ABDOMINAL OBESITY AND ITS ASSOCIATION WITH SOCIOECONOMIC INDICATORS AMONG MULTIPAROUS WOMEN

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ABSTRACT

Introduction: Obesity is an important but modifiable risk factor for chronic non-communicable diseases, whereas socioeconomic status (SES) is a determinant of health. The aim of this study was to evaluate the association between parity, socioeconomic indicators and abdominal obesity and adiposity in multiparous women.

Materials and Methods: Multiparous women who presented to a tertiary hospital were randomly selected. A total of three hundred and eighty-two (382) women who met the inclusion criteria were recruited. Socioeconomic indicators were measured using a self-reported questionnaire. Chi-square test was used to assess bivariate relationship between abdominal obesity and socio-economic status. Data on abdominal circumference, body weight, height, subcutaneous abdominal fat (SAF), skinfold thickness, waist and hip ratio (WHR) and socioeconomic status were collected. Measurement of intra-abdominal fat and deep abdominal adipose-tissue at L4-L5 area was studied using CT scan.

Results: The study revealed that 5.2%, were from upper class SES homes, 13.8%, 28.3% and 41.6% are from upper middle, lower middle, and upper lower class respectively, and the remaining 11% from lower SES homes. The sample size of 6.8% and 33% had abdominal fat and abdominal circumference respectively at risk levels. It was also observed that the deep abdominal adipose-tissue size was significantly higher in the lower socioeconomic class. In bivariable models controlling for SES and abdominal obesity, it was found to have a strong, dependent association between abdominal fat and circumference with SES among multiparous women.

Conclusion: The study established that parity and abdominal obesity was positively associated with lower socioeconomic indicators.

Keywords: Visceral adipose tissue, subcutaneous adipose tissue, Multiparty, Socioeconomic status, BMI

INTRODUCTION

Obesity is a major risk factor for numerous non-communicable chronic diseases and leads to increased morbidity and mortality. The prevalence, especially in women, is reaching epidemic proportions worldwide.Body mass index (BMI) is commonly used to diagnose obesity, whereas other anthropometric measurements such as waist circumference (WC) and waist-to-hip ratio (WHR) are also utilized to measure abdominal adipose tissue distribution. Nowadays, it is accepted that the measurements of abdominal adipose tissue correlate better with cardiovascular risk factors than BMI. Moreover, recent epidemiological studies suggest that another abdominal adiposity marker, the waist-to-height ratio (WHtR) is a better predictor of metabolic and cardiovascular risk than BMI, WC and WHR. The association between reproductive factors such as parity with weight gain and obesity prevalence in women has been intensely investigated with controversial results. However, it is not clear if biological changes that occur during pregnancy, including hormonal adaptations and postpartum behaviour, influence the regional distribution of adiposity, by promoting an abdominal or peripheral pattern. In fact, the relation between parity and regional adiposity accumulation has barely been investigated (Kim *et al*., 2007). Also there seem to be a dearth of information on the association between abdominal adiposity and socio-economic status. Therefore this study was aimed at assessing the association between abdominal fat, abdominal circumference, parity and socio-economic status in multiparous women.

MATERIALS AND METHODS

This cross-sectional study was conducted among 382 randomly selected women between 2015 and 2020. Prior to commencement of the study, participants were assured and reminded of confidentiality. All participants filled the demographic and consent form, gave answers for the socio-economic class assessment questions and then had their anthropometric measurements taken. The study population was made up of women that have had a number of pregnancies.

Inclusion criteria

Female adults who have had at least three (3) pregnancies and are within the age range for the selection (ii) multiparous women (iii) having signed an informed consent form.

Exclusion Criteria

Participants who are a primigravida or pregnant at the time of the study were excluded from the study.

Sample and Sampling Technique

The sample size was determined using Lorentz's formula as follows:

$N = Z^2 (P) (1- P)/d^2$

where **N** is the estimated minimum sample size, **P** is the proportion of population having a good level of knowledge, **Z** is the statistic for desired level of confidence (1.96 for 95% confidence level), and **d** is the accepted margin of error (5%).

So. Z= 1.96, P = 0.538, d = 0.05

Therefore, $N = 1.96^2 (0.538) (1-0.538)/0.05^2 = 381.9$

Since non whole number cannot be used, the figure was rounded up to the nearest whole number which gave a sample size of 382. For the socio-economic factors, each participant answered a structured questionnaire administered face-to-face that included the following; personal data on age in years, place of birth, educational level, type of education, occupational status, and monthly income. The modified Kuppuswamy scale was used to classify their socio-economic status.

