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## Original Research Article

# Obesity in pregnancy: maternal and perinatal outcome

Prameela H. J.\*, Madhuri S.

Department of Obstetrics and Gynecology, Mysore Medical College and Research Institute, Mysore, Karnataka, India

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**\*Correspondence:**

Dr. Prameela H. J.,

E-mail: [hjprameela@gmail.com](mailto:hjprameela@gmail.com)

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### ABSTRACT

**Background:** Obesity, the silent epidemic worldwide has reached a stage where approximately 2.3 billion adults will be overweight and more than 700 million adults will be obese by 2015, as projected by WHO. The objective of this study was to find out the incidence of the pregnancy complications due to maternal obesity and to assess the neonatal outcome.

**Methods:** Retrospective study conducted in Cheluvamba Hospital, Mysore from September 2014 to September 2015. Subjects were categorized into 3 classes based on the BMI. Class I: 30-34.9 kg/m<sup>2</sup>, class II: 35-39.9 kg/m<sup>2</sup>, Class III: >40 kg/m<sup>2</sup>. The maternal and perinatal outcome of the subjects evaluated in relation to body mass index.

**Results:** A total of 56 women were included in the study, with 37 belonging to class I, 13 women class II, 6 women class III. Class III women were significantly more likely to have pre-eclampsia (83.3%, 69.2%, 27%) and post term pregnancy (50%, 38%, 16.2%) than class II and class I. The incidence of GDM (7.6%, 5.4%) and IUGR (7.6%, 2.7%) are more in class II compared to class I. Instrumental deliveries (10%, 28.5%) and LSCS (45.9%, 46.1%, 66.6%) rates increased as the BMI increased from class I to class III. Postpartum complications like PPH (5.4%, 7.6%, 33.3%) and wound gaping (7.6%, 16.6%) were on rise with increased BMI. Class III women were more likely to have macrosomic babies than class II and class I (33.3%, 15.3%, 18.9%).

**Conclusions:** As the BMI increases pregnancy is more likely to get complicated. Interventions directed towards weight loss and prevention of excessive weight gain must begin in the pre-conception period. Obstetrical care providers must counsel their obese patients regarding the risks and complications conferred by obesity and the importance of weight loss.

**Keywords:** Maternal outcome, Obesity, Perinatal Outcome

### INTRODUCTION

Obesity, the silent epidemic worldwide has reached a stage where approximately 2.3 billion adults will be overweight and more than 700 million adults will be obese by 2015, as projected by WHO.<sup>1</sup> National Family Health Surveys in India indicated an increase in obesity from 10.6% in 1998-1999 to 14.8% in 2005-06. Obesity is increasing, both in the general population and in women of reproductive age. Obesity in pregnant women increases the risks of maternal and perinatal complications. WHO has defined the criteria of

overweight as BMI > 25 kg/m<sup>2</sup> and that for obesity as BMI > 30 kg/m<sup>2</sup>.<sup>2</sup> The increasing prevalence of obesity worldwide has prompted the WHO to designate obesity as one of the most important public health threats in the world. The four states in South India also being the predominantly rice eating population have a high incidence in obesity among women.<sup>3</sup> Several studies in India have reiterated the fact that vaginal delivery, postpartum infection, post-delivery deep vein thrombosis obesity in pregnancy puts the mother and the fetus at the risk of several complications such as gestational diabetes mellitus, pregnancy induced hypertension, preeclampsia,

preterm labour, dysfunctional labour, caesarean section, instrumental delivery. Neonates of obese women were mostly large for gestational age, macrosomic and they had high incidences of birth injuries, shoulder dystocia, premature deliveries, late fetal deaths and congenital malformations particularly spina bifida, cleft lip, cleft palate and heart defect.<sup>4</sup>

This purpose of this study is to find out the incidence of the pregnancy complications due to maternal obesity and to assess the neonatal outcome and obstetric outcome and to educate treating clinicians regarding the importance of pre-conceptional counseling regarding obesity and related issues. The results of this study will enable to highlight a problem that is a modifiable risk factor for several conditions in pregnancy and also a long term risk factor for cardiovascular diseases and for diabetes mellitus.

## METHODS

This is a retrospective study conducted in Cheluvamba Hospital Mysore from September 2014 to September 2015. Samples were selected randomly and the information needed for the study was taken from the medical records. Subjects were categorized into 3 classes based on the BMI.

- Class I: 30-34.9 kg/m<sup>2</sup>
- Class II: 35-39.9 kg/m<sup>2</sup>
- Class III: >40 kg/m<sup>2</sup>

The maternal and perinatal outcome of the subjects evaluated in relation to body mass index.

## RESULTS

A total of 56 women were included in the study fulfilling the inclusion criteria with BMI >30 kg/m<sup>2</sup>. They were further divided into 3 classes (Figure 1).

