

Prepregnancy Obesity and Pregnancy Outcome

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Abstract:

Background: Maternal obesity has long been correlated with an increased risk of chronic hypertension and diabetes prior to pregnancy and adverse pregnancy outcomes including preeclampsia, gestational diabetes, fetal macrosomia, Cesarean deliveries, postpartum endometritis and a prolonged hospital stay

Objective: To determine the effect of maternal pre-pregnancy obesity on pregnancy outcomes
Methods: One hundred and twenty two women were recruited in the study. The patients were allocated into two groups, group 1 obese patients (68) BMI 30 or more and group 2 non obese patients (54) BMI between 19.8-24.9.

Outcomes: About two - third of the study group were having mild obesity, moderate obesity comprised about 28% and about 4% only was morbidly obese. Hypertensive disorders were nine folds more among obese women (R.R 4.74). Obese pregnant women were significantly more prone to have gestational diabetes (R.R 6.35).

Even anemia was significantly more amongst Obese women when compared to non obese ones (29/68, R.R 3.84). Ante partum hemorrhage had significantly more in obese women (R.R 3.14). There was no increased risk for PROM (R.R 0.71). Moreover The macrosomic babies were extremely commoner among obese (R.R 9.1).

Conclusion: Pre-pregnancy obesity is a risk factor for gestational diabetes, preeclampsia, labor induction, cesarean section for fetal distress, and wound infection. They should be considered as high risk and counseled accordingly.

Keywords: BMI, obesity, gestational diabetes postpartum hemorrhage

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Introduction

Maternal obesity has long been correlated with an increased risk of chronic hypertension and diabetes prior to pregnancy and adverse pregnancy outcomes including preeclampsia, gestational diabetes, fetal macrosomia, Cesarean deliveries, postpartum endometritis and a prolonged hospital stay. ^(1, 2) The perinatal problems that have been identified with maternal obesity and pregnancy include an increased risk of neural tube defects, birth asphyxia, birth trauma and neonatal hypoglycemia ⁽³⁻⁴⁾. Body mass index (BMI) is defined as weight in kilograms divided by height in square meters. In healthy adults, BMI ranges from 19.8 to 24.9. When BMI is between 25 and 29.9 indicates overweight, and when BMI 30 or more indicates obesity. ⁽⁵⁾ The studies of maternal morbidity and adverse outcomes have been primarily based on retrospective studies, reviews, and large birth registries, have used weights rather than BMI, and have been limited in the outcomes evaluated. Also, these assessments have been primarily undertaken in European and the U.S. Populations with very limited data that was evaluated. ⁽⁶⁾

The purpose of this study was to determine the effect of the maternal pre-pregnancy obesity on multiple antepartum, intrapartum and neonatal outcomes.

Methods

This is a case control study was conducted in Sohag University Hospital during the period from September 2003 to August 2004. One hundred and twenty two women were recruited in the study. The patients were allocated into two groups, group 1 obese patients (68) BMI 30 or more and group 2 non obese patients (54)

BMI between 19.8 - 24.9. Patients were excluded from the study, if there was

other risk factors like previous Cesarean Section (C.S.) or pre-existing medical and / or obstetric complications to evaluate obesity as the only risk factor and its impact upon pregnancy and obstetric outcome. Both groups were comparable as regard age and parity. All patients were subjected to thorough history, detailed examinations and investigations (CBC, fasting and 2 hours postprandial blood sugar, serum creatinine, complete urine analysis and U/Sevaluation). Ante partum outcomes included the development of gestational diabetes (Women with GDM according to World Health Organization criteria ⁽⁷⁾ (fasting blood glucose ≥ 6.1 mmol/l and/or 2-h blood glucose ≥ 7.8 mmol/l) the development of preeclampsia, antepartum bleeding, preterm labor, maternal weight gain during the pregnancy, intrauterine

growth restriction, and ante partum ultrasound estimate of a fetal weight in excess of 4000 g. Intrapartum events examined included the need for an induction of labor, use of oxytocin for labor augmentation, length of the first, second and third stages of labor, and mode of delivery including the reason for operative abdominal deliveries. Post partum outcomes comprised post partum hemorrhage (PPH), extent of perineal

trauma including third and fourth degree lacerations, the incidence of retained placentas and postpartum infection. Neonatal outcomes included the gestational age at delivery, birth weight, Apgar scores.

Statistical analysis was done by using range, relative risk and odd ratio.

Results

1. Admission characteristics

Table (1). shows the mean age, BMI and weight gain during the index pregnancy of women in both groups (mean \pm SD).

	Study group	Control group	P. value
	Mean \pm SD	Mean \pm SD	
Age	27.85 \pm 3.96	26.54 \pm 3.49	N.S
BMI	33.85 \pm 2.81	24.49 \pm 1.88	*
Weight gain During the Index pregnancy	12.47 \pm 3.08	10.06 \pm 2.79	

* P. value < 0.05

During the index pregnancy control group women were significantly lesser weight gain during pregnancy Table (1).

