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Original Research Article

Assessment of Cardiovascular Indices in Obese Women Resident in Rivers State, Nigeria

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Abstract: Cardiovascular diseases (CVDs), which are often thought to be a "man's" challenge, are now recorded as the primary cause of death for women globally. Consequently, the present study set out to assess the cardiovascular indices in obese women resident in Rivers State, Nigeria. Utilizing the Leslie Fischer's formula; exactly 334 obese and non-obese women within their 18 and 65 years of age with no obvious health condition and resident in Upland and Riverine areas of Rivers State were recruited by the present study. The multistage sampling technique was used, and subjects were drawn across the upland and riverine locations of the State. Consenting subjects were randomly surveyed from the multi-ethnic residents of the state. Anthropometric (body mass index-BMI) data and auscultatory blood pressure measurement were done using Seca weight/height scale and mercury sphygmomanometer and stethoscope respectively. Electrocardiographic (ECG) features were recorded using the standard resting 12 – lead ECG. Numerical data obtained were subjected to statistical analyses using the statistical package for social sciences (SPSS) version 21.0. One-way analysis of variance (ANOVA) and independent t-test with a p< 0.05 considered statistically significant were determined. The BMI values were generally higher in the RVR subjects when compared to their UPL counterparts, but only that of obese class II were significant (P<0.05) of the aforementioned increases. The systolic and diastolic blood pressure (SBP and DBP) of all subjects indicated graded increases from obese class I to obese class III and these increases were seen to be significant (P<0.05) when compared to that of the non-obese and down the successive groups. The ECG features in the non-obese and obese class I subgroups indicated higher prevalence of left ventricular hypertrophy in the UPL residents than the RVR residents. The study thus found that there was a significantly raised prevalence of obesity in younger RVR residents when compared to that are resident UPL region of the State and that the variance is capable of directly resulting in severer traumatic cardiovascular conditions.

Keywords: Cardiovascular diseases, obese women, ivers State, blood pressure, Electrocardiographic (ECG).

INTRODUCTION

In the year 2016, WHO recorded that, 39% of adults over the age of 18 were overweight—39% of men and 40% of women. In all, the record stated that 13% of adults worldwide—11% of men and 15% of women—were obese in 2016 (WHO, 2021). In an interval of four decades, the rate of prevalence of obesity was said to have nearly tripled globally (WHO, 2021).

Obesity is described as abnormal accumulation of ≥20% of an individual's body fat (Jiang *et al.*, 2016). A body mass index of 30 kg/m2 or greater defines obese status in an individual and obesity is typically categorized into three: Class I (BMI of 30 to < 35); Class II (BMI of 35 to < 40); Class III (BMI of 40 or above). Class III obesity is frequently described as "severe" obesity (Gonzalez-Casanova *et al.*, 2013; WHO, 2021).

Low-grade systemic inflammation, which is said to be linked to obesity, appears to be a common

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precursor to the development and progression of a number of comorbidities, including cardiovascular diseases (CVDs), type-2 diabetes mellitus (T2DM) amongst others (Jarolimova *et al*., 2013; D'Antongiovanni *et al*., 2021). Also, cardiovascular diseases (CVDs), which are often thought to be a "man's" challenge, are now recorded as the primary cause of death for women globally and a major contributor to the loss of years of life adjusted for disability (Garcia *et al*., 2016; Woodward, 2019). More so, it has been noted that younger females with acute coronary syndrome (ACS) could manifest up to fifty percent elevated risk for mortality than their young male counterparts (Pathak *et al*., 2017). Further, women are also said to beless advantaged when it comes to CVD in a number of areas, and this is generally unnoticed (Woodward, 2019). There is evidence that females receive less treatment than males in primary and secondary prevention and poor understanding of this fact may add to public health burden (Woodward, 2019). Considering the foregoing scenario, the present study set out to assess the cardiovascular indices in obese women resident in Rivers State, Nigeria.

