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ORIGINAL ARTICLE

Obstetric Behavior and Pregnancy Outcome in Overweight and Obese Women

Maternal and Fetal Complications and Risks in Relation to Maternal Overweight and Obesity

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Abstract
Objective To perform analyses of maternal and fetal complications in overweight and obese women.
Methods Eighty-seven women with singleton pregnancies with BMI > 25–29.9 kg/m^2 and 83 women with singleton pregnancies with BMI > 30 kg/m^2 were studied for maternal and fetal complications at Nehru Hospital, B.R.D. Medical College, Gorakhpur during June 2007–October 2008. Forty-five women with BMI 20–24.9 kg/m^2 were selected to serve as control.
Results Compared with women with normal BMI, the outcomes which were more common in overweight and obese women were gestation hypertension ($p < 0.05$); pre-eclampsia ($p < 0.001$); preterm delivery ($p < 0.05$); induction of labor ($p < 0.05$); instrumental vaginal delivery ($p > 0.05$); cesarean section ($p < 0.01$); increased operative time ($p < 0.01$); still births ($p < 0.05$); early neonatal deaths ($p < 0.05$); Apgar score < 7 at 5 min ($p < 0.05$); and admission to NICU ($p < 0.001$). No significant differences were noted among groups regarding hypoglycemia hyperbilirubinemia and respiratory distress.
Conclusion Overweight and obesity are definite risk factors for adverse pregnancy outcomes. This may be due to altered metabolic state in obesity.

Keywords Obesity · Pregnancy · Body mass index · Perinatal outcomes · Morbidity

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Introduction

During the last decade, there has been a drastic change in socioeconomic conditions and food habits. Along with this the magnitude of obesity is increasing especially in the urban set ups and may stand out to be a major problem in future. While obesity is an established risk factor for diabetes mellitus, hypertension, coronary artery disease and stroke, much less is known about maternal obesity and pregnancy outcomes.

Materials and Methods

A prospective study was conducted at the maternity unit of Nehru hospital, B.R.D. Medical College, Gorakhpur. Women with singleton pregnancies, who delivered between June 2007 and October 2008, were included in the study. Women with multiple pregnancies, medical

disorders, and body mass index (BMI) <19.8 kg/m^2 were excluded. Detailed history and examination was collected on data collection sheets.

Maternal BMI was calculated at first antenatal visit and at the time of admission for delivery. Pre-pregnancy BMI could not be reliably obtained in our population because women do not commonly weigh themselves, or have recall. Maternal BMI at the time of labor rather than booking was used to determine the effect of the current BMI on pregnancy outcome. For the purpose of our study, the subjects were divided into groups using Garrow's grading [1] of obesity based on the Quetlet's index or BMI which is calculated as weight in kilogram/height in meter [2].

Grade	Status	BMI (kg/m^2)
0	Normal	20.0–24.9
1	Overweight	25.0–29.9
2	Obese	30.0–40.0
3	Morbidly obese	>40.0

The prepregnancy variables included age, parity, and socioeconomic status. The antepartum variables analyzed were gestational diabetes, gestational hypertension (GHTN), preeclampsia–eclampsia, anemia, preterm, prolonged pregnancy, intra-uterine growth retardation (IUGR), placental abruption, and miscarriages. Intrapartum variables studied were induction of labor, failed induction, mode of delivery (vaginal delivery/cesarean section), and operative time during cesarean section, instrumental vaginal delivery, vaginal birth after cesarean (VBAC), failed trial of labor in previous one cesarean section, and shoulder dystocia. The postpartum variables studied were postpartum hemorrhage, pyrexia, endometritis, urinary tract infection (UTI), chest infection, prolonged postnatal stay, and impaired wound healing.

The neonatal variables analyzed were low birth weight baby (<2,000 gm), macrosomia (>4,000 gm), prematurity, postmaturity syndrome, APGAR score, neonatal resuscitation, admission to neonatal intensive care unit (NICU), early neonatal death, intranatal death, still birth, neonatal hypoglycemia, neonatal hyperbilirubinemia, and respiratory distress syndrome.

