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Md. Alauddin

Senior Consultant (Obstetrics and Gynaecology), 250 Bedded General Hospital, Jhenaidah, Bangladesh

Marfia Khatun

Junior Consultant (Obstetrics and Gynaecology), 250 Bedded General Hospital, Jhenaidah, Bangladesh

Gulshan Ara

RMO (Obstetrics and Gynaecology), 250 Bedded General Hospital, Jhenaidah, Bangladesh

Sadia Sultana Mollika

Medical Officer (Obstetrics and Gynaecology), 250 Bedded General Hospital, Jhenaidah, Bangladesh

Farhana Sharmin

Medical Officer (Obstetrics and Gynaecology), 250 Bedded General Hospital, Jhenaidah, Bangladesh

Ashifa Ashrafee

Medical Officer (Obstetrics and Gynaecology), 250 Bedded General Hospital, Jhenaidah, Bangladesh

Corresponding Author:

Md. Alauddin

Senior Consultant (Obstetrics and Gynaecology), 250 Bedded General Hospital, Jhenaidah, Bangladesh

Assessment of Antenatal, Intra-Partum Complications, Perinatal Outcome in Pregnant Women with High BMI

Md. Alauddin, Marfia Khatun, Gulshan Ara, Sadia Sultana Mollika, Farhana Sharmin and Ashifa Ashrafee

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Abstract

Background: Obesity is a global health problem. Rates of obesity in pregnancy are increasing, particularly in developed countries. The increasing global prevalence of overweight and obesity makes it more likely that a growing number of women with high body mass index (BMI) are becoming pregnant. The objective of this study was to assess antenatal, intra-partum complications, perinatal outcome in pregnant women with high BMI.

Methods: It is a prospective non-randomized descriptive study conducted in the department of obstetrics and gynecology in 250 Bedded General Hospital, Jhenaidah, Bangladesh from January to June 2024. Complications during pregnancy, labor, puerperium studied 25 pregnant women of BMI >25 as cases and controls 25 pregnant women with normal BMI. The outcome variables evaluated in study were rates of preeclampsia, gestational diabetes, cesarean delivery, failed induction, operative vaginal deliveries, birth weight, and postpartum infection.

Results: Total 50 cases in this study 17(68%) of normal pregnant and 15 cases (60%) of obese pregnant group women were of 20-25years age. 30 were primi and 20 were multi. Among 30 cases 14 cases (56%) from normal group and 16 cases (66%) from obese group were primi para 5 cases developed pre-eclampsia in this study. Among the 5 cases, 2 cases (4%) belong to normal group and 4 cases (16%) to obese group. 24 cases of normal group and 4 cases (16%) remained normotensive. In total 50 cases in this study, 34 cases had spontaneous labor and 16 cases needed induction. Among the 16 cases with induced labor, 5 cases (20%) were from normal BMI group and 11 cases (44%) were from obese group. Among the total number of 50 cases, 34 had normal vaginal delivery, 5 cases required out forceps and 11 cases were delivered by caesarean section. Out of the 5 cases with normal delivery, 2 (8%) cases were from normal BMI group, 4 cases were from obese group. Out of the 11 cases who delivered by caesarean section, 3 cases (12%) were from normal BMI group and 8 cases (32%) were from obese group. Pre-term labor is 8% among obese and 2% among control groups, a significant increase. Obese group had two-fold increase in induced labours and threefold increase in caesarean section rate. Among fetal complications macrosomia is the most common complication observed in this study, the incidence being 22% in obese group and 2% in control group, a eleven fold increase. Incidence of low APGAR score or fetal distress is increased by twofold.

Conclusions: Maternal BMI shows strong associations with pregnancy complications and outcome. Both maternal and fetal complications are increased.

Keywords: BMI, obese, maternal, fetal complications

Introduction

Obesity is a global health problem [1]. Among adults of all ages, women generally have higher rates of obesity than young women [2]. Rates of obesity in pregnancy are increasing, particularly in developed countries [3, 4]. The increasing global prevalence of overweight and obesity makes it more likely that a growing number of women with high body mass index (BMI) are becoming pregnant. High maternal BMI during pregnancy has immediate implications for pregnancy complications as well as long-term health implications for both women and offspring [5, 6]. For instance, in terms of pregnancy complications, a systematic review and meta-analysis involving 11 cohort studies found that caesarean delivery risk increased by 50% in pregnant women who were overweight and was more than double for women who were obese compared with women with normal BMI [7]. High BMI during pregnancy could lead to future chronic disease such as diabetes, heart disease and hypertension [8]. Surviving offspring are also more prone to long-term obesity, hypertension, coronary heart disease, diabetes, stroke and asthma [8, 9].

