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Original Research Article

A prospective observational study on obesity related maternal and fetal complications at government headquarters hospital, Cuddalore

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ABSTRACT

Background: The magnitude of the obesity prevalence has been increasing in developed and developing nation. This study was to find out the obesity related maternal and neonatal complications in Cuddalore district.

Methods: This prospective observational COHORT study was carried out among the pregnant women for whom detailed history was obtained with complete general and physical examination. They were followed up to delivery and postpartum until discharge and the outcomes were studied.

Results: The mean body mass index (BMI) of obese women was 32.42 and that of control women was 22.59. Obese women had increased incidence of gestational diabetes mellitus at 2.67%, gestational hypertension in obese group at 10.67%, caesarean delivery at 85.33% and needed induction at 89.33% when compared to control group at 1.33%, 5.33%, 36% and 72% respectively. Obese mothers of caesarean delivery (8%) had a prolonged hospital stay due to wound gaping and wound infections, when compared to mothers of control group (2.67%). Babies of obese mothers (16%) had a prolonged hospital stay due to respiratory distress, neonatal jaundice and macrosomia, when compared to babies of mothers from control group (2.67%). We found that 33.33% of obese women delivered babies of weight 3.5 kg and above, when compared to control group (6.67%) and some needed NICU admission (14.67%).

Conclusions: The study confirmed from the population that obesity during pregnancy has increased number of complications like gestational diabetes, gestational hypertension, increased need for caesarean section, large babies needing NICU support.

Keywords: Obesity in pregnancy, Maternal complications, Neonatal complications

INTRODUCTION

Obesity is a state of excess adipose tissue mass.¹ In an India a study conducted by Mohan et al at Chennai the prevalence in age group more than 20 years was 22.5% males and 31.8% in females.

Women with BMI above 30 have longer duration and slower early progression in the first stage of labour.² The incidence of failed trial of labour after caesarean section is higher in obese women.³

Obesity also leads to structural changes to the kidney including renal and glomerular hypertrophy, glomerulosclerosis and albuminuria and is an independent risk factor for chronic kidney disease (CKD).⁴

The effects of obesity on pregnancy can be categorized as following: Prenatal complications like infertility/ sub-fertility due to obesity related increased insulin resistance and anovulatory cycles, antenatal pregnancy specific complications like gestational DM, hypertensive disorders

of pregnancy, preterm labour; intra-partum complications like labour induction, dysfunctional labour, instrumental and operative deliveries, post-partum complications like prolonged hospital stays, wound infections and dehiscence, NICU admissions, perinatal complications like macrosomia, anomalies, long term consequences of obesity and hypertensive disorders of pregnancy that may lead to ischemic heart diseases, myocardial infarction, CKD later.⁴⁻¹⁵

METHODS

The prospective observational study was conducted at Government District Headquarters Hospital, Cuddalore, Tamil Nadu during October 2018 to October 2019.

Obese (BMI >30 kg/m²) primi and multi gravida with documented antenatal records and willingness for safe confinement at last trimester included in the study as subjects and non-obese mothers were included as control. Patients having documented history of type I and type II diabetes mellitus and systemic hypertension, before conception, mothers with multiple pregnancy, miscarriage, anomalous baby, women with BMI <18.5 kg/m² and women who could not be followed until delivery and on irregular antenatal visits were excluded from the study. The subjects were followed up and the incidence of obesity related maternal complications like gestational diabetes, pre-eclampsia, gestational hypertension, abruptio placenta, placenta previa, postpartum hemorrhage, shoulder dystocia, deep vein thrombosis and post op wound infection/dehiscence during the immediate perinatal period and need for labour induction/instrumental delivery/cesarean delivery were determined. Birth weight of baby, gestational age at delivery, APGAR score, fetal mortality and morbidity in obesity complicating pregnancies during the immediate perinatal period was also followed up.

Based on the study of Dr. Padma Bharathi at Chennai, Tamil Nadu caesarean section outcome was 55.88% in obese pregnant women and 32.35% in non-obese pregnant women.¹⁶ Keeping this as prior information, power of study as 80% at confidence level 95%, the minimum sample size was calculated to be 72 in each group using Openepi software. Hence, cases were selected by following systematic random sampling, by taking first 2 months as recruitment period and remaining 10 months as follow-up period. In recruitment period for cases taking 4 obese out of 12 eligible cases per day for 3 days in a week, by choosing every third eligible case from MRD register. Considering the dropout rate of 20% is added (15+72=87 cases). Recruitment was stopped when it reached 87 cases as desired sample size was met, after drop outs finally 75 cases was studied. In control group, similar number were selected 4 controls out of 6 eligible cases per day using simple random sampling technique by lottery method without replacement method. Finally, to maintain 1:1 ratio, same no. of controls to cases taken and studied.