MATERIALS AND METHODS

Research Design

The present study adopted a cross-sectional approach to survey obese women in Rivers State, Nigeria. The target population was obese women resident in upland and riverine areas of the State, depending on multistage sampling techniques. Approval for the study was obtained from the institutional Ethics Committee of the University of Port Harcourt and duly signed consent forms were obtained from each subject before being recruited into the study.

Study Area

The study was done in Rivers State, Nigeria, between the upland and riverine residents of the State. Rivers State is the sixth largest state in Nigeria. It is characterized by many indigenous ethnic groups: Abua, Ikwerre, Ekpeye, Ijaws, Eleme/Ogoni, Etche, Ogba, Engeni, Egbema, and others. The interior part of the state consists of tropical rainforest; in the direction of the coast the typical Niger Delta environment features numerous mangrove swamps (Jones, 2000).

In line with the report of Azuogu *et al*., (2018), a multistage sampling technique was adopted, and a proportionate number of the study proforma were allocated to each stratified group based on their total number. In the course of periodic scheduled meetings, the subjects' attendance lists were used as a sampling frame. And the systematic random method was used to select participants with sampling interval of three until total number of questionnaires allocated to that group was exhausted.

Sample Size Determination

A minimum sample size of 272 was obtained using the Leslie Fischer's formula (Azuogu *et al*., 2018):

$$n = \frac{Z^2pq}{d^2}$$

With confidence interval set at 95%, normal deviate--**Z**
Z = 1.96, (Z—score for 95% confidence interval)
d(d is considered 0.05 to produce good precision and smaller error of estimate) = 0.05.
q=1-P (expected level of precision)

P=Expected prevalence or proportion of population if unknown 0.5; but in this case, the report of Chukwuonye *et al*., (2022) reported a prevalence rate of obesity in women Nigeria at 23% (i.e. 0.23). Consequently, a total of 334 subjects were actually surveyed by the current study.

Inclusion Criteria

It was obese women who are resident in Upland and Riverine areas of Rivers State, who are within their 18 and 65 years of age. And non-obese women with similar criteria as above to serve as control.

Exclusion Criteria

Were subjects as stated in the inclusion criteria but were critically ill; those who were non-residents of the study area; women below 18 years or above 65 years. And then, women who met the inclusion criteria but did not give consent to be recruited into the study.

Methods of Data Collection

The collection of data was via a well thought out proforma and laboratory analysis of the obtained biological/blood samples from the study subjects using standard methods. A lengthened meter rule and standiometer were used to determine the BMI. The classification of BMI as adopted by the present study was stipulated by the World Health Organization (WHO, 2021).

Blood Pressure and ECG Measurement

The auscultatory method of blood pressure measurement using mercury sphygmomanometer and stethoscope [which is considered as the 'gold standard' for formal blood pressure recording] (Ogedegbe and Pickering, 2010) were used to determine the systolic and diastolic blood pressures and heart rates. The meant arterial pressure were calculated using the function below by Fox, (2008)

$$\text{Mean arterial pressure} = \text{diastolic pressure} + 1/3\ \text{Pulse pressure}$$

The Cardiovit AT-2+ model standard resting 12 – lead ECG with paper velocity of 25mm/sec and standardized at 0.1mv/mm and reclining bed and power source and an alternative power supply were used for determination of ECG. The Seca weight and height scale were used to measure weight and height of the subjects for the determination of body mass index.

Method of Data Analyses

Numerical data received from the present study were subjected to statistical analysis using the statistical package for social sciences (SPSS) version 21.0. Statistical significance was determined using the following tools: one-way analysis of variance (ANOVA) and independent t-test. A p< 0.05 was considered statistically significant.

