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Original Research Article

The Impact of Increased Maternal Body Mass Index on Fetomaternal Outcome in Labour and Delivery

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Abstract: ***Background*:** Maternal obesity during pregnancy is now seen as one of the most common risk factors that can lead to negative outcomes for both mothers and their babies. Obesity is becoming a more significant concern in the field of obstetrics, and it is imperative that we prioritize its management. ***Objective*:** The aim of the study is to evaluate and compare the fetomaternal outcome among pregnant women with different BMI. ***Materials and Methods*:** This cross sectional analytical study was conducted on the admitted patients with full term singleton pregnancy in labour in the Department of Obstetrics & Gynecology of Sir Salimullah Medical College and Mitford Hospital from July 2021 to January 2022. A total of 150 pregnant women with full term singleton pregnancy in labour were selected fulfilling the inclusion and exclusion criteria. Informed written consent was taken from each respondent. All data relevant to variables of the study was collected in a data collection sheet. ***Results*:** Study revealed a significant difference between normal and overweight BMI in Anaemia, with 34 (45.33%) vs 12 (16%) p<0.001. Gestational Diabetes Mellitus 4 (5.33%) vs 13 (17.33%), respectively p 0.02, Preeclampsia 5 (6.67%) vs 14 (18.67%), respectively p 0.02, Large for Gestational Age 2 (2.67%) vs 11 (14.7%), respectively p 0.009, and Small for Gestational Age 12 (16.0) vs 4 (5.33%), respectively p 0.03. Macrosomia (>4.0kg), APGAR score < 7 at 1min and NICU admission were significantly higher in overweight/obese mother compare to normal weight group (p<0.05). ***Conclusion*:** Overweight/obese during pregnancy carries high maternal and fetal risks. Increase in the need for induction of labor, instrumental delivery, caesarean section was associated with pregnancies complicated with overweight/obese.

Keywords: Postpartum Pregnancy, Overweight, Maternal Outcome, Fetal Outcome.

INTRODUCTION

Obesity defined as a body mass index (BMI) > 30 kg/m2, has been described as the new worldwide epidemic [1]. The prevalence of overweight and obesity among women at reproductive age is increasing [2]. The prevalence of overweight and obesity is quite difference among races and ethnicities, and there might be different on the risk of perinatal complications [3]. In our country Goon *et al*., study showed that 21.2% pregnant women was obese, 40.1% and 32.8% pregnant women were overweight and healthy with pregnancy respectively. The global burden of overweight and obesity among pregnant women remained unclear [4].

Obesity in pregnancy is one of the important challenges in obstetric services given the prevalence and potential adverse effects on the mother and fetus. Obesity in pregnancy is a high-risk obstetric condition that requires special attention [5]. Obesity is a pandemic problem found in many countries. It is estimated that, in 2025, more than 21% of women in the world will suffer from obesity [5]. Obese women have a higher risk of developing gestational diabetes mellitus, gestational hypertension, preeclampsia, venous thromboembolism, postpartum hemorrhage, cesarean delivery, and maternal death [6, 7]. The mother's pre-pregnancy body mass

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index and pregnancy weight gain can directly affect both maternal and birth outcomes [8].

It is therefore not surprising that obesity is associated with increased rates of maternal and perinatal morbidity and mortality. Despite these problems, there remains a lack of awareness of both the range and severity of the problems associated with obesity in pregnancy. So the purpose of this study to evaluate and compare the fetomaternal outcome in patient belonging to different BMI.

