

## ORIGINAL RESEARCH

**Study of maternal and fetal complications during pregnancy and puerperium in obese women**Robina Shaheen Mirza<sup>1</sup>, Parikh Rana<sup>2</sup>, Sarah Navid Mirza<sup>3</sup><sup>1</sup>Associate Professor, Department of Obst and Gynae, Govt Medical College, India.<sup>2</sup>Associate Professor, Department of Obst and Gynae, Govt Medical College Jammu, India.<sup>3</sup>SR, Department of Obst and Gynae, Maulana Azad Medical College, New Delhi, India.**ABSTRACT**

**Background:** A recent increase in the prevalence of overweight and obese women of reproductive age in India has been noted. Obesity during pregnancy is associated with an increased risk of gestational diabetes mellitus (GDM), pre-eclampsia, miscarriage, venous thromboembolism, infection, and hemorrhage in the mother. The present study was aimed to explore various maternal and fetal outcomes, influenced by maternal obesity.

**Material and Methods:** Present study was hospital based, prospective, observational study conducted in pregnant women, gestational age more than 32 weeks, singleton pregnancy, with BMI more than 30, delivered at our institute, willing to participate in present study.

**Results:** During study period 107 pregnant women were considered for present study. Majority of women were from 26-30 years age (40.19 %), were primigravida (44.86 %), delivered at 37-40 weeks of gestation (40.19 %), 85.05 % had BMI 30-34.9 kg/m<sup>2</sup>(moderately obese). In present study vaginal delivery was most common mode of delivery (52.34 %) followed by LSCS (40.19 %) & instrumental delivery (7.48%). Most common birth weight group was 2.5-3.99 kg (40.19 %), followed by 1.5-2.49 kg (34.58 %) group. Neonatal outcome noted was still birth (1.87 %), neonatal death (6.54 %) & rest of neonates were discharged with mother. 63.55 % babies required NICU admission. During postpartum period, complications such as wound infection (19.63 %), fever (14.02 %), wound dehiscence (6.54 %) & DVT (0.93 %) were noted. No maternal mortality was noted in present study.

**Conclusion:** Maternal obesity is associated with development of gestational diabetes mellites, preeclampsia, need for labour induction, increased caesarean delivery as well as NICU admissions and increased incidence of postpartum infections.

**Keywords:** Maternal obesity, gestational diabetes mellites, preeclampsia, labour induction, NICU admissions

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**INTRODUCTION**

Obesity is a worldwide individual and public health issue because it contributes to the development of several chronic diseases. A recent increase in the prevalence of overweight and obese women of reproductive age in India has been shown by many studies.<sup>1,2</sup> In the Indian subcontinent, the prevalence of obese or overweight married women (15–49 years)

rose from 11 to 15% in 2005–2006 as per National family Health Survey (NFHS) 3 and further to 20.6% as per NFHS 4.<sup>3</sup>

Mothers who are overweight or obese during pregnancy and childbirth, as measured by increasing maternal body mass index (BMI), are known to be at risk of significant antenatal, intrapartum, postpartum and also neonatal complications. Excessive weight both before pregnancy and during pregnancy has been found to increase the various pregnancy related adverse outcomes or complications both for the mother and the child.<sup>4</sup>

Obesity during pregnancy is associated with an increased risk of gestational diabetes mellitus (GDM), pre-eclampsia, miscarriage, venous thromboembolism, infection, and hemorrhage in the mother. Obese women often have prolonged first and second stages of labor. Early maternal exhaustion and poor bearing down efforts lead to increased incidence of instrumental deliveries.<sup>6</sup> The present study was aimed to explore various maternal and fetal outcomes, influenced by maternal obesity.

## **MATERIAL AND METHODS**

Present study was hospital based, prospective, observational study conducted in department of obstetrics and gynaecology, at XXX medical college & hospital, XXX, India. Study duration was of 2 years (January 2019 to December 2020). Study approval was taken from institutional ethical committee.

### **Inclusion criteria**

- Pregnant women, gestational age more than 32 weeks, singleton pregnancy, with BMI more than 30, delivered at our institute, willing to participate in present study

### **Exclusion criteria**

- Anomalous baby, IUFD
- Women not willing to participate

Study was explained & a written informed consent was taken for participation in present study. Maternal BMI at the time of admission to the labour room was calculated. For the purpose of study, pregnant women were classified into groups using Garrow's grading of obesity based on Quetelet's index or BMI (calculated as weight in kilograms per height meter square).

