IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 12 Ser.4 (December. 2020), PP 51-57
www.iosrjournals.org

Prevalence of generalized obesity among women in a rural settlement in Edo North, Nigeria

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Abstract

Background*: Obesity is currently a public healththreat, affecting several countries globally. It appears to be on the increase especially in developing countries with a gradual erosion of the urban-rural difference in prevalence. The aim of the study was to determine the prevalence of generalized obesity among women living in Ayua, a small rural community in Etsako West local government area of Edo State in Nigeria*

Materials and method:

This was a cross-sectional descriptive study carried out among women of Ayua community in Edo North, Nigeria. Data obtained from participants included age andanthropometric measurements such as weight and height from which the body mass index (BMI) was calculated. Blood pressure and casual blood glucose (CBG) levels were determined for each participant. Obesity was defined as BMI > 30 kg/m2 while overweight was defined as BMI values lying between 25.0 to 29.9. Systolic hypertension was said to be present if systolic blood pressure was ≥140 mmHg while diastolic hypertension was described as diastolic blood pressure ≥90mmHg. CBG values of ≥11.0 mmol/l was considered to be in the diabetic range. The prevalence of obesity among the participants was determined. Association between obesity and age as well as blood pressure and blood glucose-related variables was tested with Fisher's exact and chi-square tests as appropriate

Results

A total of 151 women completed the study with available data.The prevalence of obesity and overweight among the women were 31.1% and 34.4% respectively. Only forty six (30.5%) of them had normal BMI. Obesity was not associated with age, history of hypertension or diabetes, presence of systolic or diastolic hypertension or casual blood glucose levels(P >0.05).

Conclusion:

The prevalence of obesity was high among the rural women in Ayua and was unrelated to their ages, medical history or the presence of hypertension or diabetes

Keywords*: body mass index, casual blood glucose, generalized obesity, overweight, prevalence,*

Date of Submission: 28-11-2020 Date of Acceptance: 13-12-2020

I. Introduction

Obesity is a substantial health crisis of international dimensions with increasing prevalence in several countries including those in Sub-Saharan Africa currently witnessing the effect of the nutritional transition [1] A systematic review of studies done in Africa from 1980 to 2014 reported an increase in age- standardized prevalence rate from 21.9 to 24.9.0%. [2] Studies done in Nigeria in various settings and across geographical zones show differing rates but with the general trend suggesting an increasing prevalence over time [3]. Gender disparity in prevalence of obesity and overweight has also been severally documented with studies in developing countries showing higher prevalence among women. In Nigeria, for example, the female obesity prevalence was put at 12.5% compared with 4.8% in males [4] This may however not be surprising considering the higher percentage of body fat in women.

Obesity may be associated with high blood pressure, diabetes, and hyperlipidemia[5] Complications of obesity may include cardiovascular disease such as ischemic heart disease, neurologic complications such as stroke, gastrointestinal conditions including non-alcoholic fatty liver disease, peptic ulcer and gall stones as well as respiratory diseases such as sleep apnea syndrome [5] Renal disease, osteoarthritis and mood disorders are also not uncommon among obese individuals [5]. While obese pre-menopausal and overweight women are at increased risk of polycystic ovarian syndrome (a leading cause of infertility), obstetric complications and infant mortality, obese post-menopausal women are more susceptible to breast and endometrial cancers [5] Obesity is

also associated with increased mortality. In a meta-analysis study of 2.88 million individuals. Obesity was associated with an increase in all -cause mortality rate, with a hazard ratio of 1.18. [6]

Contrary to popular belief, obesity is no more regarded as a disease of the affluent. In fact, the prevalence of obesity appears to be rising fast among low socio-economic and impoverished populations with a projection that the rate may surpass that among the high socio-economic group at some point in the obesity transition [7, 8] Rural communities in developing countries may serve as a breeding ground for obesity due to ignorance, poverty, and lack of health education. In some of these communities, obesity is still fashionable and considered as an evidence of high social status, fertility, good health and prosperity especially among young women. [9. 10]

The aim of this study was to determine the prevalence of generalized obesity and overweight among women living in a rural community in Edo North, Nigeria.

