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Impact of Obesity on Incision to Delivery Time and Total Operative Time at Cesarean Delivery

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ABSTRACT
Objective: *To examine the relationship between body mass index (BMI, kg/m^2) and incision-to-delivery interval and total operative time at cesarean delivery.*
Methods: *This was a prospective study of women with singleton gestations undergoing primary and repeat cesarean deliveries in Department of OBG, BMCR&I, BANGALORE from DEC 2014 to MAY 2016 were studied. Women were classified by BMI category (prepregnant weight) at time of delivery (normal 18.5-24.9, overweight 25.0-29.9, obese 30.0-39.9, and morbidly obese 40 or greater). Incision-to-delivery interval and total operative times during cesarean delivery were compared between obese and non obese.*
Results: *Of the 150 women included in the analysis, 75 were non-obese (50%) and 75 (50%) were obese. Longer operative times and incision-to-delivery interval were found among women as BMI increases. normal BMI(mean [standard deviation] incision-to-delivery: 4.8 [1.29] and total operative time: 34.1 [7.61] minutes), overweight (5.0 [1.36]; 36.79 [9.73] minutes), and obese BMIs (8.24 [2.2]; 52.0 [22.0] minutes) compared with women with non obese BMI at delivery (4.84 [1.29]; 34.6 [13.0] minutes) (P<.001).*
Conclusion: *Increasing BMI is related to increased incision-to-delivery interval and total operative time at cesarean delivery with morbidly obese BMI exposing fetus to the risk of prolonged incision-to-delivery interval and exposing women to the risk of longer operative times.*
Keywords: *Cesarean Delivery, Obesity, Incision To Delivery Interval.*

Background

The global epidemic of obesity is rapidly becoming a major public health problem in many parts of the world. In India, the prevalence of female obesity has been steadily increasing in the past decade and in Karnataka, India the prevalence is about 23.3%-urban (31.8%) & rural (16.6%) (NFHS-4, 2015-16). In developing countries like India, there are an increasing proportion of people who are overweight and obese. Lifestyle modification, urbanization, consumption of food with a high calorie content, increasing sedentary pattern of life and reduced physical activity are responsible for increasing obesity. Due to genetic tendency of Indians towards abdominal obesity and its associated risk of related lifestyle diseases. There is a possible association between obesity and increased risks

for fetal macrosomia, shoulder dystocia, and operative vaginal delivery and hence increased cesarean delivery.

Operative and postoperative complications among obese pregnant women include increased rates of excessive blood loss, operative time greater than 2 hours, wound infection, and endometritis. Obese women have an increased incidence of wound breakdown and infections and increased risk of venous thromboembolism.[1,2]

Only few studies across the world have addressed the effects of maternal obesity and operative times during cesarean delivery. Butwick et al[3] showed in a small cohort of 100 patients that the total cesarean operative time is lenghthened in morbidly obese patients. Conner et al[4] demonstrated that incision to delivery is increased with increasing BMI in a cohort of pregnant women undergoing cesarean delivery. Girsen AI et al found in a large multicentre cohort study found increasing BMI is related to increased incision-to-delivery interval and total operative time.

Since there are few similar studies in India, we conducted the study to know the scenario in India.

Materials and Methods

This study was conducted in the Department of Obstetrics and Gynecology, Bangalore Medical College and Research Institute, Bangalore during january 2016 to june 2016 Briefly, data were collected in women who underwent delivery by cesarean delivery. Ethical Clearance was obtained from Institutional Ethical Committee (IEC) of BMCR&I

Inclusion Criteria:

All obese and non obese pregnant women with singleton term gestation undergoing emergency and elective cesarean delivery giving consent for the study.

Including obese and non obese pregnant women with pre eclampsia, eclampsia, gestational hypertension and gestational diabetes mellitus.

Exclusion criteria

- Pregnant women with any other medical and surgical disorders.
- Patients who didn't give consent to be part of the study.

Body mass index (BMI) = (weight in kilograms/ height in meters^2).

Based on pre pregnant weight from medical records of the mothers was used to calculate the BMI and they were be divided into 2 groups (according to W.H.O definition) . 1. BMI < 30 kg/m^2 - non obese 2. BMI $\geq$ 30kg/m^2 – obese. All obese (study group, BMI $\geq$30kg/m^2) pregnant women were included in the study and non-Obese (control group, BMI< 30kg/m^2)pregnant women were selected by simple random sampling meeting the study criteria.

