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Prevalence of Overweight and Obesity in Enugu Metropolis, Nigeria

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Abstract: *Objectives: To study the prevalence of overweight and obesity among adults in Enugu metropolis, Nigeria. Methods: A cross-sectional study involving randomly selected 716 adults was conducted. Standard anthropometric measurements were taken, and fasting glucose concentration was determined. Results: The prevalence of overweight and obesity was 29.9% and 13.1%, respectively. Overweight and obesity affected females more than males. Overweight was 36.7% in females, and 25.0% in males, while female obesity was 16.0% and 11.0% in males (P<0.05). Overweight and obesity were the highest among the age group of 40-49. A greater proportion of married participants were overweight (56.3%) and obese (36.1%) compared to their single counterparts (23.2%) and (14.6%); respectively (P<0.05). Traders (56.2%) and civil servants (50.2%) had a higher prevalence of overweight, but obesity was seen mostly in civil servants (30.2%). Overweight males were more diabetic (20.2%), while obese females were more frequently diabetic (18.8%). Conclusion: Overweight and obesity have been found to be common in Enugu metropolis. Increased physical activities at home and in work places in addition to the nutritional education would reduce this burden.*

Keywords: *Enugu Metropolis, Nigeria, Obesity, Overweight, Prevalence*

INTRODUCTION

Recently, overweight and obesity have been widely spreading rapidly in a lot of low- and middle-income countries, especially in urban settings. As WHO (2017) reported, in the year 2016, over 1.9 billion adults more than 18 years were overweight, and more than 650 million adults were obese. Globally, overweight and obesity have caused more deaths than underweight. This data has made these medical conditions very significant issues to consider. Hypertension, diabetes mellitus and atherosclerosis and also certain types of cancer are the most important diseases related to the obesity (Chukwuonye et al., 2013).

WHO (2017) has defined overweight and obesity as the abnormal or excessive fat accumulation that may harm health. Based on the WHO report, the major cause of overweight and obesity is an energy imbalance between calories consumed and calories burned. Increase in physical inactivity due to increasingly sedentary nature of many forms of works, increased intake of energy-dense foods that are high in fat, changing modes of transportation, and increasing urbanization can be named as the other associated causes of overweight and obesity.

An internationally recognized and commonly used method to measure overweight and obesity at the population level is the body mass index (BMI). It is the same for both sexes and for all ages of adults. The

World Health Organization defines body mass index as the person's weight in kilograms divided by the square of his height in meters (WHO, 2017). For adults, the WHO defines underweight as BMI <18.5kg/m^2; normal weight, BMI of 18.5-25.0kg/m^2; overweight, BMI of 25.0-29.9kg/m^2 and obesity, BMI $\geq$ 30kg/m^2.

Overweight and obesity were once considered as a problem only in high income countries but are now of epidemic proportions in developing countries (Lim et al., 2013). Data from World Health Organization have shown that overweight and obesity have increased by more than 20% between 2002 and 2010 in Nigeria (Akarolo et al., 2014). These increases coincided with the arrival of fast food industries in Nigeria (Chukwuonye, 2013). In Enugu metropolis where the study was carried out, fast food industries have been very popular and received high levels of patronage.

Therefore, this study was conducted to determine the prevalence of overweight and obesity in Enugu Metropolis and the association between diabetes and obesity.

Materials and Methods

Study participants

A total of 716 adults were selected to participate in the study. Age of the subjects ranged from 20years to 73years. Pregnant women and lactating mothers as well as very ill people were excluded to avoid biased anthropometric estimates.

Methods

A cross-sectional study was conducted among a random sample of adults from different parts of Enugu Metropolis. The participants were drawn from Ogbete Main Market, Independence Layout, Ogui New Layout and Gariki motor park to cover varying socio-economic classes and wide range of occupations.

Anthropometric measurements

Harson Bathroom Weighing Scale H89 was employed in measuring the weight of participants. The weighing scale was first standardized.

Then the weight of each participant was measured with the person bare footed and wearing only light clothing. The weight was recorded to the nearest 1 kilogram. The weighing scale was reassessed each morning before weighing was done.

To measure height, a Stadiometer was employed. Each participant was asked to stand erect with the heels, buttocks, upper back and occiput against the stadiometer. The measurements were recorded to the nearest 1cm.