RESULTS

Table 1: Variation in BMIof obese and non-obese women resident in the Upland (UPL) and Riverine (RVR) areas of Rivers State

Groups	Body Mass Index (BMI) (Kg/m^2)		
	All Subjects	**UPL Residents**	**RVR Residents**
Non-Obese Subjects	22.37 ± 1.11	22.29 ± 1.20	22.45 ± 1.03
Obese Class I	31.03 ± 1.43 [a]	30.89 ± 0.73 [a]	31.29 ± 2.24 [a, *]
Obese Class II	36.80 ± 1.37 [a, b]	36.13 ± 0.98 [a, b]	37.35 ± 1.42 [a, b, *]
Obese Class III	42.97 ± 1.43 [a, b, c]	42.20 ± 1.37 [a, b, c]	43.38 ± 1.29 [a, b, c]

Values are expressed as Mean ± Standard Deviation (SD); n [Non-obese All=125; UPL=58; RVR =67; Obese Class I: All=77; UPL=51; RVR =26; Obese Class II: All=72; UPL=32; RVR =40; Obese Class III: All=60; UPL=21; RVR =39]. [a] Marked at P<0.05 when matched to Non-obese; [b] Marked at P<0.05 when matched to Obese Class I; [c] Marked at P<0.05 when matched to Obese Class II; * Marked at P<0.05 when values of RVR residents are matched to those of UPL residents.

Table 1 is showing the result on the variation in BMI of obese and non-obese women resident in the UPL and RVR areas of Rivers State.

The study's outcome on Table 1 shows the body mass index (BMI) of the Non-Obese Subjects as 22.37 ± 1.11; Obese Class I as 31.03 ± 1.43; Obese Class II as 36.80 ± 1.37 and Obese Class III as 42.97 ± 1.43 Kg/m^2. Expectedly, across all subjects, UPL and RVR subjects, there were graded marked (P<0.05) increases in the BMI s of Obese Class I, Obese Class II and Obese Class III subjects with respect to the Non-Obese subjects and down the respective classes. Worthy of note is that the BMI of the groups were generally higher in the RVR subjects when matched to their UPL counterparts, but only that of obese class II were marked (P<0.05) of the aforementioned increases.

Table 2: Variation in systolic blood pressure levels of obese and non-obese resident in the UPL and RVR areas of Rivers State

Groups	Systolic Blood Pressure (SBP) (mmHg)		
	All subjects	**UPL Residents**	**RVR Residents**
Non-Obese Subjects	115.28 ± 8.48	115.34 ± 7.99	115.22 ± 8.94
Obese Class I	127.53 ± 10.65 [a]	123.14 ± 9.05 [a]	136.15 ± 8.04 [a]
Obese Class II	140.28 ± 6.91 [a, b]	138.44 ± 5.74 [a, b]	141.75 ± 7.47 [a, b, *]
Obese Class III	148.50 ± 8.79 [a, b, c]	141.90 ± 6.79 [a, b]	152.05 ± 7.67 [a, b, c]

Values are expressed as Mean ± Standard Deviation (SD); n [Non-obese All=125; UPL=58; RVR =67; Obese Class I: All=77; UPL=51; RVR =26; Obese Class II: All=72; UPL=32; RVR =40; Obese Class III: All=60; UPL=21; RVR =39]. [a] Marked at P<0.05 when matched to Non-obese; [b] Marked at P<0.05 when matched to Obese Class I; [c] Marked at P<0.05 when matched to Obese Class II; * Marked at P<0.05 when values of RVR residents are matched to those of UPL residents.

Table 3: Variation in diastolic blood pressure levels of obese and non-obese resident in the UPL and RVR areas of Rivers State

Groups	Diastolic Blood Pressure (DBP) (mmHg)		
	All subjects	**UPL Residents**	**RVR Residents**
Non-Obese Subjects	72.88 ± 8.40	72.58 ± 9.09	73.13 ± 7.82*
Obese Class I	80.52 ± 7.05 [a]	80.78 ± 6.59 [a]	80.00 ± 8.00 [a]
Obese Class II	88.19 ± 7.56 [a, b]	86.25 ± 6.60 [a, b]	89.75 ± 8.00 [a, b]
Obese Class III	95.00 ± 8.33 [a, b, c]	90.95 ± 7.68 [a, b]	97.18 ± 7.93 [a, b, c]

Values are expressed as Mean ± Standard Deviation (SD); n [Non-obese All=125; UPL=58; RVR =67; Obese Class I: All=77; UPL=51; RVR =26; Obese Class II: All=72; UPL=32; RVR =40; Obese Class III: All=60; UPL=21; RVR =39]. [a] Marked at P<0.05 when matched to Non-obese; [b] Marked at P<0.05 when matched to Obese Class I; [c] Marked at P<0.05 when matched to Obese Class II; * Marked at P<0.05 when values of RVR residents are matched to those of UPL residents.