II. Materials and Methods

This was a descriptive cross-sectional study conducted among female residents of Ayua community which is a small rural settlement in Etsako West local government area in Edo North, Nigeria. It has a total population of 3,058 individuals with 1,570 females constituting about 51.3% of the population [11]. The main occupation of the residents of the community are farming and trading.

Study Duration:The women were invited to take part in a health screening exercise (with focus on obesity) in the community town hall on March, 2016. However, the entire study involving conceptualization, design, training of research assistants and data management spanned from February to April 2016.

Sample size: 160

Sample size calculation

The sample size for the study was calculated using the Cochran's formula for finite population as follows:

$n_0 = z^2p\ (1 - p)]/\ d^2$ and $n = n_0N\ /\ n_0 + (N-1)$ where

n_0 = sample size for infinite population, n = sample size for finite population, p= prevalence of female obesity in Nigeria, d = precision set at 0.05.

Substituting the 12.5% obesity prevalence [4] for 'p' in the formula will give

$n_0 = 1.96 \times 1.96 \times 0.125 \times (1-0.125)/\ 0.05 \times 0.05 – 151.9$

$n = n_0\ N/\ n_0 + (N-1) = 151.9\ X\ 1570\ /\ 151.9 +(\ 1570 – 1) = 139$

Adding 10% of 'n' for non-response will give a sample size of 153. Therefore a total of 160 women were enrolled for the study.

Subjects and selection method

A consecutive sampling of all women that presented at the venue of the health screening exercise and who met the inclusion criteria was done until the desired sample size was reached. Demographic data and medical history were obtained from them, Clinical examination including weight, height, blood pressure measurement as well as blood glucose estimation were done.

Inclusion criteria

1. Female sex
2. Individuals between 18 and 80 years
3. Having given an informed consent for the study

Exclusion criteria

1. Individuals < 18 years and
2. Elderly women> 80 years,
3. Pregnant women
4. Lactating mothers
5. Chronically ill-looking individuals and those who cannot stand
6. Women with wasting diseases such as HIV, renal, liver disease or heart failure.

Procedure Methodology

The study used quantitative method of data collection. The questionnaire was interviewer – administered and used to gather data from the participants. It was divided into three sections. The first section contained socio-demographic data (age) and medical history such as a personal and family history of hypertension and diabetes. The second section of the questionnaire was used to obtain data on clinical examination such as anthropometry and blood pressure as well as theircasual blood glucose levels.

Participants' weight and height were measured and body mass index (BMI) calculated. Weight was measured to the nearest 0.1kg using a standardized bathroom scale with participants standing barefooted and wearing only light clothing. Similarly, height was measured to the nearest 0.5cm using a standiometer while participants stoodbarefooted with feet together after removing shoes and head coverings. The sliding part of the measuring rod was adjusted so that the hair (if present) was pressed flat. In order to reduce measurement bias, measurements were done at the same time interval by a few assistants who were properly trained. The BMI was estimated by dividing the weight of the participant by the square of the height and was categorized as follows: [11]

BMI < 18.5 kg/m^2: Underweight
BMI 18.5 – 24.9 kg/m^2 Normal weight
BMI 25.0 – 29.9 kg/m^2 Overweight
BMI 30.0 – 34.9 kg/m^2: Obesity class I
BMI 35.0 – 39.9 kg/m^2 Obesity class II
BMI > 40 kg/m^2: Morbid obesity III

Generalized obesity was defined as a BMI $\geq$ 30 kg/m^2 while overweight was defined as BMI > 25kg/m^2 but less than 30kg/m^2.

Measurement of blood pressure was by the use of an OMRON digital mercury sphygmomanometer. Measurements were taken after subjects had rested for at least 10 minutes. Patient must not have taken alcohol, nicotine or caffeine at least 30 minutes before assessment. Measurement was done on the right arm placed at the level of the heart and the patient seated. Korotkoff phases 1 and 5 were taken as corresponding to the systolic and diastolic blood pressures respectively.The mean of two separate readings was determined after an interval of 2 minutes and recorded to the nearest 2 mmHg was used.Systolic blood pressure > 140 mmHg and diastolic blood pressure > 90mmHg were considered as systolic and diastolic hypertension respectively.