Data were collected through detailed chart review at delivery, and information regarding perioperative morbidity was collected. The analysis included women with BMI of 18.5 or more at the time of delivery with a singleton gestation undergoing either primary or repeat cesarean delivery. Study groups were based on four BMI categories according to the World Health Organization guidelines: normal 18.5–24.9, overweight 25.0–29.9, obese 30.0–39.9, and morbidly obese 40 or greater. Only cases with available data on each variable were analyzed. For neonatal adverse outcomes Apgar less than 7 at 5 minutes, and neonatal intensive care unit [NICU] admission were included in the analysis.

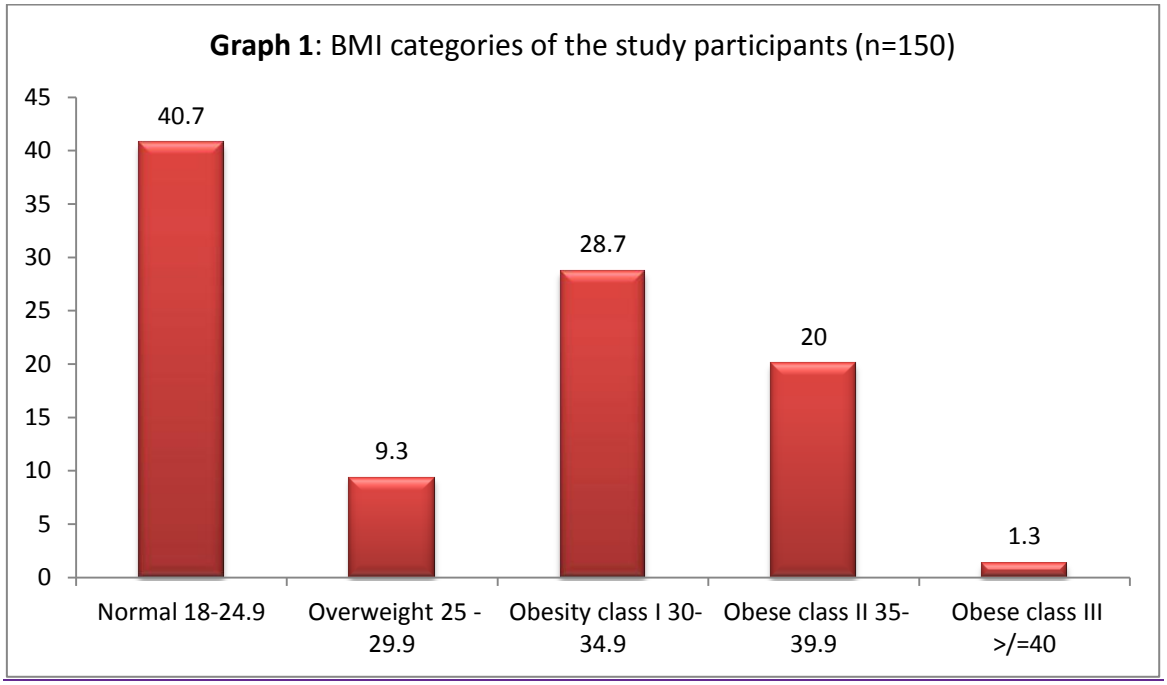
Operative times assessed included the interval from the skin incision to the delivery of the baby (incision-to-delivery interval) and the interval from the skin incision to the completion of the surgery (total operative time), both measured in minutes. The time variables were rounded to the closest 10th decimal. The incision-to-delivery interval and the total operative time during cesarean delivery were compared among four BMI groups. The data was entered in Microsoft excel and analysed using Epi Data analysis and Stata 12.0 software. The association between continuous variables like age, time duration

between incision and delivery, total operative time, birth weight of the baby and duration of hospital stay with obesity was tested using independent t test and one way ANOVA. *P*<.05 was considered statistically significant.

One hundred and fifty women were included in the analysis.

The figure shows the number of pregnant women distributed in various BMI categories.