MATERIALS AND METHODS

A Cross sectional analytical study was conducted Department of Obstetrics and Gynaecology, Sir Salimullah Medical College Mitford Hospital, Dhaka from July 2021 to January 2022. A total of 150 women were enrolled in this study, and categorized overweight/obese and normal BMI accordingly. Purpose and procedure of study was discussed with the patients. Then a written informed consent was obtained from each patient or from person authorized guardian before patient's participation in the study. Each patient was interviewed face to face by using semi structured interview schedule in which sociodemographic variables, examination findings and after that labour outcome related variables were recorded in checklist. Patients were monitor during labour and early puerperium. Labour and delivery outcome variables and associated data were recorded in structured questionnaire form and checklist. Fetal outcomes were assessed by using APGAR score, birth weight, birth trauma and asphyxia, referral to neonatal unit, perinatal mortality. Collected data were checked very carefully to identify any error in collecting data. Data processing work was consisted of editing, coding and computerization, preparation of tables, analysis and matching of data. The technical matter of editing, coding and computerization was looked after by self. A single form was allocated for a single patient. Statistical analyses were carried out by using the Statistical Package for Social Sciences version 26.0 for Windows (SPSS Inc., Chicago, Illinois, USA). The mean values were calculated for continuous variables. The qualitative observations were indicated by frequencies and percentages. The differences between groups were analyzed by appropriate statistical test of significance. Chi-square test was used to compare categorical data. A "p" value <0.05 was considered as significant.

RESULTS

Table 1 showed the onset of labour of the study respondents. Induction of labour significantly higher in obese women. Table-2 showed mode of delivery of the studied respondents, caesarean section was significantly higher in overweight/obese compare to normal weight group (p=0.002). Table-3 showed intrapartum complication respondents, failed induction was significantly higher in overweight/obese group compare to normal weight group (p=0.02). Non progress of labour and fetal distress significantly lower in overweight/obese group (p<0.05). Higher frequency of shoulder dystocia in overweight/obese group but no significant difference between two groups (p>0.05). The table 4 revealed a significant difference between normal and overweight BMI in Anaemia, with 34 (45.33%) vs 12 (16%) p<0.001. Gestational Diabetes Mellitus 4 (5.33%) vs 13 (17.33%), respectively p 0.02, Preeclampsia 5 (6.67%) vs 14 (18.67%), respectively p 0.02, Large for Gestational Age 2 (2.67%) vs 11 (14.7%), respectively p 0.009, and Small for Gestational Age 12 (16.0) vs 4 (5.33%), respectively p 0.03. Table-5 showed the neonatal outcome of the study respondents. Neonates born to overweight/obese mothers had higher birth weight in comparison to neonates of normal weight women. Low birth weight babies significantly higher in normal weight group compare to overweight/obese group (p=0.001) and macrosomia neonate significantly in overweight/obese mother compare to normal weight group (OR= 10.09, p=0.009). Low APGAR score (<7 at 1 minutes) was significant higher in overweight/obese group (p=0.041). Regarding intrauterine death, still born and low APGAR score (<7 at 5 minutes) were slightly higher in overweight/obese group but results were not statistically significant (p=0.315, p=0.311and p=0.190 respectively). Requirement of neonatal intensive care due to macrosomia and overweight/obese mothers had 4.03 times more chance (OR=4.43. p=0.026).

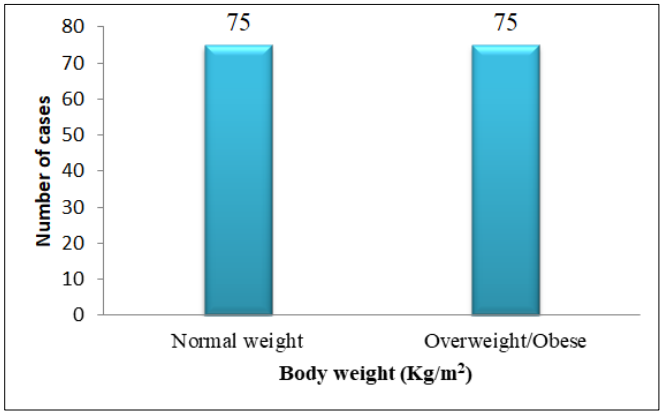

Figure I: Distribution of the study group according to body mass index

Table 1: Onset of labour between two groups (N=150)

Onset of labour	Body weight (Kg/m^2)				p value
	Normal weight (n=75)		Overweight/Obese (n=75)		
	n	%	n	%	
Spontaneous	66	88.0	54	72.0	0.014^s
Induced	9	12.0	21	28.0	
Total	75	100.0	75	100.0	

