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Evaluation of Fetomaternal Outcome in Cases of Maternal Obesity a Case Control Study

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ABSTRACT

Objective: The purpose of our study was to assess the risks to obese pregnant women and their babies, associated with pregnancy and delivery in comparison to the normal weight non – obese mothers.

Materials and Methods: Total of 100 patients were taken as cases and a matched group of 100 patients having BMI ≥ 18.5 But <30 who fulfilled the inclusion criteria were taken as controls.

A comprehensive history works up and the investigation was done for the patient. Blood pressure, hydration, temperature, and other general investigation were done. Stadiometer was used for measured height and Weight (in kgs) was taken.

Results: 35% of subjects in the study group had GDM as compared to only 10% in the control group. The P-value was found to be 0.0001 which was statistically significant. 27% of subjects in the study group and 12% of subjects in the control group had preeclampsia with a P-value of 0.0125 which was statistically significant. 3% of cases in the study group and 2% of cases in the control group had eclampsia. The P-value was found to be 1.0 which is >0.05 and hence statistically insignificant. 8% of subjects in the study group had shoulder dystocia as compared to 1% in the control group.

Conclusion: Preconception Assessment and counselling are strongly encouraged and needed to spread awareness and understanding among the pregnant population regarding obesity.

Key Words: Maternal obesity, Risk, Fetomaternal, Pregnant women

INTRODUCTION

Over the past few decades, the pervasiveness of obesity has rapidly increased globally.¹

The practice of obstetric confronts major challenge by the increasing rate of maternal obesity.

Mother and fetus both can result in harmful consequences by maternal obesity.

During pregnancy the maternal risk includes preeclampsia, high rate of caesarean section, wound infections, high instrumental delivery rate, post-partum haemorrhage and most common risk include gestational diabetes and many more.

For mother and fetus both, obesity in pregnancy can upset health later in life and the fetus is at risk for stillbirth, congenital anomalies, macrosomia and shoulder dystocia.

Nearly 50 % of women are either overweight or obese who become pregnant (overweight- BMI $> 25 - 29.9 \text{ kg/m}^2$, obese -BMI $\geq 30 \text{ kg/m}^2$).¹

During pregnancy, many females are not aware of existing commendations adjacent gestational weight gain and many gains above current gestational weight gain guidelines and they are not trying to lose the post-pregnancy additional weight.²

Maternal obesity increases the chance of risk in present and future pregnancies and also increase the rate of complications in pregnancy including, gestational diabetes mellitus (GDM), caesarean delivery and preeclampsia.¹

In women, post-partum weight gain and excessive weight gain in pregnancy are noteworthy risk issues for later obesity.²

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Maternal obesity is related to abnormal fetal development, maternal health additionally can have a significant effect on the in utero environment and, thus, on fetal growth and the healthiness of the child later in life.³

Females who are weightier are less likely to have a pregnancy complex by a small-for-gestational-age infant or intrauterine development restriction, but this defensive outcome seems to dissipate once the maternal BMI reaches the level of obesity ($> 30 \text{ kg/m}^2$). fetal macrosomia (defined as an estimated fetal weight of greater than or equal to 4000 g) is the major concern in overweight pregnant women, which appears to be increased 2- to 3-fold in obese parturients.⁴ Moreover, there appears to be a dose-dependent relationship between maternal obesity and fetal macrosomia.

Because of the recognised risks, considerations need to be made regarding plans for perinatal care and delivery. With these considerations in mind, we are conducting a study to compare the pregnancy outcomes in obese in respect to the non-obese patients.

MATERIALS AND METHODS

The present study was done in the Department of Gyne and Obs, and department of Pediatrics, R G Kar Medical College and Hospital and it was a prospective comparative hospital-based study.

The duration of the study was From July 2014 to June 2015. Ethical clearance has been taken from the institutional ethical committee (Memo no- OG/WBUHS/2014-15-0327).

The study population was drawn from patients admitted in the labour room and Labor general ward for delivery, in the department of Obstetrics and Gynaecology at the hospital. Ethical clearance was taken from the hospital ethical committee. Patients were divided into the two groups study group and Control group.

Inclusion criteria for the Study group: Pregnant women with BMI ≥ 30 (at 1st antenatal checkup done during the 1st trimester or pre-pregnancy BMI if available), with singleton live/dead(IUFD) foetuses > 28 wks gestation with the cephalic presentation, admitted in LR/LG ward of department of Gynae and Obs, RGKMCH.

Inclusion criteria for the control group: Pregnant women BMI 18.5 to 28 wks gestation with the cephalic presentation,

admitted in LR/LG ward of the department of Gynae and Obs, RGKMCH.

