

ORIGINAL RESEARCH ARTICLE

Maternal Obesity in Early Pregnancy and Subsequent Pregnancy Outcome in a Nigerian Population

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Abstract

Despite a rising prevalence worldwide, there is limited data on pregnancy outcome among African women with prepregnancy or early pregnancy obesity. This was a case-control study to determine the prevalence of maternal obesity in early pregnancy and compare the subsequent pregnancy outcome between 201 women with obesity and 201 non-obese controls in a University Teaching Hospital in Nigeria. The prevalence of obesity in early pregnancy was 9.63%. Obesity was significantly associated with advanced maternal age and parity ≥ 1 . It was also a risk factor for pregnancy induced hypertension, admissions during pregnancy, caesarean delivery and associated with 5th minute apgar score ≤ 3 (0.044). Obesity in early pregnancy is a risk factor for adverse pregnancy outcome among pregnant Nigerian women. This information should be utilised by physicians to improve the outcome of pregnancy and promote safe motherhood (*Afr J Reprod Health 2011; 15[4]: 55-59*).

Résumé

Obésité maternelle en début de grossesse et la conséquence éventuelle de la grossesse chez une population Nigériane. Malgré une prévalence qui augmente partout dans le monde, il existe des données limitées sur les conséquences de grossesse parmi les femmes africaines qui souffrent de l'obésité avant la grossesse ou en début de la grossesse. Il s'agit d'une étude de cas témoin menée dans un Centre Hospitalier Universitaire au Nigéria pour déterminer la prévalence de l'obésité en début de la grossesse et pour comparer la conséquence éventuelle de la grossesse chez 201 femmes obèses et 201 femmes témoins qui ne sont pas obèses. La prévalence de l'obésité en début de la grossesse était 9,63%. L'obésité était significativement liée à l'âge maternel avancé et la parité ≥ 1 . Elle était un facteur du risque de l'hypertension provoquée par la grossesse, les admissions pendant la grossesse, l'accouchement à travers l'opération césarienne et liée à la 5^{ème} minute de l'indice d'Apgar $\leq (0,044)$. L'obésité en début de la grossesse est un facteur de risque pour des conséquences indésirables de la grossesse chez les femmes enceintes nigérianes. Les médecins doivent se servir de cette information pour améliorer la conséquence de la grossesse et pour promouvoir la maternité sans danger (*Afr J Reprod Health 2011; 15[4]: 55-59*).

Keywords: Early pregnancy, Obesity, Prevalence, Nigeria

Introduction

Maternal obesity in pregnancy is a recognised obstetric risk factor that may be associated with adverse pregnancy outcome and recent evidence reveals a rising prevalence especially in Western countries and urban developing countries.¹ It has been associated with hypertensive disorders of pregnancy, gestational diabetes, difficulty in conducting clinical examination, interventional delivery, preterm delivery, foetal macrosomia and thrombo-embolic disorders in pregnancy.¹⁻⁴ While the prevalence of obesity reported among pregnant women from developed countries

range between 15% to 40%, the values from developing countries like Nigeria are comparatively much lower.⁵⁻⁸

This variation may be partly explained by differences in the criteria used in defining obesity in these studies, racial and environmental factor such as dietary influences. The use of absolute maternal weight or body mass index (BMI) in labour as diagnostic criteria when studying the prevalence or outcome of pregnancies complicated by maternal obesity has major limitations. Indeed, such studies should be based on maternal obesity diagnosed before or in early pregnancy as complications of obesity in pregnancy can occur before term. In addition, fluid retention contributing to maternal weight in pregnancy and multiple gestations

are also important limitations that can make result interpretation inaccurate. Hence the pre-pregnancy body mass index (BMI) or the maternal BMI in early pregnancy when available are considered to be more representative for studying the effects of maternal obesity on pregnancy.^{9,10}

To date, there have been very few published data on the influence of maternal obesity on pregnancy outcome using the pre or early pregnancy BMI among pregnant African women. This study was carried out to determine the prevalence of obesity in early pregnancy and evaluate the subsequent pregnancy outcome among a population of pregnant Nigerian women. The findings will be important in documenting the true burden of obesity in pregnancy in such settings, facilitate patient counselling and anticipation of adverse pregnancy outcomes that may be associated with this condition by obstetric care providers while improving maternal and foetal outcome.

Methods

This was a case-control study from January 2006 to December 2008 using a hospital obstetric and perinatal database which contained detailed information on every woman delivering at the University of Benin Teaching Hospital (UBTH), Nigeria. The data were coded by the Resident Doctors on duty at each delivery and subsequently presented at the daily Departmental Clinical Meetings where they were vetted by the Consultants and clinical staff of the department for accuracy of entry before storage in the Database. Ethical approval for this work was obtained from the Hospital's Research and Ethics Committee.