Results



Both incision-to-delivery interval and total operative times were significantly longer among overweight (mean[standard deviation] incision-to-delivery interval: 5.0 [1.29] and total operative time: 36.79 [9.73] minutes), obese (7.72 [2.20] and 48.26 [9.25] minutes), and morbidly obese women (11.5 [0.70] and 67.5 [10.61] minutes) compared with women with normal BMI at delivery (4.8 [1.29] and 34.10 [7.61] . There was no significant difference between primary and repeat LSCS in incision to delivery time.(p=0.907). But the total operative time was significantly more among repeat LSCS compared to primaryLSCS (p=0.003).

Compared with women with a non obese BMI, obesity was associated with a prolonged incision-to-delivery interval (n = 602 [20%] compared with 127 [6%], *P*<.001)

Table 1. Association between Obesity and incision to delivery duration of study participants

Patient characteristics	Incision to delivery time - Mean	Incision to delivery time - Standard deviation	β coefficient	P value
BMI				
Normal 18-24.9	4.8	1.29	Reference	
Overweight 25 -29.9	5	1.36	0.17	0.746
Obesity class I 30-34.9	7.72	2.2	2.94	0.000
Obese class II 35-39.9	8.77	1.98	3.97	0.000
Obese class III >/=40	11.5	0.707	6.70	0.000
Number of LSCS				
Primary LSCS	6.36	2.43	-0.47	0.097
Repeat LSCS	6.72	2.53	Reference	

Table 2. Association between total operative duration and BMI of study participants.

Patient characteristics	Total operative duration - Mean	Total operative duration - Standard deviation	β coefficient	Adjusted P value
BMI				
Normal 18-24.9	34.1	7.61	Reference	
Overweight 25 -29.9	36.79	9.73	2.40	0.375
Obesity class I 30-34.9	48.26	9.25	14.35	0.000
Obese class II 35-39.9	56.33	12.17	22.27	0.000
Obese class III >/=40	67.5	10.61	33.44	0.000
Number of LSCS				
Primary LSCS	41.33	13.76	-2.98	0.003
Repeat LSCS	45.27	12.3	Reference	

Compared with women with a non obese BMI (4.84 min), obesity was associated with a prolonged incision-to-delivery interval (8.24 min) (P<0.001)

Table 3. Association between Obesity and incision-to-delivery of study participants:

Obesity	Mean	Standard deviation	F value*	P value
Non obese BMI <30	4.84	1.29	133.17	<0.001
Obese BMI ≥30	8.24	2.2		

Compared with women with a non obese BMI (34.6 min), obesity was associated with a prolonged total operative duration (52.0 min) (P<0.001)

Table 4. Association between Obesity and total operative duration of study participants:

Obesity	Mean	Standard deviation	F value*	P value
Non obese BMI <30	34.6	13	133.2	<0.001
Obese BMI ≥30	52.0	22		

17 out of the 19 NICU admissions was associated with incision to delivery interval of ≥ 7MIN

Discussion

A significant number of cesarean deliveries is being performed for obese women in India every year, it is important to understand the influence of BMI on operative times. In our study an association between increased maternal BMI and incision-to-delivery interval in women undergoing primary and repeat cesarean delivery was demonstrated. In addition, increased BMI was related to longer total operative time at cesarean delivery. Prolonged operative times is related to higher surgery costs resulting from greater anesthesia requirements.[3] The findings in our study are consistent with previous studies reinforcing an association between obesity and increased operative time.[4,5,6]

Previous studies have demonstrated an association between increasing BMI and perioperative maternal morbidity, including anesthetic complications,[7,8] increased estimated blood loss, and increased postoperative wound complications.[9] Maternal factors that affect incision-to-delivery interval are particularly relevant in that they may affect neonatal outcomes. Butwick et al[3] also demonstrated longer cesarean intraoperative times among women with

BMI 40 or greater, but did not identify differences in incision-to-delivery times between groups. Edwards et al[10] examined 5,742 women and included those who delivered a live, term, nonanomalous singleton neonate by prelabor cesarean delivery under spinal anesthesia. Our results support the findings of Edwards et al and suggest that prolonged operative time may have an effect on neonatal outcomes at cesarean delivery.

Conclusion

Increasing BMI is associated with both increased incision-to-delivery time and total operative time. As obesity rates increase among women of reproductive age, so it increases our need to understand potential maternal and neonatal morbidities associated with it.

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