Body mass index was calculated using the WHO formula, BMI = Weight (kg)/height (m^2). The BMI was used to classify the participants accordingly.

Glucose Determination

Fasting blood glucose concentration of participants were determined using Accu-Check Active Blood Glucose Meter (Roche Diagnostics GmbH, Mannheim, Germany). Quantitative blood glucose test was done with fresh capillary blood, and diabetes diagnosed if fasting blood glucose concentrated was $\geq$ 126mg/dl (IDF, 2006).

Data generated were analyzed by descriptive statistics and the proportions were compared using the Chi-square test. A P-value of <0.05 was considered significant.

Ethical clearance was sought, and the permission was granted by State Ministry of Health's ethics committee. The participation was voluntary after the consent was given.

Results

A total of 716 subjects consisting of 416 (58.1%) males and 300 (41.9%) females participated in the study. The prevalence of overweight and obesity was 29.9% and 13.1%, respectively. Overweight was observed more in females (36.7%) versus 25.0% in males. Obesity was also higher in females (16.0%) than males (11.1%)

(P<0.05). More than half (51.0%) of the participants, however, were of normal weight and only 6.1% were underweight (Table 1).

The prevalence of overweight and obesity according to the age group of participants has been presented in Table 2. Overweight and obesity were mostly frequent at the age group of 40-59 years: (32.1%) and (16.2%), respectively.

Table 3 shows that the greater proportion of married participants were overweight (56.3%) and obese (36.1%) than the single participants (23.2% and 14.6%), respectively (P<0.05). Whereas, traders (56.2%) and civil servants (50.2%) among other occupations were overweight, and obesity was most frequent in civil servants (30.2%).

Diabetes was observed more in overweight males (20.2%) while obese females were more diabetic (18.8%) as presented in Table 4. The prevalence of diabetes was 16.3% in overweight subjects and 16.0% in obese counterparts (P>0.05).

Discussion

The prevalence of overweight, obesity and underweight in our study was 29.9%, 13.1% and 6.1%; respectively. Enugu metropolis is a developed urban city. Urban residence has been strongly associated with increased levels of overweight and obesity (Unwin & Alberti, 2006; Sola. et al., 2011). This finding has been also related to a systematic review where the prevalence of overweight and obesity in Nigeria ranged from 20.3% - 35.1% and 8.1 -22.2%; respectively (Chukwuonye et al., 2013). Overweight, obesity and underweight were similarly found in 31%, 17% and 5% of participants in the five geo-political zones of Nigeria (Okafor et al., 2014).

The prevalence of obesity found in this study (13.1%) was higher than 9.8% and 4.2% which were reported from Ilorin and Jos, Nigeria respectively (Puepet et al., 2002; Desalu et al., 2008). The studies in Ilorin and Jos were carried out many years ago. The implication was that obesity and overweight have been rising, assuming epidemic proportions in Nigeria. Also, globally, the extremes of bodyweight, especially overweight and obesity have been assumed as epidemic proportions. In Europe, overweight and obesity have been affecting 30- 80% of the adult population (aged more than 20 years old) (WHO, 2007). In Balearic Island Coll. et al. (2015) observed a prevalence of 29.4% and 11.2%, respectively for overweight and obesity.

The rising trends of overweight and obesity in Enugu could be a result of the consumption of energy- dense high calorie diet from fast food centers being popular in Enugu. It has been proposed (Potiet.et al., 2014) that fast foods have high total energy, total fats and saturated fat but lower fiber content. The production and sale of processed foods having high profit margins and transnational food corporations have been amongst the sources of foreign direct investment in Enugu as in many sub-Saharan African countries (Hawkes et al., 2005).

Sedentary lifestyle of the most participants of the study might also be responsible for the increases in overweight and obesity that were observed. The participants were recruited from markets, motor parks and Government Reserved Areas where there is physical inactivity.

Overweight and obesity affected females more than males in this study. It has similarly been found that overweight and obesity vary greatly between men and women, with women across the globe disproportionately affected (Okafor et al., 2014; Flegal et al., 2012; Gezawa et al., 2013; Amole et al., 2011). The gender difference may be a result of some cultural practices that encourage female weight gain (Brink et al., 1989; Wahab et al., 2011).