The statistical analysis was performed using χ^2 test, odd ratios, and 95 % confidence intervals. The statistical significance was defined as $p < 0.05$.

Results

Eighty-seven overweight women, 83 obese women, and 45 women with normal BMI were compared and statistically analyzed for obstetric behavior and pregnancy outcomes. The mean age, parity, and socioeconomic status were comparable in all the three groups.

A significantly higher rates of gestational hypertension ($p < 0.05$), pre-eclampsia ($p < 0.001$), prolonged pregnancy ($p < 0.05$), and placental abruption ($p < 0.05$) were noted in the overweight and obese women as compared to controls. No significant differences were noted among the groups as regards anemia, PROM, and IUGR. There was a higher rate of gestational diabetes and miscarriages among overweight and obese women as compared to controls, but did not attain statistical significance (Table 1).

Among intrapartum variables (Table 2), a significantly higher rate of induced labor ($p < 0.05$), instrumental vaginal delivery ($p > 0.05$), cesarean section ($p < 0.01$), failed VBAC ($p < 0.01$) and increased operative time in cesarean section ($p < 0.01$) were noted in obese and overweight subjects. However, significant differences in regard to emergency and elective cesareans were not present among the groups. Rate of shoulder dystocia was higher among obese women but did not reach statistical significance.

Among postpartum variables (Table 3), significantly higher number of overweight and obese women ($p < 0.01$) had prolonged postnatal stay in comparison to women with normal weight. Significantly higher rates of pyrexia ($p < 0.01$) and impaired wound healing ($p < 0.05$) were seen in these groups in contrast to controls). No statistically significant difference was seen among the groups regarding postpartum hemorrhage, urinary tract infections and endometritis.

Macrosomic babies (>4 kg), low birth weight babies (<2 kg), preterm delivery, and postmaturity syndrome were significantly (<0.05) more in overweight and obese women in contrast to controls (Table 4).

A significantly higher rate of stillbirths ($p < 0.05$) and early neonatal death ($p < 0.05$) were noted in overweight and obese women as compared to controls (11, 12 vs. 1 % still birth rates and 3, 7, vs. 1 % early neonatal death rates). Neonates born to overweight and obese women exhibited a higher rate ($p < 0.001$) of admission to NICU > 24 h (35, 36 vs. 5 %). Significantly higher percentage of overweight and obese women ($p < 0.05$) had neonates with Apgar score <7 at 5 min (32, 36 vs. 14 %). No significant differences were noted among both the groups regarding hypoglycemia, hyperbilirubinemia, and respiratory distress syndrome (Table 5).

Discussion

Concordant to the literature [2, 3], in our study, there was a significantly higher occurrence of gestational hypertension (15 and 18.3 % vs. 2.2 %) and pre-eclampsia (38.7 and 18.3 % vs. 2.2 %) in obese and overweight women. There was significantly higher rate of induction of labor (30.9 and 26.9 % vs. 6.8 %) and instrumental vaginal delivery (23.7 and 20 % vs.

Table 1 Antenatal variables

Antenatal variables		BMI groups		*p* Value
Odd ratio (95 % CI)	20–24.9	25–29.9	30–40.0	
Prolonged pregnancy	02 (04.44)	15 (18.30)	15 (18.75)	<0.05
Odd ratio (95 % CI)	–	0.15 (0.09–0.21)	0.14 (0.08–0.20)	
GDM	–	04 (04.60)	07 (08.43)	>0.05
GHTN	01 (02.22)	15 (18.30)	12 (15.00)	<0.05
Odd ratio (95 % CI)	–	0.11 (0.05–0.17)	0.13 (0.07–0.19)	
Pre eclampsia	01 (02.22)	15 (18.30)	31 (38.75)	<0.001
Odd ratio (95 % CI)	–	0.11 (0.05–0.17	0.03 (0.03–0.09)	
Anemia	15 (33.33)	33 (37.93)	22 (26.50)	>0.05
Odd ratio (95 % CI)	–	0.82 (0.76–0.88)	1.39 (1.27–1.51)	
IUGR	01 (02.22)	11 (13.41)	16 (20.00)	<0.05
Odd ratio (95 % CI)	–	0.15 (0.09–0.21)	0.9 (0.03–0.15)	
Abruption	–	03 (03.66)	08 (10.00)	<0.05
Missed abortion	–	05 (05.75)	03 (03.61)	<0.05
PROM/PPROM	04 (09.10)	15 (21.13)	10 (14.70)	>0.05
Odd ratio (95 % CI)	–	0.37 (0.27–0.47)	0.58 (0.48–0.68)	

