Bakari *et al.*^[31] who reported a higher prevalent of overweight and obesity among male subjects than female subjects.

The study also reported the incidence rate of prehypertension and hypertension of 28.3% and 13.3% respectively amongst the study population. This prevalence could be ascribed to the differences in dietary habits and sedentary life style of the bank workers. Though, the prevalence of prehypertension and hypertension amongst bank workers of the present study was lower as compared to other study conducted by Suman *et al.*^[29] The Diastolic Blood Pressure (DBP) and Systolic Blood Pressure (SBP) were of a significant increase in male subjects as compared with females. This is in consonance with the finding of Suman *et al.*^[29] who reported an increased prevalence of SBP (81.2%) and DBP (48.7%) among males compared with female subjects SBP (37.4%) and DBP (44.7%). The Diastolic blood pressure (DBP) as well as Systolic blood pressure (SBP) were significantly ($P < 0.05$) higher in overweight and obese subjects as compared with the normal and underweight subjects. Our findings also revealed that the values of Diastolic blood pressure (DBP) and Systolic

blood pressure (SBP) were significantly ($P < 0.05$) higher in overweight and obese subjects as compared with the normal and underweight subjects. These findings are in agreement with Shanthirani *et al.*^[32] and Gupta and Kapoor.^[33] which supports a strong relationship between Body Mass Index (BMI) and blood pressure.

Dyslipidemia or hyperlipidemia ascribed to unwholesome life style and absence of physical activities is now considered as an important factor in developing cardiovascular diseases.^[34] This present study documented that there exists a very strong correlation between high Body Mass Index (overweight and obesity) with dyslipidemia including; hypertriglyceridaemia, hypercholesterolaemia, and a high Low-Density Lipoprotein among subjects. In the current study, bank employees that are overweighted and obese were discovered to have elevated total cholesterol, Low-Density-Lipoprotein (LDL-C) and triglyceride (TG) levels, and reduced High-Density Lipoprotein (HDL-C) level as compared with normal and underweight subjects. Plasma lipids were absolutely correlated with Body Mass Index (BMI) except for High-density lipoprotein (HDL) which was undesirably correlated with BMI. This could be attributed to poor physical activity and consumption of diet with high contents of carbohydrate and saturated fatty acids, found in “fast foods,” which have been associated with dyslipidemia.^[35,13] The majority of the bank workers in this study fast food for lunch. Fast foods contain a lot of refined carbohydrates. These discoveries are in agreement with Christopher *et al.*^[36] and Ugwuja *et al.*^[14] which reported an elevated total cholesterol, Low-Density-Lipoprotein (LDL-C) and triglyceride (TG), and lower High-Density Lipoprotein (HDL-C) levels of overweight and obese subjects compared with normal and underweight subjects. Male subjects were discovered to have lower total cholesterol and higher High-Density Lipoprotein (HDL), Low-Density Lipoprotein (LDL) and Triglyceride (TG) levels when compare with the female subjects but the variances were not statistically significant ($p > 0.05$). Our finding is in agreement with a previous account of Margolis *et al.*^[37], who found out that relationships between lipid levels and BMI were robust in women than in men for plasma cholesterol, LDL-C, triglyceride and the ratio of cholesterol/HDL-C.

More so, a significant percentage of the bank employees were involved in social habits that may predispose them to Cardiovascular disease (CVD). About 41.7% of the subjects takes alcohol, 13.3% are involved in tobacco smoking, 16.7% of the subjects take both alcohol and cigarette and few subjects do not take alcohol neither cigarette. In regards to physical exercise, 48.3% of the subjects do not exercise, 26.7% exercise once monthly, 13.3% exercise twice weekly, and 11.7% of the subject exercise once in every week.

CONCLUSION

The present study had shown that bank workers have abnormal lipid profile, especially the female subjects. Subjects with increased Body Mass Index (BMI) are susceptible to dyslipidaemia including elevated triglycerides, total cholesterol, LDL-Cholesterol and reduced levels of HDL-Cholesterol, which may predispose to cardiovascular disease in later life as a result of overweight and obesity due to physical inactivity. It is therefore recommended that more epidemiological study of the general population be conducted, and there is need for education on healthier lifestyles, such as good nutrition, smoking and alcohol cessation, weight reduction, greater physical activity as well as regular medical check-up.

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CONFLICT OF INTERESTS

There is no conflict of interest between authors.

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