A total of 106 patients fulfilled our inclusion criteria for the study in which 4 patients did not give consent for the study and 2 patients during labour were diagnosed as mal-presentations and were excluded from the study. So a total of 100 patients were taken as cases and a matched group of 100 patients having BMI ≥ 18.5 But < 30 who fulfilled the inclusion criteria were taken as controls.

Exclusion criteria: Multiple pregnancies II. Fetal mal-presentation III. Patients with preexisting medical disorders – hypertension, DM, epilepsy, heart disease etc. IV. Patients unwilling to participate V. Patients with the previously scarred uterus (it will bias the obstetric intervention towards C- section)

A comprehensive history workup and the investigation was done for the patient. Blood pressure, hydration, temperature, and other general investigation were done. Stadiometer was used for measured height and Weight (in kgs) was taken.

Systemic examination was done comprising cardiovascular, respiratory, central nervous system to rule out any systemic pathology Per abdomen examination was done.

STATISTICAL ANALYSIS

The differences in statistical parameters for different outcomes of pregnant women with BMI > 30 were tested statistically using appropriate tests viz. t-test, Fisher exact test, Chi-square tests etc and the results are presented with p values ≤ 0.05 considered statistically significant. Analysis of data was done using standard statistical software – Med-calc (Version 12.7.4 – 1993 – 2013 Medcalc software bvba, Acaciaaan 22, B-8400 Ostend, Belgium).

RESULTS

The two groups were compared concerning the mean age. The student t-test was done for statistical analysis with a standard error of 0.467 and 95% CI -1.303 TO 0.543. The mean age in the study group was 23.56 ± 2.86 yrs as compared to 23.18 ± 3.11 yrs in the control group. The student t-test was done for statistical analysis. As P-value is 0.4172 that is > 0.05 means no statistical significance and both the group are comparable. (Table 1)

Table 1: Distribution of Patient According to Mean Age

	Study Group (n=100)	Control Group (n=100)	P Value	Standard Error
Mean age (in years) ± SD	23.56 ± 2.86	23.18 ± 3.11	0.4172	0.46

In our study, 44% of patients in the study group were primi-gravida as compared to 40% in the control group. 56% of patients in the study group were multi gravid in the study group as compared to 60% in the control group. As p-value is 0.6673 i.e. >0.05 means no statistical significance and both the group are comparable with a contingency coefficient 0.0304. (Table 2)

Table 2: Distribution of Patient According to Gravida

	Study Group (N=100)	Control Group (N=100)	P Value	Chi Squared
Primi Gravida	44(44%)	40(40%)	0.6673	0.185
Multi Gravida	56(56%)	60(60%)	0.6673	0.185

Table 3 shows the comparability between GESTATIONAL AGE of Study group and Control group. 6% of patient in the study group were preterm, 24% were past dated and 5% was post-term. As p-value for each gestational group was found to be non – significant.

Table 3: Distribution of Patient According to Gestational Age

	Study Group (N=100)	Control Group (N=100)	P Value	Chi-Squared	Or (95% Ci)
<37 WEEKS	6(6%)	4(4%)	0.0995	0.100	1.4688(0.4016-5.3718)
37 TO 40 WEEKS	65(65%)	78(78%)	0.3156	1.007	0.5238(0.2799-0.9803)
>40 TO 42 WEEKS	24(24%)	14(14%)	0.1443	2.132	1.9398(0.9369- 4.0165)
.>42 WEEKS	5(5%)	4(4%)	1	0.000	1.2632(0.3291- 4.8485)

35% of subjects in the study group had GDM as compared to only 10% in the control group. The P-value was found to be 0.0001 which was statistically significant. 27% of subjects in the study group and 12% of subjects in the control group had preeclampsia with a P-value of 0.0125 which was statistically significant.

The two groups were compared concerning the occurrence of eclampsia among them as shown in TABLE 4. 3% of cases in the study group and 2% of cases in the control group had eclampsia. The P-value was found to be 1.0 which is >0.05 and hence statistically insignificant. 8% of subjects in the study group had shoulder dystocia as compared to 1% in the control group. The P-Value was found to be 0.0407 which is <0.05 and hence is statistically significant. 20 % of patients in the study group had PPH following delivery as compared to 14% in the control group. Cervical/ Paravaginal tears were present in 2% of the BMI <30 categories and 4% in BMI >30 categories. None of the patients required hysterectomy or blood transfusion for the management of PPH. All were managed conservatively with uterotonics and by

repair of the cervical tears if any. The P-value was found to be 0.3466 which is >0.05 and is statistically not significant. Presence of caesarean section wound infection or presence of episiotomy wound infection. As in table 4, 16% of patients in the study group developed wound infection as compared to only 5% of cases in the control group. The P-value was found to be 0.0211 i.e. < 0.05 and is statistically significant.