Table 2 Intrapartum variables

Intrapartum variables		BMI groups		*p* Value
Odd ratio (95 % CI)	20–24.9	25–29.9	30–40.0	
Spontaneous VD	35 (94.29)	36 (80.00)	29 (76.31)	>0.05
Odd ratio (95 % CI)	–	4.12 (3.34–4.90)	5.12 (408–516)	
Operative VD	02 (05.71)	09 (20.00)	09 (23.68)	>0.05
Odd ratio (95 % CI)	0.24 (0.14–0.34)	0.19 (0.09–0.29)		
Shoulder dystocia	–	–	03 (07.89)	
VBAC	06 (85.70)	01 (11.10)	04 (33.30)	<0.01
Odd ratio (95 % CI)	48.0 (26.1–69.9)	12.0 (07.3–16.7)		
Induction of labor	03 (06.80)	21 (26.92)	22 (30.90)	<0.05
Odd ratio (95 % CI)	–	0.21 (0.13–0.29)	0.18 (0.12–0.24)	
Cesarean Section	10 (22.22)	37 (45.12)	42 (52.50)	<0.01
Odd ratio (95 % CI)	0.21 (0.13–0.29)	0.18 (0.12–0.24)		
Failed VBAC	01 (14.29)	08 (88.80)	08 (66.60)	<0.01
Odd ratio (95 % CI)	0.02 (0.04–0.08)	0.08 (0.08–0.24)		
Increased operative time	2 (20.00)	26 (70.27)	30 (71.43)	<0.01
Odd ratio (95 % CI)	–	0.11 (0.4–1.01)	0.10 (0.02–0.18)	

5.7 %) as noted in other studies [2, 3]. The cesarean section rate was also higher in obese (52.5 %) and overweight (45.1 %) women as compared to controls (22.2 %). These results are consistent with many previous reports [2, 3].

The success rate of vaginal delivery in obese and overweight women with prior cesarean delivery is 22 % and is consistent with study by Chauhan et al. [4] and Bujold et al. [5]. In concordance with literature, there is increased operative blood loss (>1,000 ml) and increased perioperative total operative time (100 min) [2].

Similar to the findings in Baeten et al. [6], there was higher rate of preterm deliveries in obese and overweight women (28.8 and 28.1 % vs. 11.1 %) which is contrary to observations made by Sebire et al. [2].

Obesity in pregnancy is associated with postpartum complications [2]. In the present study, pyrexia (18.8 vs. 4.4 %), endometritis (8.8 % vs. 4.4 %), prolonged post-natal stay (33.8 % vs. 8.9 %), impaired wound healing (38.1 % vs. nil), and urinary tract infections (12.5 % vs. nil) all had a higher incidence in the study group.

Table 3 Postpartum variables

Postpartum variables		BMI group		*p* Value
Odd ratio (95 % CI)	20–24.9	25–29.9	30–40.0	
Post partum hemorrhage	00	02 (02.44)	03 (03.75)	>0.05
Pyrexia	02 (04.44)	04 (04.88)	15 (18.75)	<0.01
Odd ratio (95 % CI)	–	0.91(0.85–0.97)	0.20 (0.12–0.28)	
Endometritis	02 (04.44)	03 (03.66)	07 (08.75)	>0.05
Odd ratio (95 % CI)	–	1.22 (1.22–1.32)	0.49 (0.41–0.57)	
Post natal stay prolonged	04 (08.88)	19 (23.17)	27 (33.75)	<0.01
Odd ratio (95 % CI)	–	0.32 (0.24–0.40)	0.19 (0.11–0.27)	
Impaired wound healing	–	09 (24.32)	16 (38.10)	<0.05
Urinary tract infection	–	08 (09.19)	10 (12.50)	>0.05