Random capillary blood glucose was obtained from a finger prick using an accuchek glucose meter according to standard procedures with a value of value of $\geq$11.1mmol/l consideredas beingin the diabetic range [12]

Statistical analysis

Data was entered, saved and analyzed with SPSS version 20.0 (SPSS Inc., Chicago, IL). Mean, standard deviation and range were computed for continuous variables such as age, weight, height, BMI while frequency and cross-tabulation were done for discrete variables such as history of hypertension or diabetes. Chi square and Fisher's exact testwere used to test for differences in discrete variables between two or more groups and to determine factors associated with obesity. Data was presented in tabular and graphical forms. The cut-off value for statistical significance was set at $p<0.05$.

Ethical Clearance

Ethical approval was given by the Bayelsa State Research Ethics Committee under the Bayelsa State Ministry of Health as part of a multi-centre study involving Edo State and Bayelsa State of Nigeria. Permission to carry out the study was also granted by the local government chairman of Etsako West local government area of Edo State and the traditional leader of Ayua community. Informed consent was obtained without coercion from participants after indicating their willingness to partake in the study. Information was obtained from participants with anonymity and kept with the strictest confidentiality.

III. Results

A hundred and sixty five women were enrolled and partook in the study but only151 (94.4 %%) participants completed the study with the needed data and thus, only the latter was considered in analysis.

The mean age of participants was 51.93 $\pm$ 15.00 years and ranged from 18 to 80 years. Their mean weight and height were 72.08 $\pm$ 17.23 kg and 1.61 $\pm$ 0.09 m respectively while their mean systolic and diastolic blood pressures were 128.90 $\pm$ 20.54 and 78.58 $\pm$ 12.28mmHg (table 1).

Table no 1: Demographic and bio-clinical (quantitative) variables of participants

Variable	Mean $\pm$ SD	Range
Age (yrs)	51.93 $\pm$ 15.00	18 – 80
Weight (kg)	72.08 $\pm$ 17.23	43 – 140
Height (m)	1.61 $\pm$ 0.09	1.10 – 1.80
Systolic blood pressure (mmHg)	128.90 $\pm$ 20.54	70 – 180
Diastolic blood pressure (mmHg)	78.58 $\pm$ 12.28	40 – 100
Casual blood glucose (mmol/l)	6.82 $\pm$ 5.14	40 – 100

Twenty (13.2%) and seventeen (11.3%) participants had a personal history of hypertension and diabetes respectively while a family history of hypertension and diabetes was found in 18(11.9%) and 16 (10.6%) participants respectively. While 31(20.5%) participants had systolic hypertension during the study, 10(6.6%) had diastolic hypertension. The casual blood glucose in the participants ranged from 40 -100 micromol/l with 8(5.3%) of them having values within the diabetic range.

Generalized obesity was found in 47 participants, giving a prevalence of 31.1%.while another 52(34.4%) persons were overweight. Extreme obesity was found in 9(6.0%) persons. Only forty six (30.5%) participants had normal BMI. The frequency of the various BMI categories among the participants is shown in table 2.

Table no 2: Classification of overweight and obesity by BMI among the participants [11]

Classification	**Frequency (%)**
Underweight	6(4.0)
Normal	46(30.5)
Overweight	52(34.4)
Obesity Class I	24(15.9)
Obesity Class II	14(9.3)
Extreme obesityclass III	9(6.0)

There was no association between generalized obesity and age (p = 0.128), history of hypertension (p =0.964) systolic hypertension (p = 0.083) or diastolic hypertension (p = 0.084) as shown in table 3. A personal history of DM, family history of diabetes, and having CBG in the diabetic range had no significant relationship with obesity. (p = 1.000, 0.714 and 0.736 respectively). Although obesity was more common with increasing age (fig 1), the observed difference was not statistically significant (p = 0.128) as seen in table 3.