Table 2: Association of mode of deliver between two groups (N=150)

Mode of delivery	Body weight (Kg/m^2)				p value
	Normal weight (n=75)		Overweight/Obese (n=75)		
	n	%	n	%	
NVD	50	66.7	28	37.3	0.002^s
VD	15	20.0	20	26.7	
Instrumental delivery	3	4.0	12	16.0	
Caesarean section	7	9.3	15	20.0	
Total	75	100.0	75	100.0	

Table 3: Intrapartum complication and its relation with BMI (N=37).

Intrapartum complication	Body weight (Kg/m^2)				p value
	Normal weight (n=10)		Overweight/Obese (n=27)		
	n	%	n	%	
Failed induction	2	20.0	17	63.0	0.020^s
Non progress of laour	5	50.0	4	14.8	0.027^s
Fetal distress	4	40.0	2	7.4	0.016^s
Shoulder dystocia	0	0.0	4	7.4	0.197^{ns}
Total	10	100.0	27	100.0	

Table 4: Comparison of pregnancy complication between normal and overweight BMI (n=150)

Pregnancy Complications	Body weight (Kg/m2)		Total	P value
	Normal weight (n=75)	Overweight/Obese (n=75)		
Anaemia	34 (45.33)	12 (16.0)	46	0.001
Gestational Diabetes Mellitus	4 (5.33)	13 (17.33)	15	0.02
Preeclampsia	5 (6.67)	14 (18.67)	20	0.02
Large for Gestational Age	2 (2.67)	11 (14.7)	13	0.009
Small for Gestational Age	12 (16.0)	4 (5.33)	16	0.03
Postpartum Hemorrhage	2 (2.67)	5 (6.67)	7	0.24

Table 5: Association of fetal outcome between two groups (N=150)

Fetal outcome	Body weight (Kg/m^2)				p value
	Normal weight (n=75)		Overweight/Obese (n=75)		
	n	%	n	%	
Mean Birth weight (kg)	2.95±0.46		3.22±0.54		<0.001^s
LBW (<2.5kg)	12	16.0	1	1.3	0.001^s
Normal weight (2.5-4.0kg)	62	82.7	65	86.7	0.497^{ns}
Macrosomia (>4.0kg)	1	1.3	9	12.0	0.009^s
Live born	74	98.7	71	94.7	0.172^{ns}
Still boron	1	1.3	3	4.0	0.311^{ns}
IUD	0	0.0	1	1.3	0.315^{ns}
APGAR score < 7 at 1min	7	9.3	16	21.3	0.041^s
APGAR score < 7 at 5min	3	4.0	7	9.3	0.190^{ns}
NICU admission	7	9.3	17	22.7	0.026^s

DISCUSSION

In this study observed that the onset of labour of the study respondents. Induction of labour significantly higher in obese women comparison of normal weight women. Kumari *et al*., [9], and Sujatha *et al*., [10], have reported higher rates of labor induction in obese women (OR=1.71; 95%CI 0.78-3.73 and OR=3.14; 95%CI 1.60-5.80 respectively) [9, 10]. The higher early induction rates may be due to the co-morbid conditions that are associated with obesity such as gestational hypertension and preeclampsia.

The mode of delivery of the studied respondents, caesarean section was significantly higher in overweight/obese compare to normal weight group (p=0.002). Similarly, higher occurrence of need for caesarian section had been reported in previous reports by Scott-Pillai *et al*., [11], Ramonienė *et al*., [12], and Wahabi *et al*., [13], ranging from 1.2 to 2.8 times more in obesity than normal weight mothers.