Both immediate and long-term health implications of high BMI during pregnancy have economic consequences. There is considerable evidence that maternal obesity during gestation increases the incidence of complications such as childhood obesity, diabetes, cardiovascular diseases, several types of cancer, and metabolic syndrome at multiple life stages in the offspring [4]. In contrast, maternal underweight has a protective effect on these pregnancy complications except for the slightly increased risks of having a baby with low birth weight and intrauterine growth restriction. As many of the physiological changes of pregnancy associated with maternal obesity are present from early pregnancy onward, reducing maternal obesity before conception is probably the best strategy to decrease the health burden of adverse fetal and birth outcomes [10]. Several observational studies and systematic reviews have provided a connection between maternal BMI during pre-pregnancy or early gestation and adverse perinatal outcomes [11]. Infants of overweight or obese mothers are affected by various pregnancy comorbidities including gestational diabetes, gestational hypertension, preeclampsia, premature birth (PTB), macrosomia and stillbirth [12, 13]. Pre-pregnancy underweight remains a significant health problem and is associated with low birth weight (LBW) and small for gestational age (SGA) [14, 15].

Methods & Materials

It is a prospective non-randomized descriptive study conducted in the department of obstetrics and gynecology in 250 Bedded General Hospital, Jhenaidah, Bangladesh from January to June 2024. Complications during pregnancy, labor, puerperium studied 25 pregnant women of BMI >25 as cases and controls 25 pregnant women with normal BMI.

Inclusion criteria

All women with singleton pregnancies >20 years and <35 years with BMI above 25 without preexisting medical comorbidities.

Exclusion criteria

All women with multiple pregnancy, previous cesarean section, more than 35 years and less than 20 years of age, underweight women, preexisting hypertension and diabetes. Women were informed about the study.

Detailed history regarding name, age, and obstetric score were taken. Estimated gestational age calculated based on recalled LMP or USG studies. Baseline weight and height were recorded during the initial visit in the first trimester and basal BMI was calculated using the formula. The women were placed in standard BMI categories and the obstetric outcome variables were evaluated. The outcome variables evaluated were rates of preeclampsia, gestational diabetes, cesarean delivery, failed induction, operative vaginal deliveries, birth weight, and postpartum infection.

Basic investigations were carried out like hemoglobin, blood grouping and typing, HIV, HbsAg, HCV, urine routine and microscopy and random blood sugar Sonography was routinely carried out at first-initial visit (Dating scan), second 20-22 weeks for any congenital anomalies (Anomaly scan), 3rd trimester (Growth scan). Patients were subjected to other tests, when required like screening test for diabetes - FBS, PPBS, GTT, platelet count, urine culture and sensitivity, 24 hours urinary protein, serum creatinine, blood urea, serum uric acid and fundoscopy. Patients having B p>=140/90 mmHg on two occasions 6 hours apart were considered as having hypertension and were managed accordingly after performing the necessary investigations. Patients having risk factors for GDM were

subjected to screening tests for diabetes and if gestational diabetes was diagnosed it was managed accordingly. Most of the patients allowed to go into spontaneous labor, were induced as and when required, none of the booked admitted patients were allowed to go for post maturity. Each baby was assessed by the neonatologist soon after the delivery. APGAR score was recorded at one minute and five minutes, weight of the baby recorded. Any complications were treated aggressively. The mother and baby were observed in postnatal period for any complications, women were educated about weight reduction. The observations were then computed and compared to evaluate the problems associated with.

Results

Total 50 cases in this study 17(68%) of normal pregnant and 15 cases (60%) of obese pregnant group women were of 20-25years age. 30 were primi and 20 were multi. Among 30 cases 14 cases (56%) from normal group and 16 cases (66%) from obese group were primi para 5 cases developed pre-eclampsia in this study. Among the 5 cases, 2 cases (4%) belong to normal group and 4 cases (16%) to obese group. 24 cases of normal group and 4 cases (16%) remained normotensive. 3 cases developed gestational diabetes among which only 1case (2%) belongs to normal group and 2 cases (8%) in obese group. 25 cases in normal group and 23 cases in obese group remained normoglycemic in this study (Table-1).