Table no 3: Association of obesity with age, hypertension and diabetes- related variables

Variable	BMI <25.0	> BMI< 30	BMI ≥ 30
Age (yrs)			
≤20	1(100.0)	0(0.0)	0(0.0)
21 -30	10(76.9)	0(0.0)	3(23.1)
31 -40	12(41.4)	10(38.5)	7(24.1)
41 -50	7(26.9)	10(38.5)	9(34.6)
51 – 60	14(30.4)	17(37.0)	15(32.6)
61 – 70	5(26.3)	6(31.6)	8(42.1)
71 – 80	8(35.3)	4(23.5)	7(41.2)
Total	55(36.4)	47(31.1)	49(32.5)
Fisher's exact 16.7, p = 0.128			
Personal History of hypertension			
Yes	8(40.0)	6(30.0)	6(30.0)
No	47(35.9)	43(32.8)	41(31.3)
Total	55(36.4)	49(32.5)	47(31.1)
Chi square = 0.073, p = 0.964, Exact p =1.000			
Personal History of diabetes			
Yes	6(35.3)	6(35.3)	5(29.4)
No	49 (36.6)	43(32.1)	42 (31.3)
Total	55(36.4)	49(32.5)	47(31.1)
Fisher's exact = 1.000			
Family History of hypertension			
Yes	7(38.9)	5(27.8)	6(33.3)
No	48(36.1)	44(33.1)	41(30.8)
Total	55(36.4)	49(32.5)	47(31.1)
Chi square = 0.204, p = 0.903			
Family History of Diabetes			
Yes	7(43.8)	4(25.0)	5(31.2)
No	48(35.6)	45(33.3)	42(31.1)
Total	55(36.4)	49(32.5)	47(31.1)
Fisher's exact = 0.597, p = 0.714			

Presence of systolic hypertension			
Yes	8(25.8)	8(25.8)	15(48.4)
No	47(39.2)	31(34.2)	32(26.7)
Total	55(36.4)	49(32.5)	47(31.1)
Fisher-s exact 5.099. p = 0.083			
Presence of diastolic hypertension			
Yes	1(10.0)	3(30.0)	6(60.0)
No	54(38.3)	46(32.6)	41(21.9)
Total	55(36.4)	49(32.5)	47(31.1)
Fisher's exact 4.650, p = 0.084			
Presence of CBG in the diabetic range			
Yes	4(50.0)	2(25.0)	2(25.0)
No	51(35.7)	47(32.9)	45(31.5)
Total	55(36.4)	49(32.5)	47(31.1)
Fisher's exact 0.676, p = 0.736			