2. Degree of obesity

Table (2). Weight classification of study group according to BMI.

Degree of obesity (BMI)	No.	%
Mild obesity (class1(30.034.9)	46	67.6%
Moderate obesity (class2(35.5-39.9)	19	27.9%
Extreme obesity > 40	3	4.4%

About two - third of the study group were having mild obesity, Moderate obesity comprised about 28% and about 4% only were morbidity obese (Table 2).

Table (3). Weight gain during the course of pregnancy by parity.

Parity	Mean weight					
	Study group (68)			Control group(54)		
	No.	%	Mean	No.	%	Mean
PGDA						
Multipara	35	51.5%	12.12	31	57.4%	10.25
GMP	30	44.1%	12.97	23	42.6%	10.3
	4	5.9%	13	0	0%	0

Parity does not seem to have any impact upon body weight gain within study group. Nevertheless, obese women add significantly more body weight than non obese, in all patients.

Table (4). Mean increase of body weight among obese women by the degree of obesity

Degree of obesity	Mean increase of body weight (kg)
Mild	12.9±4.75
Moderate	10.8±3.23
Sever	13.3±3.23

Regarding the degree of obesity, sever obese patients had gained more weight (13.3) than mild and moderate obese patients, respectively (12.9, 10.8).

4. Incidence of antenatal complications

Table (5). Incidence of antenatal complications.

	Study group	Control group	R.R
Hyper emesis gravidarum	10/68 (14.7%)	6/54 (11.1%)	1.32
Multi pregnancy	6/68 (8.8%)	1/54 (1.9%)	4.76
Hypertensive disorder	22/68 (32.4%)	2/54 (3.7%)	8.74
Gestational diabetes	8/68 (11.8%)	1/54 (1.9%)	6.35
Anemia	29/68 (42.6%)	6/54 (11.1%)	3.84
A.P. hemorrhage	4/68 (5.9%)	1/54 (1.9%)	3.18
P.R.O.M.	9/68 (13.2%)	10/54 (18.5%)	1.71
Preterm labor	4/68 (5.9%)	2/54 (3.7%)	1.59
Postdates	8/68 (11.8%)	8/54 (14.8%)	0.79
L.G.A.	23/68 (33.8%)	2/54 (3.7%)	9.13

Hypertensive disorders were found nine times more among obese women (R.R 4.74). Obese pregnant women were significantly more prone to have gestational diabetes (8/60 vs.1/54 R.R 6.35). Even anemia was significantly more amongst obese women when compared to non obese ones (29/68, R.R 3.84). Ante partum hemorrhage was significantly more in obese women (R.R

3.14), yet there was no increased risk for PROM (R.R 0.71). Moreover the change of having postdates may be slightly lower among obese women (R. R 0.79). Macrosomic babies were extremely commoner among obese (R.R 9.1).

5.1 Obstetric outcome

Table (6). Incidence of C.S. and C.S. wound infection in both groups.

	Study group	Control group	R.R
C.S.	40/68 (58.8%)	11/54 (20.4%)	
C.S. wound infection	12/40 (30%)	1/11 (9%)	

Cesarean Section (**C.S**) was done more significantly commoner in obese women compared to the control group (R.R 2.65) Table (6).

Wound infection in C.S. in obese women was more than nine times (R.R 3.3). Table (6)

5.2 Perinatal outcome

Table (7). Mean fetal weight and incidence of shoulder dystocia in both groups.

	Study group	Control group	
Fetal Weight	3409.59±922.69	2524.62±299.84	P < 0.05
Shoulder dystocia	3/68(4.4%)	1/54(1.9%)	R.R:2.38

Generally obese women had larger fetuses (3409.59±922.69 and 2524.62±299.84 for obese and control groups respectively (P < 0.05).

Three out of 68 obese women had shoulder dystocia compared to one out of 54 in control group (R.R 2.38).

Table (8). Fetal weight classification according to (BMI) of control group.

Fetal weight classification according to (BMI) of control group	(mean ±SD)
Mild obesity (class1(30.0-34.9)	3398.913±921.75
Moderate obesity (class2(35.5-39.9)	3491.667 ± 929.98
Extreme obesity > 40	3300±923.38

Moderate obesity had more effect on fetal weight than mild obesity and extreme obesity respectively.

Discussion

Obesity is a growing problem all over the world and it may have an important impact on pregnancy. Studies on maternal and fetal outcomes of pregnancies implicated by obesity have reported varied results. Women with other risk factors like previous C.S. or pre-existing medical and / or obstetric complications were excluded from the study to evaluate obesity as the only risk factor and its impact upon pregnancy and obstetric outcome. Generally, the results of the present study indicated that obese mothers are at higher risk for most of obstetric complications ranging from a relatively little increase in risk for some problems like hyper emesis gravidarum where obese women had risk of 1.32 to have this problem when compared to non obese one. This agrees with⁽⁸⁾ who found that hyper emesis gravidarum where obese women had a risk of 1.5 to have this problem when compared to non obese one.