The study was carried among women with singleton pregnancies who booked their pregnancies in the first trimester and delivered in the hospital. In the study group, obesity was defined as a Body Mass Index (BMI) at booking $\geq 30 \text{ kg/m}^2$ while the next consecutive woman in the database with a booking BMI between $18.5 - 24.9 \text{ kg/m}^2$ served as non-obese controls. Outcomes of interest included the social and demographic details of the participants, occurrence of specific complications of pregnancy such as pregnancy induced hypertension, gestational diabetes, preterm births and antenatal admissions. Data on the outcome of labour and foetal outcome were also analysed. Women with multiple gestation and pre-existing chronic medical disorders such as diabetes mellitus, essential hypertension and sickle cell anaemia were excluded from this study. Social class stratification was done as published by Olunsanya et al¹¹ with class 1,2,3 considered upper class while 4 and 5 was considered as low social class respectively.

Data were entered into SPSS version 15 (SPSS Inc., Chicago, IL, USA). Dichotomous data are presented as counts or frequencies and continuous variables summarized as means (SD). Comparison of categorical variables was with the Fisher exact test. Parametric data were compared using the unpaired student's t-test. Odds ratio and 95% confidence intervals were computed. All tests were two-sided and statistical significance was set as $p < 0.05$ or confidence interval excluding 1.

Results

A total of 402 women were included in the study which comprised 201 cases and 201 non-obese controls. In the three year study period there were 2086 eligible women who presented for antenatal care in the first trimester. Of this number, 201 had BMI $\geq 30 \text{ kg/m}^2$ giving a prevalence of 9.63% for obesity in early pregnancy.

Social and demographic characteristics

In Table 1, the mean maternal age in both groups was comparable (29.49 vs. 32.14) and it ranged from 19 to 42 years and 21 to 46 years for the cases and controls respectively. Maternal age ≥ 35 years (OR 2.52, CI 1.56 – 4.08, $p=0.002$) and parity ≥ 1 (OR 1.68, CI 1.10 – 2.55, $p=0.02$) were significant risk factors for obesity in early pregnancy.

Antenatal Complications of Pregnancy

Obesity in pregnancy was significantly associated with pregnancy induced hypertension and admissions during pregnancy (antenatal admissions) compared to the non-obese controls (OR 3.35, CI 1.59 – 7.06, $p=0.001$ and OR 1.91, CI 1.06 – 3.44, $p=0.04$ respectively). There was no significant difference between both groups in the occurrence of gestational diabetes, preterm delivery before 37 weeks or delivery before 34 weeks (Table 2).

Outcome of Labour

With regards to the outcome of labour (Table 3), caesarean delivery was significantly higher among the obese women (OR 2.01, CI 1.27 – 3.18, $p=0.003$). However, there was no significant difference between both groups in the rate of augmentation of uterine contraction with Oxytocin, the incidence of episiotomies, perineal lacerations and primary post partum haemorrhage. During the study period there was no maternal death recorded in both groups. The leading indication for caesarean section in obese and non-obese parturients was cephalo-pelvic disproportion (38% vs.

Table 1: Clinical risk factors for maternal obesity with odds ratio (OR)

Variable	Obese (%) N=201	Non-obese (%) N=201	OR (95% CI)	p- value
BMI at Booking (mean \pm SD)	33.39 \pm 3.26	22.69 \pm 1.58	-	<0.0001
Mean Maternal age (years \pm SD)	32.14 \pm 4.54	29.59 \pm 4.34	-	0.2
Age group (years)				
<35	136 (67.7)	169 (84.1)	2.52 (1.56 - 4.08)	0.002
\geq 35	65 (32.3)	32 (15.9)		
Parity				
0	56 (28.0%)	79 (39.1%)	1.68 (1.10 - 2.55)	0.02
\geq 1	145(72.0%)	122 (60.9%)		
Social class				
Upper	105 (52.2)	114 (56.7)	1.20 (0.81- 1.78)	0.42
Lower	96 (47.8)	87 (43.3)		
Marital Status				
Married	201(99.5%)	200 (99%)	0.5 (0.04 – 5.53)	1
Single	1(.5%)	2 (1%)		

Table 2: Complications of pregnancy associated with maternal obesity

Variable	Obese (%) n=201	Non-obese (%) n=201	OR (95% CI)	p- value
Gestational Diabetes	7 (3.5%)	1 (.5%)	0.14 (0.02 – 1.14)	0.07
PIH	30 (17.4%)	10 (5.2%)	3.35 (1.59 – 7.06)	0.001
Antenatal admission	35 (21.1%)	20 (11%)	1.91 (1.06 – 3.44)	0.04
Birth before 37weeks	29 (16.9%)	23 (12.9%)	1.31 (0.73 – 2.35)	0.46
Birth before 34weeks	10 (5%)	3 (1.5%)	3.46 (0.94 – 12.75)	0.09

*PIH – pregnancy induced hypertension

Table 3: Outcome of labour

Variable	Obese (%) n=201	Non-obese (%) n=201	p- value
Augmentation of Labour	28(16.2%)	26(14.9%)	0.74
Mode of Delivery			
SVD	133(66.2%)	162(80.6%)	0.008
Instrumental	2(1%)	1(.5%)	
Caesarean section	65(32.4%)	39(19.4%)	
Episiotomy	44(21.8%)	50(24.8%)	0.556
Perineal Tear	30(14.8%)	38(18.6%)	0.424
PPH	11(5.5%)	4(1.9%)	0.070
Maternal Mortality	-	-	

*SVD- Spontaneous vaginal delivery, PPH-Primary post partum haemorrhage

46% respectively) and foetal distress (25% vs. 21.5% respectively). Out of 10 women who had caesarean section for severe pregnancy induced hypertension, 8 (80%) were obese.