CBG = casual blood glucose

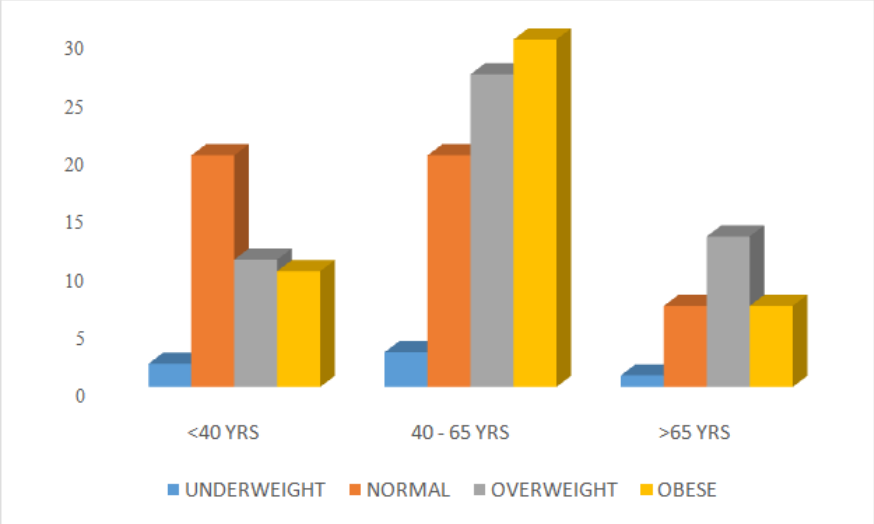

Fig no 1: Association of BMI class with age group

IV. Discussion

The prevalence of generalized obesity reported at 31.1% in this study was very high. Also over three-fifths of the women studied were either obese or overweight. Egbi et al reported a lower prevalence of 12.2% and 23.7% for obesity and overweight with a female obesity prevalence of 15.8% in a rural community in Bayelsa State, which was lower than what was found in this study [14]. Amole et al similarly found a lower female sex prevalence of 19.5% and 28.5% for obesity and overweight respectively. [15] However, the study carried out in an urban community about a decade ago may not be representative of current realities. In Isara's study, obesity was found in 10.6% % while another 21.8% had overweight in some rural communities in Esan South East local government council in Edo State. [16] Although our study was done in the same geographical region and among persons with similar occupation as their study, it was carried out a few years after and was restricted to the female gender in a different area of the state. The prevalence of obesity, pre-obesity and overweight among some rural communities in Delta State was reported as 5.5%, 17.5% and 23.0% respectively. [17] However, the population studied was younger than ours as majority of them were less than 40 years of age. The sex-specific prevalence rate was also not stated in their study.

There was no relationship between socio-demographic variables such as age and obesity in this study. Similarly, among a population of middle aged women in Iran, no difference in rate of obesity and overweight was found between pre-menopausal, peri-menopausal and post-menopausal women. [18]. Apart from education, most other socio-demographic variables also showed no association with obesity or overweight in that study. On the contrary, previous studies have reported an increase of obesitywith age [19]. It is howeverpossible that this age difference in obesity is becoming eroded with the increase in childhood and early adulthood obesity [20].

Rural residence and working in agricultural-related jobs had also been linked to lower odds for obesity in previous studies. [21] However, the high rates found in this rural setting we studied where a good proportion were farmers, may suggest that the obesity epidemic is rapidly spreading across geographical, socio-economic or occupational barriers.

Obesity was not significantly associated with blood glucose elevation in our study. This may not be surprising since no distinction was made between the possible etiologies of the hyperglycemia observed. While Type 2 DM, for instance, may be associated with overweight and obesity, Type 1 DM, on the other hand, may occur in individuals with normal weight and could even cause weight loss.

Although studies have reported increased prevalence of obesity and other metabolic conditions in association with family history of hypertension [22] and diabetes [23], our study found no association between them. However, a major constraint with a study of this nature is its subjective nature of relying on self-report without an independent clinical confirmation. It has been reported that a significant proportion of individuals with a positive family history of such conditions may be missed with such methods. [24] A diagnosis of DM in this study was not fully established because a history of symptoms was not ascertained in these patients. Use of an isolated casual blood glucose reading requires a corroborative history of symptoms to make a definite diagnosis of DM. Another limitation of the study is its failure to assess central obesity which is an important indicator of metabolic syndrome and cardiovascular health. Consequently, some individuals with normal BMI but with central adiposity may have been erroneously dismissed as being 'non-obese.' Also, risk factors associated with obesity such as physical inactivity, dietary patterns and social habits such as alcohol or tobacco use, were not assessed in this study. The cross-sectional design of the study creates a limitation on evaluation of cause - and - effect relationship between variables. Lastly, the non-probability sampling technique used could introduce some selection bias.

V. Conclusion

Despite the limitations of this study, the findings of a high prevalence of generalized obesity among women in Ayua community in Edo State, Nigeria remains valid. More efforts should be put in place by policymakers and stakeholders in the health sector to raise awareness about the increasing prevalence and associated complications of obesity and overweight. Women of all age group, especially those living in rural communities in developing countries should be targeted. Health sensitization and screening programs will need to be carried out from time to time in such communities for early diagnosis and prompt management of obesity and related complications.

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Acknowledgement
Nil

Conflict of Interest:
No potential conflict of interest declared

Oghenekaro Godwin Egbi, et. al. "Prevalence of generalized obesity among women in a rural settlement in Edo North, Nigeria." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(12), 2020, pp. 51-57.