Demographic details, detailed history (age, parity, menstrual history, infertility, hypertension, diabetes, hypothyroidism, or other medical illnesses, history of previous pregnancy outcome) & examination findings (general, systemic & obstetric examination) were noted in case record form. Necessary haematological investigations (CBC, Blood grouping, HIV, HbsAg, LFT, KFT, Thyroid profile, random blood sugar, FBS/PPBS) , Obstetric USG/ Doppler were done whenever required.

As per obstetric & medical conditions, decision of induction of labour/ caesarean delivery were taken. Patients labour course was monitored by partograph. All neonates were immediately examined by neonatologists. Patients & neonates were followed till 7 days and outcome studied. Data was collected and compiled using Microsoft Excel, Statistical analysis was done using descriptive statistics.

## **RESULTS**

During study period 107 pregnant women satisfying inclusion & exclusion criteria were considered for present study.

Majority of women were from 26-30 years age (40.19 %) followed by age group 19-25 age group (24.3 %). Among obese women, majority in present study were primigravida (44.86

%) & second gravida (30.84 %). In present study, majority of women delivered at 37-40 weeks of gestation (40.19 %), 17.78 % patients were > 40 weeks while 42.05 % were from 32-37 weeks gestation. Only 1 patient had BMI > 40 kg/m<sup>2</sup> (morbidly obese) and 14.02 % had BMI 35-39.9 kg/m<sup>2</sup> (severely obese), rest 85.05 % had BMI 30-34.9 kg/m<sup>2</sup>(moderately obese).

**Table 1: Maternal Age Distribution**

| Age (in years)          | No. Of patients | Percentage |
|-------------------------|-----------------|------------|
| 19—25                   | 26              | 24.3       |
| 26—30                   | 43              | 40.19      |
| 31—35                   | 25              | 23.36      |
| >35                     | 13              | 12.15      |
|                         |                 |            |
| Primigravid             | 48              | 44.86      |
| Gravida 2               | 33              | 30.84      |
| Gravida 3               | 20              | 18.69      |
| Gravida 4 and more      | 6               | 5.61       |
| Gestational Age (Weeks) |                 |            |
| 32-34                   | 20              | 18.69      |
| 35-37                   | 25              | 23.36      |
| 37-40                   | 43              | 40.19      |
| >40                     | 19              | 17.76      |
| BMI kg/m <sup>2</sup>   |                 |            |
| 30-34.9                 | 91              | 85.05      |
| 35-39.9                 | 15              | 14.02      |
| ≥ 40                    | 1               | 0.93       |

Hypothyroidism (25.23 %), diabetes (14.95 %) & hypertension (12.15 %) were most common pre-pregnancy medical disorders in present study.

**Table 2: Pre-pregnancy medical disorders**

| Medical Disorders | No of patients | Percentage |
|-------------------|----------------|------------|
| Hypothyroidism    | 27             | 25.23      |
| Diabetes          | 16             | 14.95      |
| Hypertension      | 13             | 12.15      |
| Heart disease     | 3              | 2.8        |
| Asthma            | 2              | 1.87       |
| Epilepsy          | 1              | 0.93       |

Previous LSCS (40.19 %), preeclampsia (33.64 %), gestational hypertension (29.91 %), Moderate & severe anemia (24.3%) & gestational diabetes mellitus (19.63 %) were common obstetric high risk factors in present study.

**Table 3: High risk factors**

| High risk factor              | No of patients | Percentage |
|-------------------------------|----------------|------------|
| Previous LSCS                 | 43             | 40.19      |
| Preeclampsia                  | 36             | 33.64      |
| Gestational Hypertension      | 32             | 29.91      |
| Moderate & severe anemia      | 26             | 24.3       |
| Gestational Diabetes Mellitus | 21             | 19.63      |

|                 |   |      |
|-----------------|---|------|
| Rh negative     | 4 | 3.74 |
| Placenta previa | 3 | 2.8  |
| History of DVT  | 2 | 1.87 |

In present study vaginal delivery was most common mode of delivery (52.34 %) followed by LSCS (40.19 %) & instrumental delivery (7.48%). previous LSCS, Cephalo Pelvic Disproportion, Fetal Distress, Failed Induction & Failure to progress were common indications for LSCS. Postpartum haemorrhage (11 %), Abruptio (6 %), Cervical tear (4 %), Shoulder dystocia (1 %), Obstructed labour (2 %) were common complications noted in present study.