Ethical approval

The study protocol was reviewed and approved by institutional scientific and ethical committees.

Statistical analysis

Differences between groups are evaluated using Chi-square and student t test. The data were collected and entered in MS excel. Data was compiled, refined, coded, and recoded to analyze the objectives of the research. Data analyzed using SPSS version 19.0. Results explained in form of baseline identification and with various outcomes of my research. The results were summarized.

RESULTS

In this prospective observational cohort study, 75 obese women with BMI>30 kg/m² taken as case group and 75 women with BMI 18.5 kg/m² to 24.99 kg/m² taken as control group and studied for one year. The mean age of obese women is 23.7 years and that of control women was 22.7 years. The mean BMI of obese women is 32.42 and that of control women is 22.59. Obese women had increased incidence of gestational diabetes mellitus (2.67%) when compared to control group (1.33%). Obese women had increased incidence of gestational hypertension in obese group (10.67%) when compared to control group (5.33%). Obese women underwent more induction (89.33%) when compared to control group (72%). Increased cesarean delivery rates were found among obese women (85.33%) when compared to control group (36%).

Table 1: Obesity related obstetric complications among cases and controls.

Obesity related obstetric complications	Obese		Control	
	N	%	N	%
Obstetric related complications	13	17.33	5	6.67
GDM	2	2.67	1	1.33
GHT	8	10.67	4	5.33
Non severe pre-eclampsia	1	1.33	0	0
Prolonged pregnancy	1	1.33	0	0
Severe pre-eclampsia	1	1.33	0	0
Nil	62	82.67	70	93.33
Total	75	100	75	100

Chi-square test, test statistic=4.04, p=0.044, Relative risk: 2.6, 95% confidence interval: 0.9754 to 6.931

No significant difference was seen among obese and control group with respect to occurrence of preeclampsia, varying degrees of perineal tear, post operative wound infections and wound dehiscence. No case was complicated by postpartum hemorrhage, placenta previa,

Continued.

abruptio placenta, shoulder dystocia and deep vein thrombosis. Obese mothers of caesarean delivery (8%) had a prolonged hospital stay due to wound gaping and wound infections, when compared to mothers of control group (2.67%). Babies of obese mothers (16%) had a prolonged hospital stay due to respiratory distress, neonatal jaundice and macrosomia, when compared to babies of mothers from control group (2.67%). We found that 33.33% of obese women delivered babies of weight 3.5 kg and above, when compared to control group (6.67%). No difference was seen among obese and control group with respect to APGAR score at 5 min, due to good neonatal resuscitation. Neonates of obese mothers had increased NICU admission (14.67%) and NICU observation (22.67%) when compared to control group, the most common reasons for admission and observation of babies are respiratory distress, neonatal jaundice and macrosomia.

Table 2: Distribution of birth weight of newborn of cases and controls.

Birth weight group (kg)	Obese		Control	
	N	%	N	%
2-2.49	6	8	14	18.67
2.5-2.99	21	28	41	54.67
3-3.49	23	30.67	15	20
3.5-3.99	18	24	5	6.67
≥4	7	9.33	0	0
Total	75	100	75	100

Chi-square test, test statistic=24.669, $p < 0.001$, degree of freedom=3.

Table 3: Distribution of prolonged hospital stay of cases and controls.

Prolonged hospital stays	Obese		Control	
	N	%	N	%
No	57	76	71	94.67
Yes, due to baby	12	16	2	2.67
Yes, due to mother	6	8	2	2.67
Total	75	100	75	100

Chi-square test (Yates corrected), test statistic=10.4, $p < 0.001$, degree of freedom=1.

DISCUSSION

This prospective observational COHORT study was carried out among 150 (75 case+75 control) antenatal women from the outpatient and inpatient wards of the department of obstetrics and gynaecology of the Government Headquarters Hospital, Cuddalore.