Anthropometric Measurements

Measurements are undertaken by researchers trained for the purpose, stadiometer was used to measure height in barefooted subjects standing straight at the level of the head, the weight was assessed using a weighing scale to the nearest 0.1 kg, the waist circumference was measured at the midway between coastal margin and iliac crest while the hip circumference was measured at the widest region of the greater trochanter using non elastic tape. Height and weight information were also measured and used to calculate the participants' body mass index (BMI), which is used to identify adults as underweight, normal, overweight, or obese. Screening for abdominal obesity was carried out in these subjects using waist and abdominal circumferences (The National Cholesterol Education Program Third Adult Treatment Panel criteria were used). The abdominal skin fold thickness was measured using a calliper.

Radiological Assessments

Intra-abdominal fat and subcutaneous adipose tissue (SAT) analysis were established using CT Scan. Visceral fats area (VFA) was assessed at the level of L4 which represents the best site to examine total VAT volume, with a multi slice to note the intra-abdominal fat accumulation and abdominal visceral fat volume. Their hands were positioned above the heads and in sustained inspiration. Visceral Adipose tissue (VAT) in this study is the intra-abdominal fat found within the rectus sheath of the abdomen.

Statistical Analyses

Analyses were performed using SPSS version 22 (SPSS, Inc., Chicago, IL, USA). Data are presented as mean ± standard deviation and percentages. Differences between abdominal adiposity were calculated using the Analysis of Variance (ANOVA) test. The Chi-square test was used to test if the variables followed

a normal distribution curve and to decide whether there was an association between SES, parity and abdominal adiposity.

RESULTS

Table 1: Participants Demographic Characteristics (n = 382)

Characteristics	Mean ± SD
Age (years)	36.8 ± 2.40
BMI (Kg/m^2)	22.69 ± 0.96
Abdominal Circumference (cm)	122.86 ± 1.05
Abdominal skin fold thickness (mm)	5.13 ± 1.34
Parity	4.84 ± 0.65

Table 2: Distribution of Respondents according to Age of the Study Population (n = 382)

Age (years)	Frequency	Percentage (%)
18 – 25	124	32.5
26 – 30	34	8.9
31 – 35	32	8.4
36 – 40	40	10.5
41 – 45	44	11.5
46 – 50	36	9.4
51 – 55	56	14.7
56 – 60	16	4.2
Total	**382**	**100.0**

Table 3: Socio-demographic Profile of Study Population

Characteristics	Frequency (N)	Percentage (%)
BMI (kg/m^2)		
Underweight	14	3.7
Normal weight	186	48.7
Over weight	112	29.3
Obese	44	11.5

Extremely obese	26	6.8
ABDCIR		
Excellent	58	15.2
Good	66	17.3
Average	132	34.6
At risk	126	33
ABDFAT		
0mm – 20.99mm	32	8.4
21mm – 40.99mm	92	24.1
41mm – 60.99mm	145	38.0
61mm – 80.99mm	55	14.4
81mm – 100.99mm	32	8.4
101mm – 120.99mm	18	4.7
121mm – 140.99mm	8	2.1
Parity		
Multiparity	328	85.86
Grand-multiparity	54	14.14
Socio-economic Class		
Upper-class	20	5.2
Upper Middle class	110	28.8
Lower Middle class	108	28.3
Upper Lower class	140	36.6
Lower class	S4	1.0

Table 4: The Differences in the Socio-demographic profiles

Socio-demographic profile	Mean ± SD	ANOVA	P-Value
ABDCIR (cm)			
Upper class	92.60 ± 0.94	10.027	0.000
Upper Middle class	98.40 ± 0.97		

Lower Middle class Upper Lower class Lower class	101.11 ± 0.86 103.03 ± 1.15 124.00 ± 0.70		
ABDFAT (mm)			
Upper class Upper Middle class Lower Middle class Upper Lower class Lower class	4.00 ± 1.72 4.60 ± 1.33 5.14 ± 1.38 6.21 ± 1.28 6.00 ± 0.20	0.862	0.487
Parity			
Upper class Upper Middle class Lower Middle class Upper Lower class Lower class	2.40 ± 0.503 2.76 ± 0.69 3.82 ± 0.64 4.97 ± 0.59 4.50 ± 0.58	5.497	0.00