- Class I: BMI 30-34.9 kg/m<sup>2</sup> included 37 women
- Class II: BMI 35-39.9 kg/m<sup>2</sup> included 13 women
- Class III: BMI >40 kg/m<sup>2</sup> included 6 women.

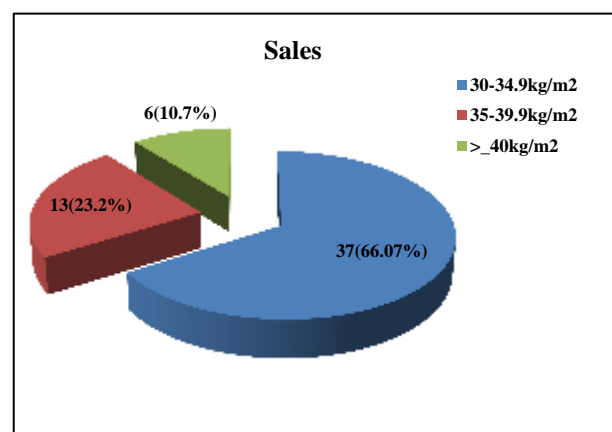


Figure 1: Distribution of study subjects.

Table 1: Antepartum complications in relation to BMI.

|                     | Class I (n = 37) | Class II (n = 13) | Class III (n = 6) | Total (n = 56) |
|---------------------|------------------|-------------------|-------------------|----------------|
| GDM                 | 2 (5.4%)         | 1 (7.6%)          | -                 | 3 (5.3%)       |
| Pre eclampsia       | 10 (27%)         | 9 (69.2%)         | 5 (83.3%)         | 24 (42.8%)     |
| Post term pregnancy | 6 (16.2%)        | 5 (38%)           | 3 (50%)           | 14 (25%)       |
| Oligohydromnias     | 3 (8.1%)         | 3 (23%)           | -                 | 6 (10.7%)      |
| Polyhydromnias      | 1 (2.7%)         | -                 | -                 | 1 (1.7%)       |
| IUGR                | 1 (2.7%)         | 1 (7.6%)          | -                 | 2 (3.5%)       |
| Preterm labor       | 1 (2.7%)         | 1 (7.6%)          | -                 | 2 (3.5%)       |

Table 2: Mode of delivery in relation to BMI.

|                      | Class I (n = 37) | Class II (n = 13) | Class III (n = 6) | Total (n = 56) |
|----------------------|------------------|-------------------|-------------------|----------------|
| Vaginal              | 20 (54%)         | 7 (53.8%)         | 2 (33.3%)         | 29 (51.7%)     |
| Spontaneous delivery | 13 (65%)         | 3 (42.8%)         | 1 (50%)           | 17 (58.6%)     |
| Induced              | 5 (25%)          | 2 (28.5%)         | 1 (50%)           | 8 (27.5%)      |
| Instrumental         | 2 (10%)          | 2 (28.5%)         | -                 | 4 (13.7%)      |
| LSCS                 | 17 (45.9%)       | 6 (46.1%)         | 4 (66.6%)         | 27 (48.2%)     |

### Ante partum complications and its relation with BMI

Out of 56 women 24 women had preeclampsia, of which 10 women were between BMI 30-34.9 kg/m<sup>2</sup>, 9 were

between BMI 35-39.9 kg/m<sup>2</sup>, 5 were with BMI >40 kg/m<sup>2</sup>. 3 women had gestational diabetes mellitus. 14 women were post term, of which 6 were between BMI 30-34.9 kg/m<sup>2</sup>, 5 were between BMI 35-39.9 kg/m<sup>2</sup>, 3 women with BMI >40 kg/m<sup>2</sup>. 2 women had IUGR. 2

women had preterm labor. Oligohydramnios were seen in 6 women, of which 3 were between BMI 30-34.9 kg/m<sup>2</sup> and 3 were between 35-39.9 kg/m<sup>2</sup>. Polyhydramnios were seen in one woman.

#### Mode of delivery

Of the total 56 women, 29 women delivered vaginally and 27 by LSCS. Of the 29 women delivered vaginally 17 were spontaneous, 8 were induced and 4 instrumental

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#### Indication for LSCS

**Table 3: Indication of LSCS in relation to BMI.**

| Indications                                | Class I (n = 17) | Class II (n = 6) | Class III (n = 4) | Total (n = 28) |
|--|------------------|------------------|-------------------|----------------|
| Failed induction                           | 5 (29.4%)        | 2 (33.3%)        | 3 (75%)           | 10 (35.7%)     |
| Fetal distress                             | 3 (17.6%)        | 3 (50%)          | -                 | 6 (21.4%)      |
| CPD  | 3 (17.6%)        | -                | -                 | 3 (10.7%)      |
| Deep transverse arrest                     | 3 (16.6%)        | -                | -                 | 3 (10.7%)      |
| Secondary arrest in descent and dilatation | 2 (11.7%)        | -                | 1 (25%)           | 3 (10.7%)      |
| Severe preeclampsia                        | 1 (5.8%)         | 1 (16.6%)        | -                 | 2 (7.1%)       |