Generally, the middle aged participants (30-59 years) were commonly found to be overweight and obese. However, the prevalence of both overweight and obesity was highest at the age of 40-49 years old. Similar findings have been reported by several workers (Hajian et al., 2007; Adedoyin et al., 2009; Amira.et al., 2011). Individuals in these age brackets were workers who may indulge in less home-made food but more in fast food during working hours. In the studied areas, fast food joints offering meat pies, doughnut, hamburgers and

beef burgers were common. The increased prevalence could also be attributed to the decreased physical activity that accompanies aging (Vijayakumar et al., 2008).

The majority of the participants who were overweight and obese were married, civil servants or traders. Enugu is not only a civil service town as Government and Public Service establishments abound but also the commercial nerve center of Enugu State. Marital fulfillment, relaxation and overfeeding may all contribute to increase in weight observed in these married people. Some studies have similarly reported associations between marital status/occupation and overweight and obesity (Sidik et al., 2009; Abdulai et al., 2010).

Obesity is the major risk factor for Type 2 diabetes, which accounts for over 90% of all the diabetes (Lim. et al., 2013; IDF, 2006). This was evident in the current study: obese females were more diabetic while in overweight males, the frequency of diabetes was higher. However, gender was not a factor in acquiring diabetes among the overweight and obese subjects. Excess bodyweight has been identified as an issue of concern for both type 1 and type 2 diabetes (Ganz. et al., 2010).

Conclusion

The prevalence of overweight and obesity was 29.9% and 13.1% respectively in Enugu metropolis. Females were mostly affected, and overweight and obesity peaked at the age of 40-49 years. Obesity was seen to be associated with diabetes. Increased physical activities both at home and in work places, and enhanced nutritional education of the populace about balanced diet in addition to regular basic medical check- up will help reduce the burden.

Conflicts of Interest

Disclosure of potential conflicts of interest:

The researchers had no conflicts of interest to declare.

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Table 1: Prevalence of overweight and obesity by gender

Gender	No studied (%)	Normal weight (%)	Overweight (%)	Obesity %(%)	Underweight (%)
Males	416(58.1)	236(56.5)	104(25.0)	46(11.1)	31(7.5)
Females	300(41.9)	129(43.0)	110(36.7)	48(16.0)	13(4.3)
Total	716(100)	364(51.0)	214(29.9)	94(13.1)	44(6.1)

Table 2: Prevalence of overweight and obesity according to age of study participants

Age group (Yr)	No studied (%)	Normal weight (%)	Overweight (%)	Obesity %(%)	Underweight (%)
20-29	105	43(41.0)	33(31.4)	12(11.4)	17(16.2)
30-39	186	103(55.4)	52(28.0)	26(14.0)	5(2.6)
40-49	234	121(51.7)	75(32.1)	38(16.2)	0(0)
50-59	139	72(51.8)	43(31.0)	11(7.9)	13(9.3)
60 and older	52	25(48.1)	11(21.2)	7(13.4)	9(17.3)
Total	716	364(51.0)	214(29.9)	94(13.1)	44(6.1)

Table 3: Marital status and occupation of studied population (n = 716)

Characteristic	No studied (%)	Normal weight (%)	Overweight (%)	Obesity %(%)	Underweight (%)
Marital status					
Married	634	80(12.6)	357(56.3)	197(31.1)	0(0)
Single	82	31(37.8)	19(23.2)	12(14.6)	20(24.4)
Occupation					
Trading/business people	267	58(21.7)	150(56.2)	46(17.2)	13(4.9)
Civil servants	199	30(15.0)	100(50.3)	60(30.2)	9(4.5)
Students	91	66(72.5)	19(20.9)	6(6.6)	0(0)
Laborers	159	97(61.0)	24(15.0)	16(10.0)	22(14.0)

Table 4: Pattern of diabetes and weight distribution among participants

Weight categories (based on BMI)	Males		Females		Total DM+
	Total	DM+(%)	Total	DM+ (%)	
Normal weight	235	12(5.1)	129	2(1.6)	14(3.8)
Overweight	104	21(20.2)	110	14(12.7)	35(16.3)
0besity	46	6(13.0)	48	9(18.8)	15(16.0)
Underweight	31	0(0)	13	0(0)	0(0)