Table 5: The Distribution of Abdominal Fat measured by CT scan (n=382) subjects

Visceral/subcutaneous adipose tissue	**Mean ± SD**	**ANOVA**	**P-Value**
VAT (cm^2)			
Upper class Upper Middle class	166.5 ± 0.94 171.2 ± 0.97	0.1718	0.000

Lower Middle class Upper Lower class Lower class	182.6 ± 0.86 220.8 ± 1.15 206.5 ± 0.41		
SAT (cm^2)			
Upper class Upper Middle class Lower Middle class Upper Lower class Lower class	198.2 ± 1.72 210.3 ± 1.33 268.3 ± 1.38 277.8 ± 1.28 310.2 ± 0.73	0.3427	0.042

Table 6: Association between SES classes and Abdominal Circumference

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	77.696[a]	12	.000
Likelihood Ratio	83.834	12	.000
Linear-by-Linear Association	22.274	1	.000
N of Valid Cases	382		

There was a significant association between abdominal circumference and social economic status in this study (X^2 = 74.70, p < .001).

Table 7: Association between SES classes and Parity

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.538[a]	8	.001
Likelihood Ratio	29.488	8	.000
Linear-by-Linear Association	17.143	1	.000
N of Valid Cases	382		

There was a significant association between parity and social economic status in this study (X^2 = 27.54, p < .001).

Table 8: Association between SES classes and Abdominal Fat Categories

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	92.274[a]	24	.000
Likelihood Ratio	89.067	24	.000
Linear-by-Linear Association	.832	1	.362
N of Valid Cases	382		

There was a significant association between abdominal fat and social economic status in this study (X^2 = 92.27, p < .001).

DISCUSSION

This study examined the association between abdominal fat, abdominal circumference and socio-economic status in multiparous women. Abdominal visceral and subcutaneous adiposity has been consistently linked to cardiovascular events and metabolic disorders but not much has been said about its association with parity and socioeconomic status. However, contention exist with the belief that woman of the lower socioeconomic class tend to accumulate more abdominal fat.

The data from this study revealed that there was a significant association between abdominal fat accumulation and socioeconomic variables. Therefore, the current study supported previous studies that SES is associated with abdominal

obesity. The study showed that majority of the multiparous women (85.86%) were younger than grand multiparous women (14.14%), also grand multiparous women showed greater prevalence of low SES. The classification of the subjects based on their age into various levels of abdominal obesity was not very efficient, this may be due to fat atrophy associated with increasing age. The mean age of the study subjects was 36.8± 2.40 years.(Table 1)

The study shows that majority of the women 34.6% (n=132) had an abdominal circumference at average levels. $X^2 = 74.70$, $p < .001$). Analysis of abdominal fat shows that about 38% (n=145) of women had abdominal fat within the range of 41mm-60.99mm, with the least prevalence of 2.1% (n=8) at 121mm-140.99mm.

This findings showed positive association between abdominal circumference and the socioeconomic parameters, with lower SES having increased abdominal circumference and fat deposition. Association between SES, Parity, Abdominal Circumference and Abdominal fat showed significant relationships between SES and these variables at $X^2 = 27.54$, $p < .001$).

This finding agrees with several other studies conducted among parous women, in which there was an association between SES and abdominal obesity. Socio-economic status is significantly associated with abdominal adiposity. Radiological findings among the women of low and high socioeconomic status showed a VAT of 206.5 ±0.41 cm² and 166.5 ± 0.98 cm²; and SAT of 310.2 ± 073 cm² and 198.2 ± 0.73 cm² respectively. These findings are significantly associated at ($X^2 = 92.27$, $p < .001$).

CONCLUSION

Conclusively, this study to the best of our knowledge is the first in Nigeria to examine the association between SES and abdominal obesity in multiparous women, which has been a topic of enormous interest and controversy as it predisposes to certain health conditions and unwillingness of some women to get pregnant. The current study established from the findings that intra-abdominal adiposity as measured using VAT, SAT, abdominal circumference, and abdominal fat is significantly associated with women of lower socio-economic status.

RECOMMENDATION

We recommend greater awareness programme that will educate and inculcate in these women various fitness and abdominal weight control measures to engage in, irrespective of their SES, and also screen them regularly for the cardio-metabolic health risks associated with abdominal obesity.

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