Table 2 displays the variation in systolic blood pressure levels of obese and non-obese resident in the UPL RVR areas of Rivers State.

The systolic blood pressure (SBP) of all subjects indicated graded increases from obese class one I to obese class III and these increases were seen to be marked (P<0.05) when matched to that of the non-obese and down the successive groups. The foregoing trend was same for the UPL and RVR subjects, only that the SBP of obese class III amongst the UPL residents did not markedly vary from that of their obese class II. When the SBP values of the RVR residents were matched to those of the UPL residents, obese class II had markedly (P<0.05) levels amongst the RVR subjects.

On Table 3 the changes in the diastolic blood pressure levels of obese and non-obese women resident in the UPL and RVR areas of Rivers State are shown.

The pattern of variation for the diastolic blood pressure (DBP) was same like that of the SBP, just that the between the UPL and RVR residents, the non-obese group had markedly (P<0.050) level for the RVR subjects matched to UPL residents.

Table 4: Variation in Heart Rate (HR) of obese and non-obese resident in the UPL and RVR areas of Rivers State

Groups	Heart Rate (HR) (bpm)		
	All subjects	**UPL Residents**	**RVR Residents**
Non-Obese Subjects	76.69 ± 8.81	70.76 ± 4.91	81.82 ± 8.21*
Obese Class I	80.12 ± 10.79	76.10 ± 7.76 [a]	88.00 ± 11.65*
Obese Class II	88.11 ± 14.36 [a, b]	78.50 ± 13.32 [a]	95.80 ± 9.90 [a, b]
Obese Class III	90.25 ± 15.61 [a, b]	93.47 ± 10.55 [a, b, c]	88.51 ± 17.64 [a, c]

Values are expressed as Mean ± Standard Deviation (SD); n [Non-obese All=125; UPL=58; RVR =67; Obese Class I: All=77; UPL=51; RVR =26; Obese Class II: All=72; UPL=32; RVR =40; Obese Class III: All=60; UPL=21; RVR =39]. [a] Marked at P<0.05 when matched to Non-obese; [b] Marked at P<0.05 when matched to Obese Class I; [c] Marked at P<0.05 when matched to Obese Class II; * Marked at P<0.05 when values of RVR residents are matched to those of UPL residents.

Table 5: Variation in Mean Arterial Measure (MAP) of obese and non-obese resident in the UPL and RVR areas of Rivers State

Groups	Mean Arterial Pressure (MAP) (mmHg)		
	All subjects	**UPL Residents**	**RVR Residents**
Non-Obese Subjects	86.84 ± 8.42	86.71 ± 8.47	86.95 ± 8.44
Obese Class I	96.44 ± 7.25 [a]	95.27 ± 6.95 [a]	98.72 ± 7.43 [a]
Obese Class II	105.58 ± 7.10 [a, b]	103.67 ± 6.01 [a, b]	107.11 ± 7.59 [a, b]
Obese Class III	112.85 ± 8.18 [a, b, c]	107.96 ± 7.26 [a, b]	115.49 ± 7.47 [a, b, c]

Values are expressed as Mean ± Standard Deviation (SD); n [Non-obese All=125; UPL=58; RVR =67; Obese Class I: All=77; UPL=51; RVR =26; Obese Class II: All=72; UPL=32; RVR =40; Obese Class III: All=60; UPL=21; RVR =39]. [a] Marked at P<0.05 when matched to Non-obese; [b] Marked at P<0.05 when matched to Obese Class I; [c] Marked at P<0.05 when matched to Obese Class II; * Marked at P<0.05 when values of RVR residents are matched to those of UPL residents.