**Table 4: Intrapartum and postpartum complications.**

| COMPLICATION           | Class I (n = 37) | Class II (n = 13) | Class III (n = 6) | Total (n = 56) |
|------------------------|------------------|-------------------|-------------------|----------------|
| PPH                    | 2 (5.4%)         | 1 (7.6%)          | 2 (33.3%)         | 5 (8.9%)       |
| Cervical/vaginal tears | 2 (5.4%)         | -                 | -                 | 2 (3.5%)       |
| Wound gapping          | -                | 1 (7.6%)          | 1 (16.6%)         | 2 (3.5%)       |

**Table 5: Perinatal outcome.**

|                 | Class I (n = 37) | Class II (n = 13) | Class III (n = 6) | Total (56) |
|-----------------|------------------|-------------------|-------------------|------------|
| NICU            | 6 (16.2%)        | 7 (53.8%)         | -                 | 13 (23.2%) |
| Weight > 3.5 kg | 7 (18.9%)        | 2 (15.3%)         | 2 (33.3%)         | 11 (19.6%) |
| Weight < 3.5 kg | 30 (81.08%)      | 11 (84.6%)        | 4 (66.6%)         | 45 (80.3%) |

#### Intra-partum and post-partum complications

Of the 56 women post-partum hemorrhage was encountered in 5 women (8.9%), of which 2 women delivered vaginally and 3 by cesarean. Two women had cervical tear. 2 women had wound gapping postoperatively and one woman developed peripartum cardiomyopathy.

#### Perinatal complications

Out of 56 babies delivered 13 needed NICU admissions due to low APGAR scores. Macrosomia was seen in 11 babies.

#### DISCUSSION

A number of systems have been used to define and classify obesity. The body mass index (BMI), also known as the Quetelet index, is currently most often used. The

BMI is calculated as weight in kilograms divided by the square of the height in meters (kg/m<sup>2</sup>).<sup>4</sup>

Antenatal complications: In our study as the BMI increased the incidence of pre-eclampsia increased from 27% in those with BMI 30-35 kg/m<sup>2</sup> to 69.2% in those with BMI 35-39.9 kg/m<sup>2</sup> and 83.3% in those with BMI >40 kg/m<sup>2</sup>. The overall incidence of pre-eclampsia in obese women is 42.8% which is consistent with the study conducted by Dasagupta et al where the incidence of hypertensive disorders is 38%.<sup>1</sup> In a study conducted by Kabiru et al showed the incidence of hypertensive disorders in obese women as 35.4%.<sup>5</sup>

The increase in the risk of GDM increased with the increase in BMI from 5.4% in class I obese women to 7.6% in class II obese women. The overall incidence of GDM is 5.3%. In a study of 16 102 women, the incidence of GDM was 2.3% in the control group and increased to

6.3% in the obese group (OR 2.6) and 9.5% in the morbidly obese group (OR 4.0).<sup>6</sup> Therefore, diabetes is associated with increasing overweight and obesity.

Post term pregnancy was seen in 25% women and the percentage women with post term pregnancy increased as BMI increased. Obese women are more likely to go for postterm pregnancy and induction of labor.

Obese women are more prone for delivery by cesarean section. In our study the rate of cesarean increased with BMI. Lynch et al. studied over 5000 subjects in a retrospective cohort study, and showed that delivery by caesarean section was two- to threefold more likely in obese women. The same study also found that there was a progressive reduction in the successful vaginal delivery rate with increasing BMI, consistent with findings in our study.<sup>7</sup>

Post-partum hemorrhage and wound infections were significantly raised from obese women (5.4%,0%) to morbidly obese women (33.3%,16.6%). Alanis et al had demonstrated higher risks of post caesarean wound gape, discharge and seroma formation among the morbidly obese.

## CONCLUSION

Obesity causes significant complications for the mother and fetus. Interventions directed towards weight loss and prevention of excessive weight gain must begin in the pre-conception period. Obstetrical care providers must counsel their obese patients regarding the risks and complications conferred by obesity and the importance of weight loss. Maternal and fetal surveillance may need to be heightened during pregnancy; a multidisciplinary approach is useful. Women need to be informed about both maternal and fetal complications and about the measures that are necessary to optimize outcome, but the most important measure is to address the issue of weight prior to pregnancy. Obesity in pregnancy is a major predictor of obesity later in life, which is commonly

associated with the development of chronic hypertension, dyslipidaemia and T2DM. Therefore, from a public health perspective, obesity represents an important modifiable risk factor for adverse pregnancy outcome..

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