Table 1: Comparison of demographic distribution in each group

| Age | Controls | Obesity | Total |
|------------------------------|----------|----------|-------|
| 20-25 Years | 17(68%) | 15 (60%) | 32 |
| 26-30 Years | 6(24%) | 3 (12%) | 9 |
| 31-35 Years | 2(8%) | 7 (28%) | 9 |
| Gravida | | | |
| Primi | 14(56%) | 16 (64%) | 30 |
| Multi | 11(44%) | 9 (36%) | 20 |
| Rate of pre-eclampsia | | | |
| Yes | 1(4%) | 4 (16%) | 5 |
| No | 24(96%) | 21 (84%) | 45 |
| Gestational diabetes | | | |
| Yes | 1 (4%) | 2 (8%) | 3 |
| No | 24(96%) | 23 (92%) | 47 |

Table 2: Comparing rate of various parameters in labor of two groups

| Pre-term labor | Normal group(N=25) | Obese group (N=25) | Total |
|--------------------------|--------------------|--------------------|-------|
| Yes | 1 (4%) | 2 (8%) | 3 |
| No | 24 (96%) | 23 (92%) | 47 |
| Labor | | | |
| Induced | 5 (20%) | 11 (44%) | 16 |
| Spontaneous | 20 (80%) | 14 (56%) | 34 |
| Mode of delivery | | | |
| Normal delivery | 20 (80%) | 14 (56%) | 34 |
| Forceps | 2 (8%) | 3 (12%) | 5 |
| Caesarean section | 3 (12%) | 8 (32%) | 11 |
| Birth weight (kg) | | | |
| <2.5 | 3 (12%) | 3 (12%) | 6 |
| 2.5-3.5 | 21 (84%) | 17 (68%) | 38 |
| >4 | 1 (4%) | 5 (20%) | 6 |

Table-2 shows that 50 cases in this study 47 patients delivered at term and 3 patients had preterm delivery among which 1 (4%) case belongs to the group of normal BMI and 2 cases (8%) to that of obese group. In total 50 cases in this study, 34 cases had spontaneous labor and 16 cases needed induction. Among the 16 cases with induced labor, 5 cases (20%) were from normal BMI group and 11 cases (44%) were from obese group. Among the

total number of 50 cases, 34 had normal vaginal delivery, 5 cases required out forceps and 11 cases were delivered by caesarean section. Out of the 5 cases with normal delivery, 2 (8%) cases were from normal BMI group, 4 cases were from obese group. Out of the 11 cases who delivered by caesarean section, 3 cases (12%) were from normal BMI group and 8 cases (32%) were from obese group. 41 with normal birth weight and 4 infants were born with macrosomia. Among 8 infants with macrosomia, only 1 infant is from the group with normal BMI and 4 infants were from the obese group. Among 100 cases in the study 5 infants were born with low APGAR score in which only one infant is from normal BMI group and 4 from obese group.

Table 3: Comparing the APGAR score and fetal, neonatal, maternal complications.

| APGAR score | Normal group | Obese group | Total |
|------------------------------------|--------------|-------------|-------|
| <6 | 1 (4%) | 2 (8%) | 3 |
| 7-10 | 24 (96%) | 23 (92%) | 47 |
| Fetal and neonatal complications | | | |
| Macrosomia | 1 (4%) | 5 (20%) | 6 |
| Low APGAR | 1 (4%) | 2 (8%) | 3 |
| Maternal complications and outcome | | | |
| Pre-eclampsia | 1(4%) | 4 (16%) | 5 |
| Gestational diabetes | 1 (4%) | 4 (16%) | 5 |
| Preterm labor | 1 (4%) | 4 (16%) | 5 |
| Induction of labor | 5 (20%) | 11 (44%) | 16 |
| Forceps delivery | 2 (8%) | 3 (12%) | 5 |
| Caesarean section | 3 (12%) | 8 (32%) | 11 |

Table-3 shows that pre-term labor is 8% among obese and 2% among control groups, a significant increase. Obese group had two-fold increase in induced labours and threefold increase in caesarean section rate. Among fetal complications macrosomia is the most common complication observed in this study, the incidence being 22% in obese group and 2% in control group, a eleven fold increase. Incidence of low APGAR score or fetal distress is increased by twofold.