The data on Tables 4 and 5 indicate the variation in heart rates (HR) and mean arterial pressure respectively of obese and non-obese women across Rivers State, Nigeria.

The variability of HR of all subjects indicated markedly (P<0.05) raised levels in obese classes II and III when matched to the non-obese and obese class 1 groups respectively. Amongst the UPL residents, all classes of obese subjects indicated markedly raised heart rates when matched to that of the non-obese subjects. And only the obese class III had markedly higher HR matched to those of obese classes I and II.

On the other hand, the RVR residents had markedly raised HR value in obese classes II and III subjects when matched to the non-obese subjects. Noteworthy in this sub-population, is the remarkably (P<0.05) increased mean HR in the obese class II subjects when matched to those of obese classes I and III subjects. More so, comparing the mean HR levels of the RVR subjects to those of their UPL counterparts, there were remarkably (P<0.05) higher values for the non-obese and obese class I RVR subjects.

The study's outcome on mean arterial pressure (MAP) for all subjects revealed a markedly (P<0.05) elevated MAP across all obese subjects matched to the non-obese subjects and these increases were markedly (P<0.05) progressive with increasing BMI amongst the subjects. The foregoing trend was same for both the UPL and RVR residents; except that, there was only a marginal (P>0.05) between the MAP values for obese classes II and III amongst the UPL residents.

Table 6: Changes in Some ECG Parameters of obese and non-obese resident in the UPL and RVR areas of Rivers State

ECG Changes	Control Subjects n=334		Study Groups [Frequency (percent) of prevalence]					
			Obese Class I n=77		Obese Class II n=72		Obese Class III n=72	
	UPL Residents	RVR Residents	UPL Residents	RVR Residents	UPL Residents	RVR Residents	UPL Residents	RVR Residents
Left ventricular hypertrophy (LVH)	5(3.09)	1(0.58)	3(1.85)	2(1.16)	3(1.85)	4(2.33)	2(1.23)	5(2.91)
Right ventricular hypertrophy (RVH)	2(1.23)	2(1.16)	2(1.23)	-	2(1.23)	-	2(1.23)	-
Anterolateral myocardial ischaemia	-	-	-	-	2(1.23)	-	1(0.62)	-
Anterior septal myocardial ischaemia	-	-	-	-	-	1(0.58)	1(0.62)	
Left atrial enlargement	-	-	-	3(1.74)	-	2(1.16)	1(0.62)	6(3.49)
Septal myocardial ischaemia	-	-	-	1(0.58)	-	-	-	-
Benign early repolarization	-	-	-	1(0.58)	-	-	-	1(0.58)
Sinus tachycardia	1(0.62)	-	-	4(2.33)	-	12(6.98)	-	11(6.39)
Left axis deviation	-	-	-	-	-	1(0.58)	-	-

Source: Field Survey, 2022.

Table 7: Prevalence of Abnormal Electrocardiographic (ECG) Changes in obese and non-obese resident in the UPL and RVR areas of Rivers State

Groups	All subjects [Frequency (percent) of prevalence]		UPL Residents [Frequency (percent) of prevalence]		RVR Residents [Frequency (percent) of prevalence]	
	Normal ECG	Abnormal ECG	Normal ECG	Abnormal ECG	Normal ECG	Abnormal ECG
Non-Obese Subjects	112 (33.53)	13 (3.89)	55 (33.95)	3 (1.85)	57 (33.14)	10 (5.8)
Obese Class I	61 (18.26)	16 (4.78)	46 (28.4)	5 (3.09)	15 (8.72)	11 (6.4)
Obese Class II	39 (11.68)	33 (9.90)	24 (14.81)	8 (4.94)	15 (8.72)	25 (14.53)
Obese Class III	26 (7.78)	34 (10.18)	13 (8.02)	8 (4.94)	13 (7.56)	26 (15.13)
Total	238 (71.26)	96 (28.74)	138 (85.18)	24 (14.81)	100 (58.14)	72 (41.86)

Source: Field Survey, 2022.