Table 4 Neonatal outcomes (gestational age and birth weight)

Neonatal outcomes		BMI group		*p* Value
Odd ratio (95 % CI)	20–24.9	25–29.9	30–40.0	
Preterm (<37 weeks)	05 (11–11)	23 (28.05)	23 (28.75)	<0.05
Odd ratio (95 % CI)	–	0.25 (0.17–0.33)	0.24 (0.16–0.37)	
Post maturity (>40 weeks)	02 (04.55)	04 (05.63)	06 (08.81)	<0.05
Odd ratio (95 % CI)	–	0.72 (0.64–0.80)	0.44 (0.36–0.52)	
Low birth wt (<2 kg)	03 (06.82)	10 (14.10)	13 (19.11)	<0.05
Odd ratio (95 % CI)	–	0.41 (0.31–0.51)	0.26 (0.18–0.34)	
Macrosomia (>4 kg)	–	05 (07.04)	06 (08.82)	<0.05

Table 5 Neonatal Complications

Neonatal complications		BMI group		*p* Value
Odd ratio (95 % CI)	20–24.9	25–29.9	30–40.0	
APGAR score (<7)	14 (31.81)	32 (45.07)	36 (52.94)	<0.05
Odd ratio (95 % CI)		–	0.85 (0.79–0.91)	0.41 (0.31–0.51)
Intubation	02 (04.55)	05 (07.04)	09 (13.24)	>0.05
Odd ratio (95 % CI)	–	0.63 (0.53–0.73)	0.31 (0.23–0.39)	
Stay in NICU (>24 h)	05 (11.36)	35 (49.30)	36 (52.94)	<0.01
Odd ratio (95 % CI)	–	0.13 (0.07–0.019)	0.11 (0.05–0.17)	
Still birth	01 (02.22)	11 (13.41)	12 (15.00)	<0.05
Odd ratio (95 % CI)	–	0.11 (0.05–0.17)	0.13 (0.07–0.19)	
Early NN death	01 (02.27)	03 (04.23)	07 (10.30)	<0.05
Odd ratio (95 % CI)	–	0.53 (0.45–0.61)	0.20 (0.12–0.28)	
RDS	–	04 (05.63)	04 (05.88)	>0.05
Photo therapy	08 (18.18)	12 (16.90)	12 (16.18)	>0.05
Odd ratio (95 % CI)	–	1.09 (1.03–1.15)	1.15 (1.07–1.23)	
Hypoglycemia	04 (09.09)	06 (08.45)	06 (08.82)	>0.05
Odd ratio (95 % CI)	–	1.08 (1.02–1.14)	1.03 (0.99–1.07)	

Lu et al. [7] have demonstrated that obese women are more likely to deliver large for gestational age babies. Similar to results in the literature [3, 6], in our study, the rate of macrosomia among obese women was higher (8.8 % vs. nil). The rate of small for gestational age neonates (SGA) was also higher in obese and overweight

women (19.1 and 14.1 % vs. 6.8 %). The higher incidence of SGA noted could be related to severe hypertension and preeclampsia.

An increased incidence of still births (15 and 13.4 % vs. 2.2 %), early neonatal death, and admission to NICU (52.9 and 49.3 % vs. 11.4 %) among obese and overweight women were noted in our study.

Conclusion

Based on the above study, we conclude that obesity is an independent risk factor for adverse pregnancy outcomes and hence it is a preventable risk factor for reducing maternal morbidity, perinatal morbidity, and mortality. A prepregnancy counseling and general awareness regarding weight control and food habits is really required, especially on seeing the increasing trend of overweight and obesity among women in the present day scenario.

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