**Table 4: Mode of delivery**

| Mode of delivery      |         | No of patients | Percentage | Total | Percentage |
|-----------------------|---------|----------------|------------|-------|------------|
| Vaginal delivery      | FTND    | 27             | 25.23      | 56    | 52.34      |
|                       | PTVgD   | 29             | 27.1       |       |            |
| LSCS                  | FTLSCS  | 27             | 25.23      | 43    | 40.19      |
|                       | PTLSCS  | 16             | 14.95      |       |            |
| Instrumental delivery | Forceps | 3              | 2.8        | 8     | 7.48       |
|                       | Vacuum  | 5              | 4.67       |       |            |

Most common birth weight group was 2.5-3.99 kg (40.19 %), followed by 1.5-2.49 kg (34.58 %) group. 10.28% incidence of macrosomia was noted. Apgar score at 5 minutes was  $\geq 8$  (89.72 %) in majority of neonates. Neonatal complications observed were IUGR (8.41 %), Prematurity (34.58 %), Low birth weight babies (17.13 %), Respiratory distress syndrome (21.5 %), Meconium aspiration (14.02 %) & NICU admission (20.83 %). Neonatal outcome noted was still birth (1.87 %), neonatal death (6.54 %) & rest of neonates were discharged with mother. 63.55 % babies required NICU admission. Infant of diabetic mother, preterm & birthweight < 2 kg, meconium aspiration, macrosomia, intrapartum asphyxia & transient tachypnea of new born were common indications for NICU admission in present study.

**Table 5: Perinatal outcome**

| Neonatal characteristics      | No of patients | Percentage |
|-------------------------------|----------------|------------|
| Birth weight (grams)          |                |            |
| $\leq 1000$                   | 3              | 2.8        |
| 1001-1499                     | 13             | 12.15      |
| 1501-2499                     | 37             | 34.58      |
| 2500-3999                     | 43             | 40.19      |
| $\geq 4000$                   | 11             | 10.28      |
| Apgar score at 5 minutes      |                |            |
| 1-2                           | 2              | 1.87       |
| 3-7                           | 9              | 8.41       |
| $\geq 8$                      | 96             | 89.72      |
| Neonatal outcome              |                |            |
| IUGR                          | 9              | 8.41       |
| Prematurity                   | 37             | 34.58      |
| Respiratory distress syndrome | 23             | 21.5       |
| Meconium aspiration           | 15             | 14.02      |

|                         |    |       |
|-------------------------|----|-------|
| Still birth             | 2  | 1.87  |
| NICU admission          | 68 | 63.55 |
| Low birth weight babies | 53 | 49.53 |
| Neonatal death          | 7  | 6.54  |

In present study, during postpartum period, complications such as wound infection (19.63 %), fever (14.02 %), wound dehiscence (6.54 %) & DVT (0.93 %) were noted. No maternal mortality was noted in present study.

**Table 6: Postpartum complications**

| Postpartum complications | No of patients | Percentage |
|--------------------------|----------------|------------|
| Wound infection          | 21             | 19.63      |
| Fever                    | 15             | 14.02      |
| Wound dehiscence         | 7              | 6.54       |
| DVT                      | 1              | 0.93       |

## DISCUSSION

Several factors are associated with increased risk of obesity that included older maternal age, urban residence, higher education, and higher socioeconomic status.<sup>7</sup> The significant contributors to weight gain, which may eventually lead to obesity, are decreased physical activity, increased dietary fat intake, and genetic factors.<sup>8</sup>

Chopra M et al.,<sup>9</sup> analyzed the National Family Health Survey (NFHS)-4 data (2015–16) & noted that, national prevalence of obesity (BMI  $\geq 25$ ) was comparable among pregnant (12%) and postpartum women (13%)  $\geq 20$  years of age. A high prevalence of obesity (>40%) was observed in over 30 districts in multiple states. Older maternal age, urban residence, increasing wealth quintile, and secondary education were associated with increased odds of obesity among pregnant and postpartum women; higher education increased odds among postpartum women only (OR 1.90; 95% CI, 1.44–2.52).

