

DOI: <http://dx.doi.org/10.18203/2320-1770.ijrcog20180894>

Original Research Article

Retrospective study on the effect of Body Mass Index (BMI) on maternal and neonatal outcome

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Received: 06 January 2018

Accepted: 31 January 2018

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ABSTRACT

Background: Obesity has become health problem worldwide. Prevalence of obesity has increased globally with more incidence observed in female than male. Objective of present study was assessment of maternal outcome in term of associated medical disorder and mode of delivery and assessment of neonatal outcome.

Methods: The retrospective study performed at Nowrosjee Wadia Maternity Hospital, a tertiary care centre between 1st January 2017 to 30th November 2017. Total 64 patients were enrolled. Maternal and neonatal outcomes were studied in all nulligravida women with high BMI using logistic regression adjusted for confounding variable.

Results: Women with high BMI were at increased risk of hypertensive disorder of pregnancy (40.65%), diabetes (7.81%), induction of labour (62.5%), instrumental delivery (14.06%), operative intervention (42.18%), prolonged hospital stay and NICU admission (26.56%).

Conclusions: This study observes increase risk of adverse outcome in pregnant women with high BMI.

Keywords: Body mass index, Deep transverse arrest, Gestational diabetes mellitus, Induction of labour, Neonatal intensive care unit, Non progress of labour

INTRODUCTION

Obesity has become health problem worldwide. Prevalence of obesity has increased globally with more incidence observed in female than male. Due to improvement in the economic status along with the faulty dietary habits and increase in the caloric intake prevalence of obesity has increased in general population of India.¹ Over-weight and obesity in Indian women has increased from 10.6 to 14.8.²

According to WHO criteria BMI is classified into 6 categories.³

According to several studies it was observed that obesity puts the antenatal patient at the increased risk of

developing chronic hyper tension, pre-eclampsia, pre-gestational diabetes mellitus, gestational diabetes mellitus, pre term labor, dysfunctional labor, instrumental deliveries, caesarean section, pro-long hospital stay, poor bone healing. And neonates of the obese women were at the increased risk of congenital anomalies, preterm deliveries, large for gestational age and increased NICU admission.

METHODS

Study was conducted retrospectively at Nowrosjee Wadia Maternity Hospital between the period of 1st January 2017 to 30th November 2017. It is a routine practice at the institute to categories patient with BMI ≥ 25 as a high risk

pregnancy card and such patients were selected for data assimilation from the medical record department.

Subjects were classified as per WHO criteria into 3 categories.

Table 1: BMI for Obese class.

Class	BMI
Obese Class I	30-34.99 kg/m ²
Obese Class II	35-39.99 kg/m ²
Obese Class III	40 kg/m ² and above

Maternal and perinatal outcome were studied in above subjects.

Inclusion criteria

- Primigravida
- BMI ≥30
- Singleton pregnancy.

Exclusion criteria

- Multigravida
- BMI < 30
- Multiple pregnancy
- Previous myomectomy.

Based on medical records, the patients were categorised according to the presence of pre-existing medical illnesses, development of hypertension, glucose intolerance, development of antenatal fetal complications, various modes of delivery and fetal outcome based on APGAR score and need for NICU admission.

Statistical analysis

Logistic regression adjusted for confounding variable.

RESULTS

64 women were recruited in the study considering the inclusion criteria of BMI ≥30. As per their BMI, they were categorized as below.

Table 2: Categorization of patient.

Class	Number of patients
Class I	38
Class II	20
Class III	6

In present study it was found 7 out of 64 (11%) women had chronic hyper-tension, 19 (29.6%) had pre-eclampsia, 1 (1.5%) patient had pre-existing heart disease, 1 (1.5%) had pre-gestational diabetes and 4 (6.25%) had gestational diabetes mellitus. 2 (3.1%) patient came with pre-term labour, 3 (4.68%) patients had

IUGR and for 12 (18.7%) patients were extended till 40 weeks (Table 3).

Table 3: Antenatal complication.

Complications	Class I (38)	Class II (20)	Class III (6)	Total (64)
Chronic hypertension	-	5 (25%)	2 (33%)	7 (11%)
Preeclampsia	8 (21%)	10 (50%)	1 (16.6)	19 (29.6%)
Pre-existing heart disease	1 (2.63%)	-	-	1 (1.5%)
Pre-gestational diabetes	-	-	1 (16.6%)	1 (1.5%)
GDM	2 (5.2%)	-	2 (33%)	4 (6.25%)
IUGR	-	3 (15%)	-	3 (4.68%)
Pre-term	-	2 (10%)	-	2 (3.1%)
Post-term	8 (21%)	4 (20%)	-	12 (18.7%)

Out of 64 patients, 21 (32.81%) went in spontaneous labour, 40 (62.5%) required induction of labour, the common indications for induction of labour being post datism, gestational and pre-existing diabetes, pre-eclampsia. 3 (11.11%) were elective LSCS done for breech presentation and Cephalopelvic disproportion. Among 37 patients who delivered vaginally, 28 (43.75%) had normal vaginal delivery and 9 (14.06%) required instrumental delivery (Table 4).

Table 4: Mode of delivery.

	Class I (38)	Class II (20)	Class III (6)	Total (64)
Induced	19 (50%)	15 (80%)	6 (100%)	40 (62.5%)
Spontaneous labor	17 (44.7%)	4 (20%)	-	21 (32.81%)
Instrumental delivery	4 (10.5%)	4 (20%)	1	9(14.06%)
LSCS	16 (42%)	6 (30%)	5 (100%)	27 (42.18%)
Normal vaginal birth	18 (47.36%)	10 (50%)	-	28 (43.75%)

Indication of instrumental delivery was foetal distress (forceps), decrease maternal effort (vacuum) and occipital posterior (forceps) (Table 5).