The data on Table 6 shows the prevalence of abnormal electrocardiographic (ECG) changes in obese women resident in UPL and RVR regions of Rivers State, Nigeria.

Under the non-obese and obese class I, groups, left ventricular hypertrophy was seen to be more prevalent in the UPL residents more (3.09 percent and 1.85 percent) than the RVR residents (0.58 percent and 1.16 percent respectively). Meanwhile, the condition was more incident amongst the RVR residents who fall in obese classes II and III (2.33 percent and 2.91 percent) as matched to their UPL associates (1.85 percent and 1.23 percent) respectively.

On the incidence of right ventricular hypertrophy, although very similar between the RVR and UPL residents, the later had higher cases. The case of anterolateral myocardial ischaemia was only seen in the UPL residents who are obese class II (1.23 percent) and III (0.62 percent). The RVR residents under obese class I and III were observed to be more predisposing to left atrial enlargement than their UPL counterparts.

More so, only the RVR residents with obese class I presented with septal myocardial ischaemia (0.58 percent). It was a similar case for benign early repolarization incidence, as only these subjects under obese classes I and III presented with the condition. Again, only the RVR subjects under obese classes I, II and III greatly presented with sinus tachycardia, 2.33 percent, 6.98 percent, and 6.39 percent respectively. Finally, left axis deviation was only seen amongst the RVR subjects under obese class II (0.58 percent).

In a nutshell, aside from the case of anterolateral myocardial ischaemia that was only prevalent amongst obese classes II and III of the UPL residents, all the recorded abnormal ECG conditions by the present study were most prevalent in the RVR residents with increasing BMI. The data on Table 7 shows prevalence of abnormal electrocardiographic (ECG) changes in obese women resident in UPL and RVR areas of Rivers State, Nigeria.

Amongst all subjects put together, a total of 71.26 percent of the study participants had normal ECG records and 28.26 percent presented with abnormal ECG features. For the UPL residents, 85.18 percent indicated normal ECG record and only 14.81 percent showed abnormal ECGrecords. And then, for the RVR residents, 58.14 percent had normal ECG records and 41.86 percent had abnormal ECG features.

DISCUSSION

Variations in BMI of Study Participants

According to the WHO's categorization (WHO, 2015), the results of the participants' varying BMI were divided into several categories. Adults who are obese or overweight are classified using the BMI. It is determined by dividing the individual's weight in kilograms by the square of his or her height in meters (kg/m2). The WHO definition is thus: a BMI greater than or equal to 25 kg/m^2 as overweigh and a BMI greater than or equal to 30 kg/m^2 is obesity which is further graded into three classes (I: 30 to34.9; II: 35 to 39.9 and III: equal to or greater than 40 kg/m2 kg/m^2) (WHO, 2015). An interesting finding of the present study indicated remarkable increases in the obese classes I and II BMI amongst the RVR residents with respect to their UPL counterparts.

According to the submissions of Jura and Kozak (2016) and Li *et al*., (2022), the epidemic of overweight and obesity, which is frequently encouraged by economic growth, mechanized transportation, urbanization, a rise in physical inactivity, and a switch toward refined foods and high-calorie meals in terms of nutrition, poses a marked challenge to global health and the prevention of protracted diseases. Since RVR residents in the State are more exposed to these obesity risk dynamic s (such as urbanization, sedentary lifestyles, and a greater dependency on processed foods and high-calorie meals in terms of nutrition), the aforementioned finding of the present study is obviously consistent with earlier submission (Li *et al*., 2022). This is to point out that irrespective of age (as seen for the present study between the two subgroups); the aforementioned causative dynamics of obesity are more important or responsible in the level of prevalence of obesity amongst subjects. Still on the aforementioned possible causes of obesity, Obesity could also result from the body storing calories (consumed in excess of the body's) as fat. Physiologically, a large portion of the calories consumed in high-energy meals, particularly those high in fat and sugar, that aren't completely burned off through activity will be stored as fat in the body (Hruby *et al*., 2016). To make matters worse, when someone overeats, their stomach enlarges beyond normal proportions to accommodate the extra food. The stomach pushing up on other organs causes an uneasy sensation. This ache may cause you to feel lethargic, sluggish, or sleepy (Herman *et al*., 2019).