Mamula, O et al.,<sup>10</sup> studied records of 23190 women with singleton birth, women with increased BMI at pregnancy term had a significantly higher incidence of post term pregnancy, gestational diabetes, pregnancy-induced hypertension and third trimester hemorrhage, compared to normal weight women. Women with increased BMI had significantly more labor induction with prostaglandins and elective caesarean. Also, overweight and obese women had higher incidence of operative delivery: caesarean section and vacuum extraction. The incidences of postpartum febrility and thrombophlebitis were also significantly higher. We can conclude that prepregnancy normal weight women with increased BMI during pregnancy need special follow-up and counseling in pregnancy and delivery.

Maternal obesity is a risk factor for several pregnancy-related complications which may have adverse effects on both the mother and her infant. Odd ratio (OR) of gestational diabetes (4.62), pregnancy induced hypertension (3.23), cesarean section (2.88), preeclampsia (2.69), microsomia (4.65), macrosomia (3.95), NICU admission (3.39), perinatal death (3.17) in obese/overweight Indian mother is either equal or higher than western counterparts.<sup>11</sup>

In study by Munibala M et al., obese women had 3.14 times increased risk of being induced than controls. The primary caesarean delivery rates were higher in obese group (36%) compared to controls (16%). Wound infection and wound dehiscence rates were higher in the obese women (10% and 4%) than the controls (2% and 2%). Mean birth weight of the neonate in the obese group was 3.16 kg and 2.87 kg in the controls which was statistically

significant. Obesity during pregnancy has risk of developing hypertension, diabetes, induction of labor, LSCS, wound infection, delivering large babies and neonatal admissions. Maternal obesity was strongly associated with antenatal complications like gestational diabetes mellitus, gestational hypertension, preeclampsia and increase in need for induction of labour and operative interference.<sup>13</sup> Bhavadharini B et al.,<sup>14</sup> analyzed records of 2728 pregnant, overweight and obese women who gained more weight during pregnancy were at high risk of delivering macrosomic infants (overweight - odds ratio [OR]: 2.3, 95% confidence interval [CI]: 1.1–5.2, P = 0.02 and obese - OR: 1.6, 95% CI: 1.1–2.4, P = 0.01). In addition, obese women who gained more weight were also at high risk of preterm labor (OR: 2.1, 95% CI: 1.1–3.8; P = 0.01), cesarean section (OR: 1.9, 95% CI: 1.4–2.5; P < 0.001), and preeclampsia (OR: 2.8, 95% CI: 1.1–7.2, P = 0.03). Normal weight and overweight women who gained less weight had a protective effect from cesarean section and macrosomia. Overweight/obese women who gained more weight than recommended are at a high risk of developing adverse pregnancy outcomes.

Maternal prepregnancy obesity and excessive gestational weight gain are associated with increased risks of low Apgar score, neonatal hypoglycemia and referral to neonatal intensive care unit.<sup>15</sup> Maternal obesity is a risk factor for fetal macrosomia, independent of a diabetic metabolic state. The pathogenesis of fetal macrosomia is complex. Fetal macrosomia, maternal obesity and excessive weight gain during pregnancy are associated with later obesity in childhood and adolescence.<sup>16</sup> A meta-analysis done in 13 studies showed that, as compared to maternal prepregnancy normal weight, maternal prepregnancy obesity was associated with a twofold higher risk of delivering a large size for gestational age infant.<sup>17</sup>

Most normal gestational weight gain occurs after 20 weeks of gestation and the definition of “normal” is subject to regional variations, but should take into consideration pre-pregnant body mass index (BMI). According to the Institute of Medicine classification (43), women who are underweight at the start of pregnancy (i.e. BMI < 18.5 kg/m<sup>2</sup>) should aim to gain 12.5–18 kg, women who are normal weight at the start of pregnancy (i.e. BMI 18.5–24.9 kg/m<sup>2</sup>) should aim to gain 11.5–16 kg, overweight women (i.e. BMI 25–29.9 kg/m<sup>2</sup>) should aim to gain 7–11.5 kg, and obese women (i.e. BMI > 30 kg/m<sup>2</sup>) should aim to gain 5–9 kg.<sup>18</sup>

## CONCLUSION

The risk of pregnancy-associated disorders increases with increasing severity of obesity. Maternal obesity is associated with development of gestational diabetes mellitus, preeclampsia, need for labour induction, increased caesarean delivery as well as NICU admissions and increased incidence of postpartum infections.

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