Obese women in this study have almost 5 times the risk of carrying a multiple pregnancy compared to non obese group.

This is in agreement with study which showed that was found that 9.6% of obese women had multi fetal gestation.⁽²⁾

In our study we found that obese women associated were with an increased risk both gestational hypertension and preeclampsia about nine times compared to control group.

In a large prospective study done on 2827 patients: they founded that observed there is an increased risk for both gestational hypertension and preeclampsia (4.8% in control group, 10.2% in obese group and 12.3% in morbidity obese group).⁽⁸⁾

Another study was done on 481 women who delivered in university hospital .Prevalence of obesity was 18% among pregnant women and 30.6% of them were overweight Medical complications of pregnancy were more frequent in obese women than in women with normal weight since obese women showed higher frequency of proteinuria (24.1% versus 10.5%, $p < 0.15$) and high blood pressure (25.9% versus 4.5%, $p > 0.001$).⁽⁹⁾

In our study we found that Obese women were associated with an increase risk for gestational diabetes about 6.5 times compared to non obese ones.

Doherty *et al* founded that obese and morbidity obese patient are at increased risk for gestational diabetes. The incidence of gestational diabetes in both obese (6.3%) and

morbidity obese (9.5%) patients was increased compared with the control group (2.3%).⁽⁸⁾ a study reported that incidence of gestational diabetes to be 24.5% for patients with a BMI greater than 40 compared with 2.2% for patients with BMI of 20 to 24.9 ($P < .0001$).⁽¹⁰⁾

In other study gestational diabetes mellitus was significantly more common in obese pregnant women (odds ratio (99% confidence interval) for BMI 25-30 and MBI ≥ 30 respectively (1.53 – 1.84), 3.6 (3.25-3.98).⁽¹¹⁾ A cohort study was conducted from 1999 to 2002 which included 5131 women: 49.8% non obese, 43.9% obese, and 6.3% morbidity obese. Increase in BMI category was associated with higher rates of gestational diabetes.⁽¹²⁾

The relationship between maternal size and fetal size is interesting. Although an increase risk for IUGR has been suggested by⁽¹³⁾ among obese patients before excluding medical complications, our data, as well as other studies,⁽¹⁴⁾ suggest that IUGR is not influenced by BMI. On the other hand, an increased risk of fetal macrosomia and large – for gestational age neonates has been observed with maternal obesity.

Our findings confirm this association. We found that both obese and morbidity obese patients have a significantly increased risk for birth weight greater than 4000g compared with controls. These findings are important to remember when clinically estimating fetal weight in the labor room.

In our study we found that obese and morbidity obese patients are at increased risk of large for gestational age (LGA) delivery fetal birth weight greater than 4000g (Ors 1.7 and 1.9) and greater than 4500g (ORs 2.0 and 2.4).

Usha et al., 2004 found that Obese mothers had a higher incidence of large for gestational age delivery compared to normal weight mothers (14.8% vs7.6%).⁽¹⁵⁾

Bianco et al, found that weight gains of more than 25 lb was associated strongly with birth of a large for gestational age (LGA) neonate ($P < .01$); however, poor weight gain did not appear to increase the risk of delivery of a low birth weight neonate.⁽¹⁴⁾

In our study we found that obese mothers had risk of caesarean section about 3 times more when compared with non obese ones.

Doherty et al, found that overall caesarean delivery rate was 22.7% for controls, in comparison, obese patients had an

increased cesarean delivery rate of 33.8% (OR: 1.;95% CI: 1.4-2.2) and morbidly obese patients had a much higher cesarean delivery rate of 47.4% (OR: 3.0;95% CI:2.2-4.0).⁽⁸⁾

In a study done to evaluate the factors that are associated with cesarean delivery they observed that of cesarean delivery for primiparous women was 21.76%. Risk of cesarean delivery increased consistently and significantly ($P > 0.0001$) with increasing BMI ($> 20.7\%$), (20-25; 18.44%), 25-30; 24 96%), (30;37.6%).⁽¹⁶⁾

In our study a significant increase in rate of post – cesarean delivery wound infection in obese women was nearly 10 times more in comparison to non- obese women. This finding is in agreement with a study (16) who found that the overall incidence of wound infection in obese women was significantly higher than non obese.

The mean fetal weight in the present study was significantly more in obese mothers in comparison to non obese ones (3409 vs. 2524 $P < 0.05$). Shoulder dystocia was about 2.3 times to occur; this due to good monitoring and practice.

Conclusion

Pre-pregnancy obesity is a risk factor for gestational diabetes, preeclampsia, labor induction, cesarean for fetal distress and wound infection. They should be considered as high risk and counseled accordingly.

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