Discussion

His study provided a quantitative estimation of the risk of adverse pregnancy complications among mothers with varying BMI levels. It was found that mothers who were diagnosed as overweight or obesity faced a significantly higher risk of pregnancy complications, including GDM, GHTN, and pre-eclampsia. Obesity has become one of the major public health problems in the world. Incidence of obesity is on rise in developing countries including Bangladesh. Obesity not only affects the mother but also has hazardous effect of the fetus and is also responsible for the offspring overweight or obesity. Because the overall prevalence of obesity has increased over the past decades, the prevalence of obesity complicating pregnancy has also increased. This study adds to the increasing body of evidence which suggests that obesity measured by BMI, predisposes women to complicated pregnancies and increased obstetric interventions. We found a linear relationship between increasing body mass index and the risk of developing pre-eclampsia, gestational diabetes, failed induction and emergency caesarean section. Conversely low BMI has a protective effect on some obstetric complications and had better pregnancy outcomes than women with normal BMI. In this present study majority of obese group were between 20 and 25 years, followed by 31 and 35 years. In a study conducted by Vahratian *et al.* majority of obese group were between 20-25 years [16]. In the

present study 64% of obese patients were of primigravida and 36% were of multigravida. In a study conducted by Cedergren *et al.*, 65% of obese group were primigravida and 35% were of multigravida [17]. In a study conducted by sohinee Bhattacharya *et al.*, 14.7% of obese women developed pre-eclampsia [18]. In our present study pre-eclampsia developed in 16% of obese women. Incidence of pre-eclampsia is 4 times higher in obese group compared to normal BMI group in this study. In a study conducted by Cedergren *et al.*, 6% of obese women developed gestational diabetes mellitus. In our study 8% of obese women developed GDM [17]. Obese women 4 times more incidence of GDM. This result is mostly due to increased insulin resistance in obese patients. In the present study the incidence of preterm labor in obese group is 8% and 2% in normal BMI group and there is four times increase in rate of pre-term labor in obese group. However increase is higher in present study, which probably reflects increased number of women who are anemic and of low socioeconomic status compared to above studies. In addition small number of patients in present study could also contribute to this result. In our study the incidence of instrumental delivery in obese group is 14%. In a study conducted by Cedergren *et al.*, the incidence of instrumental delivery is 39% [17]. This difference may be due to the use of instrumental delivery as a prophylactic measure in other studies, whereas in this study forceps was used when and only indicated. In the present study, there is an increase in the rate of cesarean section by 3 times in the obese group when compared to control group and this incidence is comparable to the study conducted by Oded langer *et al.* in which 10.2% of normal BMI group and 39% of obese group had cesarean section that is about four times increased rate [19]. In a study conducted by Seligman LC *et al.* incidence of cesarean rate was higher in normal BMI group, and there was only 1.5 times increased risk in obese group [20]. In our study there is 11 times increase in the incidence of macrosomia in obese group which is high when compared to other studies where there is 2 to 4 fold increase in the incidence. The reason for this might be that in other studies, the cut off for macrosomia being birth weight >4.5 kg, where as in our study 4 kg being taken as the cut off. Limited number of cases in the study group may also contribute to this result. In our study, the incidence of low APGAR score in control group is 2% and in obese group 8% which is comparable to other studies. There is increased incidence of low Apgar score (<3) by 4 fold. The increased incidence of prolonged labor, meconium-stained liquor in obese group explains the increased of low APGAR score. Booking body mass index (BMI) is of clinical interest since obese pregnant women face far greater risks of pregnancy complications like preeclampsia, gestational diabetes and macrosomia. Awareness of these findings needs to be increased in both women planning a pregnancy and their careers. The outcome variables evaluated in study were rates of preeclampsia, gestational diabetes, caesarean delivery, failed induction, operative vaginal deliveries, birth weight, and postpartum infection.

Conclusion

Maternal BMI has a strong association with pregnancy complications and outcomes. Both mother and fetal complications increase. Attempts should be made to prevent obesity in women of childbirth age and to promote weight loss before pregnancy. Furthermore, pregnancy complications such as gestational diabetes, preeclampsia, preterm labor, caesarean delivery, and macrosomia might occur frequently with increasing maternal BMI. In addition, below-average weight was

found to have a protective effect against these complications. Regarding the increased maternal and neonatal risks in women with above-average BMI prior to pregnancy, appropriate nutrition and weight control should be advised for expecting mothers.

Conflict of Interest: None.

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