The mean BMI in obese group was 23.7 and maximum obesity was found between 20-24 years of age and it was also clear that obesity increased with age. In the study of Bharathi et al conducted at Chennai, Tamil Nadu 2017, mean age was 27.¹⁶

In obese women we observed to have an increased incidence of gestational diabetes mellitus (2.67%) when compared with control group (1.33%). Obese women observed to have higher risk of developing gestational hypertension (10.67%) when compared to control group (5.33%). Risk was two times higher in obese group when compared to control group which was in accordance with the study of Bharathi et al conducted at Chennai, Tamil Nadu 2017 where gestational diabetes mellitus risk was increased in obese group (8.82%) when compared to control group (2.94%) and increased incidence of gestational hypertension in obese group (8.82%) noted when compared with control group (5.88%).

The labour induction was more in obese group (89.33%) when compared to control group (72.00%) which was in accordance with other study of Ekblad et al obese women and mothers with excessive weight gain during pregnancy had an increased incidence of induced labour and tendency for emergency caesarean delivery.¹⁰ The risk of induction among the obese women was increased almost 2.5-fold. In our study the augmentation of labour was 34.67% in obese group.

The cesarean delivery rates were increased in obese group (85.33%) when compared to control group (36%). Obese women had 2.24-fold increased risk of cesarean delivery when compared to control group which was in accordance with the study of Bharathi et al conducted at Chennai, Tamil Nadu on 2017, the cesarean delivery rates increased in obese group (55.88%) when compared to control group (32.35%) and she found that obese women had 2.8-fold increased risk of cesarean delivery when compared to control group. This was in accordance with previously conducted studies of Weiss et al obesity is an independent risk factor for adverse obstetric outcome and was significantly associated with an increased cesarean delivery and Marie, that have demonstrated an increased risk for cesarean delivery in obese group.^{6,17}

In our study, instrumental deliveries were not increased in obese group, which was in contrast to other studies of Weiss et al and Marie where obese mothers had increased risk of cesarean delivery, instrumental delivery, shoulder dystocia, meconium aspiration, fetal distress and early neonatal death, when compared to normal-weight mothers. We did not find association between instrumental delivery and obesity in our study, which was due to increased caesarean rates in obese women. Varying degree of perineal tear and shoulder dystocia was not routinely seen in either group, which was also due to increased caesarean delivery rates.^{6,17}

In our study, only some degree of caesarean wound infection and wound dehiscence was noted but was not statistically significant, which is due to better care and appropriate management with prophylactic antibiotics. This was in contrast to other study of Vogel et al in which obesity was an independent risk factor for surgical site infections, regardless of wound closure technique.¹²

In our study, the mean birth weight of the neonates of obese women was 3.189 kg and the neonates of control group was 2.734 kg. As previously reported by Ehrenberg et al obese women had increased risk of delivering high birth weight babies.¹³ We found that 33.33% of obese group delivered babies of 3.5 kg and above, when compared to 6.67% of control group.

In our study, neonates of obese mothers had increased NICU admission (14.67%) and NICU observation (22.67%), the major reasons for admission being respiratory distress in newborn. There was no difference in APGAR score at 5 min between the two groups.

In our study, obese mothers (8%) had a prolonged hospital stay due to wound gaping and wound infections and reasons for prolonged hospital stay in babies (16%) were respiratory distress, neonatal jaundice and macrosomia as some of the commonest complications. This was in accordance with previous studies of Heslehurst et al the obese women had increased wound infections; prolonged hospital stays and NICU admission.¹¹

CONCLUSION

The magnitude of the obesity prevalence has been increasing in developed and developing nations, though in varying degrees. Obesity is associated with higher rates of all causes of early mortality. Furthermore, metabolic syndrome and obesity are linked with cardiovascular disease, including myocardial infarction, atrial fibrillation, heart failure and stroke. Thus, obesity among women of child bearing age is associated with a number of health risks later in life. This stresses the importance of concentrating on trying to reduce the increasing incidence of obesity in fertile women. The best time of intervention for obese women is pre-pregnancy phase. This implicates the need of pre-pregnancy advice and counseling to young obese women. Obese women considering pregnancy should be informed about the risk of obesity on her pregnancy, baby and long-term effects in life. Health care professionals need to encourage and assist obese women to make life style changes, to lose weight pre-conceptually in an attempt to optimize and potentially decrease the risk of complication in pregnancy. Pregnancies of obese women should get appropriate care, should be provided with heightened surveillance, anticipation and diagnosis of the complications and early intervention, if complication arises.

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