Of course, urban food settings, architectural surroundings, and technological improvements all contribute in different ways to worse diets and lower levels of physical activity. The following are five characteristics of metropolitan settings that physiologically stimulate the obesity pandemic in low- and middle-income nations: they are namely less outdoor space, more weight media, more high-calorie food consumption, passive transportation, more, and then less work-related physical activity (HTH-CHAN, 2023). On the other hand, the physiological basis of the possible causation of obesity by sedentary lifestyle portends that the additional energy consumed by an individual is stored by the body as fat if such a person is not physically active enough to utilise the energy given by the food eaten (Hruby *et al*., 2016).

It was alluded that individuals with upwards BMI stand 30 percent increased risk of mortality from their trauma than non or less obese people, and double the risk of major complications. Thus, the incidence of higher BMI values in the RVR residents in this study may portends severer morbidity/morality in these subjects matched to the UPL residents. Worthy of note is that overweight has been said to be more prevalent in females than males (Vadera *et al*., 2010).

Blood Pressure and ECG Variation in the Study Subjects

Powell-Wiley *et al*., (2021) argued that obesity contributes directly to incident cardiac risk dynamics, including dyslipidemia, hypertension (HTN) and type two diabetes mellitus (T2DM) amongst others. Thus, the present study's outcome on blood pressure variation in obesity validated the fact that obesity may pose traumatic cardiovascular conditions in all obese subjects. And that the RVR residents presented with higher tendencies for HTN as seen in their consistently higher SBP, DBP, HR and MAP levels.

Obesity and HTN are said to be coexisting conditions that have an impact on the activities of the heart and raise the risk of cardiac events. A longer QRS duration (QRSd) as been linked to worse cardiac outcomes because it represents ventricular depolarization. Obesity and hypetension may have an impact on QRS length, which would indicate a higher risk dynamic for adverse cardiac events (Dzikowicz and Carey, 2019).

Records have it that variable rates of cardiac disease influences life expectancy and healthy life expectancy (Apostu *et al*., 2021); thus the implication of the above finding is that the obese subjects may present with or confronted with difficult and challenged life expectancy owing from their dispositions to CVD. Of course this may be severer in the RVR subjects.

Aside from the case of anterolateral myocardial ischaemia that was only prevalent amongst obese classes II and III of the UPL residents, all the recorded abnormal ECG conditions by the present study were most prevalent in the RVR residents with increasing BMI. In fact, at obese classes II and III, only the RVR residents presented with sinus tachycardia. This finding is similar to some earlier finding that reported a left shift of the P, QRS and T axes, morphological deviation of the P wave, low QRS amplitude, potentially prolonged QT and QTc, amongst others, are present at a markedly raised rate in obese than in non-obese individuals (Simonyi, 2014). This is an indication that severer levels of obesity not only places great burden on the heart but can elicit or induce numerous dysfunction of the heart. Thus, this may not only raise the risks of heart diseases but cardiac arrest/or sudden cardiac death in obese individuals, particularly in women.

CONCLUSION

In the light of the above findings of the present study, it is suggestive to conclude that the pattern of prevalence of obesity especially amongst women within a homogenous population, like the one understudy, could significantly vary possibly due to cultural, lifestyle and socio-economic differences. This variance is capable of directly resulting in severer traumatic cardiovascular conditions like higher chances of the occurrence of HTN, anterolateral myocardial ischaemiasinus tachycardia, amongst others in the surveyed subjects.

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