The two groups were compared concerning fetal outcome in terms of liveborn (alive), stillbirth and early neonatal death. 5% were stillborn in the study group as compared to 3% in the control group. 3% of early neonatal deaths occurred in the study group as well as the control group. The P-values for both were calculated and were found to be statistically not significant. As there were 5 stillborn in the study group and 3 stillborn in the control group, so for the following tables the total number of subjects will be 95 in study group and 97 in the control group. 31.57% of the newborn in the study group required NICU admissions as compared to 22.68% in the control group as shown in table 16. P-value of 0.1293 was found which was statistically not significant (Table 4).

Table 4: Distribution showing the maternal and fetal outcome in both groups

	STUDY GROUP (n=100)	CONTROL GROUP (n=100)	P VALUE	CHI- SQUARED	OR(95% CI)
GESTATIONAL DIABETES					
GDM PRESENT	35(35%)	10(10%)	0.0001	16.516	4.84(2.23-10.48)
GDM ABSENT	65(65%)	90(90%)	0.0001	16.516	4.84(2.23-10.48)
PRE- ECLAMPSIA					
PRESENT	27	12	0.0125	6.243	2.7123(1.2845 - 5.7274)
ABSENT	73	88	0.0125	6.243	2.7123(1.2845-5.7274)
ECLAMPSIA					
ECLAMPSIA OCCURRED	3(3%)	2(2%)	1.0	0.000	1.5155(0.2477-9.2705)
NO ECLAMPSIA	97(97%)	98(98%)	1.0	0.000	1.5155(0.2477-9.2705)
ONSET OF LABOR					
INDUCED	29(29%)	13(13%)	0.0092	6.781	0.3658(0.1771-0.7557)
SPONTANEOUS	71(71%)	87(87%)	0.0092	6.781	0.3658(0.1771-0.7557)
SHOULDER DYSTOCIA					
PRESENT	8(8%)	1(1%)	0.0407	4.188	8.6087(1.0561 - 70.1723)
ABSENT	92(92%)	99(99%)	0.0407	4.188	8.6087(1.0561
OCCURRENCE OF PPH					
PPH OCCURRED	20(20%)	14(14%)	0.3466	0.886	1.5357(0.727-3.2439)
NO PPH	80(80%)	86(86%)	0.3466	0.886	1.5357(0.727- 3.2439)
WOUND INFECTION					
PRESENT	16(16%)	5(5%)	0.0211	5.321	3.6190(1.272-10.303)
ABSENT	84(84%)	95(95%)	0.0211	5.321	3.6190(1.272-10.303)
PERINATAL OUTCOME					
ALIVE	95	97	0.7817	0.0768	0.7340(0.2451- 2.1983)
STILLBIRTH	5	3	0.7182	0.1300	1.7018(0.3956-7.3209)
EARLY NEONATAL DEATH	3	3	0.6785	0.1720	1.0000(0.1969- 5.0779)
NICU ADMISSIONS					
NICU ADMISSION	30(31.57%)	22(22.68%)	0.1293	2.300	1.7143(0.9099 -3.2298)
NO NICU ADMISSION	65(68.42%)	75(77.31%)	0.1293	2.300	1.7143(0.9099 -3.2298)

APGAR SCORE AT 1 MIN: 23.15% of neonates in the study group had an Apgar score < 7 at 1 min as compared to 11.34% in the control group. 76.84% of neonates in the study group had an Apgar score >7 at 1 min as compared to 88.65% in the control group. The P-value was found to be

0.0442 which was statistically significant. Apgar score of neonates at 5 mins was compared between both the groups. 14.7 % of neonates in the study group had Apgar score 7 as compared to 90.721% in the control group (Table 5).

Table 5: Distribution Showing Apgar Score at 1 and 5 Minute in the Two Groups

APGAR SCORE	STUDY GROUP (n=95)	CONTROL GROUP (n=97)	CHI SQUARED	P VALUE	OR(95% CI)
<7	22(23.15%)	11(11.34%)	3.639	0.0442	2.2821(1.0409-5.0033)
>7	73(76.84%)	86(88.65%)	3.629	0.0442	2.2821(1.0409- 5.0033)
APGAR SCORE AT 5 MINS					
<7	14(14.7%)	9(9.27%)	0.786	0.3753	1.6460(0.6774- 3.9993)
>7	81(85.26%)	88(90.721%)	0.786	0.3753	1.6460(0.6774-3.9993)

DISCUSSION

This study has demonstrated that many adverse outcomes of pregnancy are associated with maternal obesity and has provided quantification of these risks. We have confirmed an increased rate of complications of pregnancy in obese women such as gestational diabetes, induction of labour and wound infection, pre-eclampsia, shoulder dystocia and increased rates of LSCS.