Table 5: Induction of assisted vaginal delivery.

	Class I	Class II	Class III
Decrease maternal effort	2 (5.26%)	-	1 (16.86)
Fetal bradycardia	2 (5.26%)	3 (15%)	-
OP	-	1 (5%)	-

27 patients had LSCS out of which 3 (11.11%) were elective and remaining 24 (88.89%) were required emergency LSCS. The commonest indication of LSCS was foetal distress followed by failure of induction and NPOL (Table 6).

Table 6: Indication of LSCS.

	Class I	Class II	Class III	Total
CPD	2 (5.26%)			2 (3.13%)
NPOL	2 (5.26%)		3 (50%)	5 (7.81%)
Mal-presentation	2 (5.26%)			2 (3.13%)
Failure of induction	6 (15.78%)		2 (33.33%)	8 (12.5%)
Fetal distress	4 (10.52%)	4 (20%)	1 (16.6%)	10 (15.6%)
DTA	-	1 (5%)		1 (1.56%)

NICU admissions were found more in patient with high BMI (Table 7). The most common cause of NICU admission was glucose monitoring in neonate, MSAF, IUGR, hyper-bilirubinaemia (Table 8).

Table 7: Neonatal outcome.

	Class I	Class II	Class III	Total
NICU required	7 (18.42%)	6 (30%)	4 (66.67%)	17 (26.52%)
NICU not required	31 (81.57%)	14 (70%)	2 (33.33%)	47 (73.43%)

Table 8: Indication of NICU admission.

	Class I	Class II	Class III
IUGR/ LBW	-	2 (10%)	
Macrosomia	-	-	1 (16.6%)
Neonatal asphyxia	-	2 (10%)	
MSAF	4 (10.52%)	-	1
Hypo-glycaemia	3 (7.89%)	1 (5%)	4 (66.67%)
Hyper-bilirubinaemia	-	1	

In present study, there were certain incidental finding such as

- Obese women underwent reproductive enhancing procedure,
- Women with high BMI had longer hospital stay as compared to other
- The incident of wound gape was more in obese women.

DISCUSSION

Obesity is considered as a high risk factor as it has adverse impact on the maternal and foetal outcome. Obesity is classified by various method, but Body Mass Index is most commonly used.⁴

BMI is calculated as follow:

$$\text{BMI} = \text{Weight (Kg)} / \text{Height}^2(\text{m})$$

In the study perform by Ovesen P et al the incidence of glucose intolerance during pregnancy is 3% to 8%, higher in obese as compared to normal weight women.⁵ Similar finding was found in our study with 7.81% obese patient suffered from glucose intolerance.

In similar study perform by Bhattacharya S et al it was found that incidence of pre-eclampsia, gestational hypertension, IOL, emergency LSCS was higher in the moderately obese women.⁶ Same observation was found in our studies with higher incidence of above finding in obese patient.

As per study done by Dasgupta A et al, it was found that the incidence of hypertensive disorder in pregnancy [chronic hypertension (28%) and preeclampsia (18%)] was significantly high in obese patient and the rate of LSCS 46% and instrumental delivery was found high in the obese patient post LSCS wound were high in obese patient.⁷ Similar result was found in our study with chronic hypertension (11%), preeclampsia (29.6%) and the rate of LSCS was more in obese patient (42.18%).

According to Callaways L K It el, new born of morbidly obese women require NICU admission more often.⁸ In our study 8 (50%) out of 17 went to NICU for post-delivery sugar monitoring in view of maternal deranged sugar level. 2 went for low birth weight.

In study performed by Athukorala C et al, women who are obese have an increases risk complication during pregnancy in term of gestational diabetes, pre-eclampsia, increase rate of LSCS.⁹ Similar finding is found in present study.

According to Crane JM et al, in women who were obese with excess weight gain during pregnancy had more incidence of macrosomic babies (weight >4 kg), neonatal metabolic abnormality.¹⁰

Rehman MM et al performed a systematic review and metaanalysis of 42 studies on maternal BMI and adverse outcomes in low and middle income countries in 2015. Compared with mothers with normal BMI, overweight or obese mothers were at increase odds of gestational diabetes, pregnancy induce hypertension, preeclampsia, caesarean delivery and postpartum haemorrhage. Treatment and prevention of maternal underweight, overweight or obesity may help reduce the burden on maternal and child health in developing countries.¹¹

Pillai R et al, compared women of normal weight with obese women and found to have more risk of hypertensive disorder of pregnancy, gestational diabetes mellitus, induction of labor, caesarean section postpartum haemorrhage and macrosomia. In class III obesity there was additional risk of preterm delivery, still birth, prolong stay and increased NICU admission.¹²

CONCLUSION

Obesity should be considered as a high risk factored during pregnancy and women should be counsel regarding maternal and foetal complication associated with obesity to obtain optimal results. Health care professional should proactively screen obese women for gestational diabetes, hypertensive disorder of pregnancy and delivery should be conducted in well-equipped tertiary care centre.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Shah PM, Chatrapati AK, Bandekar PK. Retrospective study on the effect of Body Mass Index (BMI) on maternal and neonatal outcome. *Int J Reprod Contracept Obstet Gynecol* 2018;7:1070-3.