Foetal Outcome

The foetal outcome among obese women and the controls is shown in Table 4. Although severe birth asphyxia (5 minute Apgar score <3) was significantly commoner in the study group, the differences observed

between both groups with respect to the occurrence of foetal macrosomia, birth weight <2500 gram, stillbirths and admission into the neonatal special care unit were not statistically significant.

Discussion

This study showed that maternal obesity in early pregnancy among a population of black African women can be associated with adverse obstetric outcomes. The prevalence reported in this study, although slighter

Table 4: Foetal outcome

Variable	Obese (n)	Non-obese (n)	p-value
Sex			
Male	103 (51.6%)	98 (48.4%)	0.549
Female	98 (48.4%)	103 (51.6%)	
Birth weight <2500 gram	19 (9.5%)	16 (7.9%)	0.600
Foetal macrosomia	12 (6%)	6 (3%)	0.156
Shoulder Dystocia	None	None	
Stillbirth	6 (3%)	2 (1%)	0.128
Admission into neonatal special care unit	38 (19%)	25 (12.4%)	0.068
5 minute Apgar score <3	12 (6%)	4 (2%)	0.044

higher, is still comparable to previously published Nigerian data but much lower than what has been documented from western countries.⁴⁻⁸ This difference in prevalence from results in western population supports the suggestion that racial, social and environmental influences like diet may be important determinants of the occurrence and distribution of obesity among this population and in early pregnancy. However, in an African population where poverty and infectious diseases like HIV is widespread, dietary influences may not be comparatively as important a risk factor for the prevalence of obesity as observed in western countries.

In this study, increasing parity was identified as a risk factor for maternal obesity as has been documented previously in the literature.^{6,8} This may be explained by the fact that not all the weight gained in each pregnancy is lost after delivery and this cumulatively predisposes women with high parity and advancing maternal age to obesity. Indeed, available data from the most recent Nigerian National Demographic and Health survey estimates that the Nigerian women will give birth to 5.7 children by the end of her childbearing years.¹² In addition, it reported a five fold increase in the prevalence of obesity between women age 15-19 years and 40-49 years at the end of their reproductive years. Clearly, the high fertility rates and by extension parity appears to be major determinants of obesity among women in the reproductive age group in Nigeria. Effective family planning services to space child bearing appropriately and limit family size may be important strategies to limit the effect of increasing parity as an aetiological factor for maternal obesity in our environment.

The significant association between pregnancy induced hypertension and maternal obesity in pregnancy in this study is consistent with previously published data which have shown that maternal obesity in pregnancy is a risk factor for medical disorders of pregnancy.^{1,2,5-9} In addition, the higher rates of maternal admissions during the antenatal period among obese women may be partly explained by the increase in the

incidence of these medical disorders which usually require closer materno-foetal surveillance and interventional delivery for foetal or maternal indications. Pregnancy induced hypertension and its sequelae have been recognised as a leading cause of maternal mortality worldwide.^{13,14} Therefore, a reduction in the prevalence of obesity among pregnant women may reduce the occurrence of these complications with their attendant maternal morbidity and mortality ultimately promoting safe motherhood.

In this study, delivery by caesarean section and 5th minute apgar score ≤ 3 was also significantly higher among obese women. Obesity in pregnancy has been recognised as a risk factor for caesarean delivery in previous studies.^{7,8,15,16} Pregnancy in an obese woman can be considered a high risk pregnancy which may be associated with increased incidence of other complications of pregnancy, as such the resort to interventional delivery including caesarean section by physicians may be higher to prevent morbidity or mortality either for the woman or her baby. In a setting where women are averse to delivery by caesarean section¹⁷, a reduction in the prevalence of obesity among pregnant women may help in lowering the incidence of associated complications of pregnancy and consequent caesarean sections.

The extrapolation of the results of this study to the general population requires some caution since it was conducted in a University Teaching Hospital with predominantly urban dwellers who may differ markedly from rural dwellers. More studies, preferably multi-centred and involving more rural dwellers are necessary. However this study provides important data on the influence of maternal obesity in early pregnancy on pregnancy outcome in an African population with limited published data on the subject using these diagnostic criteria for obesity in pregnancy.

Maternal obesity is an important complication of pregnancy among patients receiving antenatal care in our hospital. It is a risk factor for pregnancy induced hypertension and 5th minute apgar score ≤ 3 . Increasing parity and advancing maternal age are also associated

with maternal obesity in pregnancy. Physicians providing care for obese pregnant women should anticipate these conditions and appropriately manage these women in order to improve the outcome of pregnancy and promote safe motherhood. Pre-pregnancy counselling of obese patients on weight reduction before the next pregnancy, lifestyle modification and effective family planning services are also important interventions that will help to reduce obesity related morbidity in pregnancy.

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