Present study showed intrapartum complication respondents, failed induction was significantly higher in overweight/obese group compare to normal weight group (p=0.02). Non progress of labour and fetal distress significantly lower in overweight/obese group (p<0.05). Higher frequency of shoulder dystocia in overweight/obese group but no significant difference between two groups (p>0.05). Sharma *et al*., [14], reported obese women had 1.98 fold increased risk (95% CI 1.24- 3.14) of cesarean delivery when compared to control group. It is likely multifactorial with increased dystocia, macrosomia and other maternal complication such as eclampsia or gestational hypertension and diabetes mellitus. Similarly, higher occurrence of need for caesarian section had been reported in previous reports by Scott-Pillai *et al*., [11]. Ramonienė *et al*., [12], and Wahabi *et al*., [13], ranging from 1.2 to 2.8 times more in obesity than normal weight mothers.

Current study revealed a significant difference between normal and overweight BMI in Anaemia, with 34 (45.33%) vs 12 (16%) p<0.001. Gestational Diabetes Mellitus 4 (5.33%) vs 13 (17.33%), respectively p 0.02, Preeclampsia 5 (6.67%) vs 14 (18.67%), respectively p 0.02, Large for Gestational Age 2 (2.67%) vs 11 (14.7%), respectively p 0.009, and Small for Gestational Age 12 (16.0) vs 4 (5.33%), respectively p 0.03. Obese pregnant women have been shown to have very high likelihood, two to eleven-fold, of developing gestational diabetes mellitus (GDM) as shown in previous literature by Ovesen *et al*., [15]. Chu *et al*., [16], and Yogev *et al*., [17], 12-14 In Sharma *et al*., [14], study population, obese group developed gestational diabetes mellitus (9.52%) in comparison to normal BMI group (2%). Thus, there was 4.76 fold risk increase for GDM among obese women. Farooq *et al*., [18], study reported pregnancy problem risk given as an odds ratio for each BMI category compared to the normal BMI Increasing BMI was associated with an increase in gestational diabetes (GDM) and pre-eclampsia. In comparison to women with a normal BMI, the adjusted odds ratios for gestational diabetes and preeclampsia in the morbidly obese population are 13.1 (95% CI: 2.4, 26.8) and 6.2 (95% CI: 1.0, 13.2), respectively. The risk of postpartum hemorrhage is 2.27 (95 % CI 0.67, 3.1), whereas the morbidly obese category had a risk of postpartum hemorrhage of 2.4 (95 %CI 0.29–21.4). There was a 3.74 adjusted relative risk of anemia in the underweight group (95% confidence interval of 1.5– 2.7). Anemia may be a factor in the increased risk of PPH in underweight individuals.

In our study, the mean birth weight of the neonates of obese group was 3.22±0.54 kg which was significantly higher (p<0.001) than the neonates of control group where it was 2.95±0.46kg. Neonates of obese mothers had increased NICU admission, the major reasons for admission being infants of diabetic mothers and macrosomia. In present study macrosomia significantly higher with OR 10.09(1.24-81.8, p=0.009) in overweight/obese mother compare to normal weight group. The results are concurrent with previous studies by Usha *et al*., [19], and Vasudevan *et al*., [20]. Various studies have found an association of low apgar score at birth, neonatal admissions and increased incidence of perinatal deaths among obese pregnant women which was comparable with our findings [21]. The impact of abnormal body habitus on birth weight of the baby grows as the maternal BMI increases according to various studies [22]. The findings in our study showing the increased incidence of macrosomia in obese women was consistent with these studies. In our study, we have found out that normal weight mothers are associated with increased risk of giving birth to LBW babies. This is consistent with other studies such as Han *et al*., [23], and Kanadys [24]. Kuamr and Chellamma [25], shown that macrosomia or babies with higher birth weight is common in obese and overweight women, which consistent with present study. Maternal overweight/obese is significantly associated with an increased risk of macrosomia, low APGAR score, NICU admission.

CONCLUSION

Fetal and maternal health is threatened when a pregnant woman is overweight or obese. Pregnancies complicated by overweight or obesity were associated with an increased requirement for instrumental delivery, caesarean section, and induction of labor. Anaemia, GDM, preeclampsia, large for gestational age, and small for gestational age are significantly different in women with normal and overweight body mass indexes.

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