In our study, we found that 35% of the patients in the study group were known patients of gestational diabetes as compared to only 10% in the control group with a P-value of 0.001. Also, the occurrence of Preeclampsia was more in the study group, 27% as compared to 12% in the control group with a P value of 0.0125. Our results were similar to studies done by D Mandal et al. and Sebire NJ et al.^{5,6} both of which reported increased rates of pre-eclampsia and gestational diabetes among the obese group. The occurrence of eclampsia among the two groups in our study showed no significant difference, 3% of cases in the study group and 2% of cases in the control group had eclampsia. The P-value was found to be 1.0 which was statistically non-significant. None of the other studies reported any increased incidence of eclampsia among obese pregnant women.

The mode of delivery or the mode of termination of pregnancy is one of the important outcomes of our study. Study by D Mandal et al. (2011)⁵ showed increased cesarean section rates (36.72% vs 17.53%; P-value < 0.001) and instrumental delivery rate (12.32% vs 5.21% : P value < 0.001) in obese pregnant women. Sebire NJ et al. (2001) and Michlin R et al. (2000)^{6,7} also showed increased cesarean section rates in the obese group.

Post-partum haemorrhage (PPH) occurred in 14% of the patients with BMI <30 categories and in 20% of the patients in the BMI >30 categories. The difference was statistically not significant with a P-value of 0.604. The odds ratio was 1.5357(0.727 – 3.2439). Although the percentage of patients having PPH was more in the study group the values were not significant. Sebire et al. and Marie Blomberg^{6,8} also showed increased rates of PPH in obese pregnant women but with significant P values. They showed that the risk of atonic uter-

ine haemorrhage increased rapidly with increasing BMI. The increased risk of postpartum haemorrhage in obese women, even after accounting for such predisposing factors as caesarean section may be explained by more bleeding from the relatively larger area of implantation of the placenta usually associated with a large for gestational age foetus.

Our study also showed increased rates of caesarean section and episiotomy wound infection. 16% of patients in our study group developed wound infection as compared to only 5% in the control group. Our results were similar to D Mandal et al. (2011) which showed increased chances of infection morbidities (9.95% vs 3.79%). Also, Sebire et al. (2001)^{6,7} in his study showed increased rates of the genital tract and wound infection similar to our study.

The fetal outcome was compared in terms of liveborn, stillbirth and early neonatal death. 92% of neonates were liveborn, 5% was stillborn and 3% died in first 7 days of their life due to asphyxia, low birth weight ARDS and sepsis. In the control group 94% were liveborn, 3% stillborn and 3% had an early neonatal death. The P values were not significant but the number of stillborn were more in the obese group. The results of the study done by Sebire *et al* (2001)⁶ showed that the risk of stillbirth is increased in women with raised BMI and is significantly increased in those women with the highest BMI. The neonatal morbidity was evaluated in terms of neonates requiring NICU admission. In our study, 31.57% of neonates in the study group required NICU admission as compared to 22.68% in the control group. The P-value was 0.1293 which was statistically insignificant.

Also, the Apgar scores at 1 min and 5 min were compared. The P-value of Apgar score at 1 min was 0.0442 which was statistically significant and the P-value of Apgar score at 5 mins was 0.375 which was statistically insignificant. But the percentage of neonates having Apgar score <7 at 1 min and 5 min were more in the study group being 23.15% and 14.7%, respectively, showing that maternal obesity is related with fetal distress or perinatal asphyxia of some sorts. Similar results were shown by Blomberg M et al. (2013) and Michlin et al. (2000),^{7,8} who also showed increased risks of fetal distress, perinatal asphyxia, RDS and birth injury among neonates born to obese mothers.

CONCLUSION

It can be stated that obese women are at increased risk of several pregnancy complications; therefore preconception Assessment and counselling are strongly encouraged and needed to spread awareness and understanding among the pregnant population regarding obesity.

Hence we conclude that Greater understanding is needed of the pathophysiological link between obesity and the various adverse outcomes of pregnancy described in our study before effective and safe management strategies can be devised. At present, one can only advise that it would be sensible to attempt to achieve nearer normal weight before conception.

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