



CONSEQUENCES OF MATERNAL BODY MASS INDEX ON THE PREGNANCY OUTCOME

Obstetrics & Gynaecology

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ABSTRACT

Introduction: Maternal body mass index (BMI) is one of the most important predictor of nutritional status of a pregnant lady. Both nutritional input and maternal weight are modifiable factors which can influence pregnancy outcome. Either underweight or overweight, both can have significant impact on outcome of pregnancy. Obese women are more prone for developing gestational hypertension, preeclampsia, gestational diabetes mellitus, postpartum hemorrhage, and increased incidence of operative deliveries. Weight is an indicator of general health of a person. Being underweight is not considered healthy and so is being over-weight Obesity affects women more than men. Pregnancy is one of the most important phases of a woman's life and is suggested as the significant event which could lead to excess weight gain and hence obesity. Therefore efforts should be made to identify various factors which lead to excess weight gain during and after childbearing so that this rising problem of obesity could be managed effectively. **Aims and Objectives:** To determine the maternal risk in terms of antepartum, intrapartum, postpartum complications and perinatal outcome in relation to extremes of maternal BMI. **Materials and Methods:** This was a prospective study conducted in Alluri Sitaramraju Academy of Medical Sciences, Eluru. Total of 100 women were taken for study after satisfying all inclusion and exclusion criteria. All patients were followed up till delivery and various outcomes were studied and analysed. **Results:** A total of 72 (65.45%) patients were in the age group of 21-30 years. The present study has showed that PIH has been developed to 21% of patients, gestational diabetes mellitus to 32%, pre-eclampsia to 21%, PPH to 7%, Threatened miscarriage occurred to 31%, wound infection developed to 5%. Increased rate of LSCS was associated with high BMI group 41.67% (n=20) when compared to normal 16.67% (n=6) p=0.013, Significant. **Conclusion:** Body Mass Index plays a significant role in adverse pregnancy outcome. High BMI is associated with increased incidence of hypothyroid, gestational diabetes mellitus, gestational hypertension, instrumental delivery, caesarean delivery. There is significant association of underweight BMI with anaemia, low birth weight. It can be concluded from our study that extremes of maternal BMI is associated with adverse maternal and perinatal outcome. Adequate preconceptional counselling should be given to all women in reproductive age group so that they can attain normal BMI before conception.

KEYWORDS

Body mass index, Gestational diabetes mellitus, Gestational hypertension, Obesity, Pregnancy outcome

INTRODUCTION:

Excessive weight is a major health problem in all affluent societies. Obesity continues to rise in the prevalence around the globe. The globe epidemic of obesity continues to grow at an alarming rate, crossing boundaries of age, race and gender. Indeed, it is now so common that it is replacing the more traditional public health care concerns including under nutrition and infectious disease as one of the most significant contributions to ill health. (1) WHO in 2009 announced obesity in pregnancy as one of the important non-communicable diseases that threaten maternal and child health. Maternal obesity has been associated with adverse perinatal outcomes. (2) American College of Obstetricians and Gynaecologists (ACOG) to recommend that the body mass index to be recorded for all women at the initial prenatal visit and that information concerning the maternal and fetal risks of a very elevated BMI in pregnancy should be provided.

Worldwide there has been alarming increase in the incidence of obesity and overweight, particularly in the past two to three decades. In the latest report, the WHO has indicated that approximately 1.6 billion adults are overweight and around 400 million are obese. Obesity as thus becomes a major contributor for global burden of chronic diseases and disabilities. (3) Pregnancy complications secondary to overweight and obesity have been studied from as early as 1945, and it has been well established that these women are more prone for developing gestational hypertension, preeclampsia (PE), gestational diabetes mellitus (GDM), postpartum hemorrhage, and increased incidence of operative deliveries. (4)(5) Furthermore, it has been showed that low APGAR score and perinatal deaths are more common in neonates of obese women. (6)(7) There are some studies which have reported increased incidence of anemia, intrauterine growth retardation, low birth weight (LBW) babies, and preterm labor. While some studies have reported a protective effect on some pregnancy complications such as GDM and PE. (8) Hence, this study is to determine the effect of maternal BMI on pregnancy outcome.

Aims and Objectives:

1. To determine the maternal risks in terms of antenatal, intrapartum, and postpartum complications in relation to extremes of maternal BMI.
2. To determine the perinatal outcome in relation to extremes of maternal BMI.

MATERIALS AND METHODS:

Women attending antenatal OPD for antenatal check up at Alluri Sitaramraju Academy of Medical Sciences, Eluru from March 2019 to February 2020 are included after informed written consent. A minimum of 100 patients were studied.

Inclusion Criteria:

1. Primigravida with singleton pregnancy
2. Booked cases with their first visit before 12 weeks of Gestation
3. No history of any medical disorders.

Exclusion Criteria:

1. Multipara
2. Multiple gestations
3. Presence or history of any medical disorders.

A total of 100 patients were taken for study after satisfying all inclusion and exclusion criteria. The measurements of height and weight were taken by means of standard methodology. BMI of patients was calculated using formula:

$$\text{BMI} = (\text{weight in kilograms} / \text{height in meters}^2).$$

Women will be informed about the study and purpose of study in detail. The above women will be placed in standard BMI categories and the obstetric outcome variables will be evaluated.

The women will be categorised into four groups according to their

BMI as per WHO classification as follows;

Underweight (group 1): less than or equal to BMI 18.5KG/M2
Normal (group 2): BMI > 18.5-24.9 KG/M2 Overweight (group 3): BMI 25-29.9 Kg/m2 Obese (group 4): BMI: 30-34.9 Kg/m2.

A complete history regarding present and past illness was noted. Detailed general physical and systemic examination was performed. Baseline routine investigations were performed. All findings were noted down in a pre-designed proforma and records were maintained till delivery. All patients under study were counselled to have follow-up visits as per standard protocol till delivery. Decision regarding mode of delivery was taken depending on the particular case.

The outcome variables of the study included;

1. Development of hypertensive disorders of pregnancy
2. Development of gestational diabetes mellitus
3. Development of PPH
4. Mode of delivery
5. Birth weight of baby.
6. Post operative complications like wound infections.

Results :

Table1: Distributing according to age

Age	18-22	23-29	30-35	Total
Underweight	3 (18.7%)	9 (56.25%)	4 (25%)	16
Normal	7 (19.44%)	26 (72.22%)	3 (8.33%)	36
Overweight	9 (23.68%)	25 (65.78%)	4 (10.52%)	38
Obesity	2 (20%)	6 (60%)	2 (20%)	10
Total	21	66	13	100

Table 1 shows; 21% (n=21) of women are between 18-22 age group. 66% (n=66) of women are in 23-29 age group. 13% (n=13) of women are between 30-35 age. Majority of study population 66% (n=66) were in the age group between 23-29. Mean age of women in the study was 25.84 years.

Table 2: Mode of delivery

Mode of delivery	Vaginal	LSCS	Instrumental	Total
Underweight	14 (87.5%)	2 (12.5%)	-	16
Normal	29 (80.55%)	6 (16.66%)	1 (2.7%)	36
Overweight	22 (57.89%)	14 (36.84%)	2 (5.26%)	38
Obese	1(10%)	6 (60%)	3 (30%)	10
Total	66	28	6	100

In present study 66% of women had vaginal delivery, underweight group were 87.5% (n=14), normal 80.55% (n=29), Overweight were 57.89% (n=22), obese 10% (n=1).

Among 28% of women with LSCS underweight group were 12.5% (n=2), normal 16.66% (n=6), overweight were 36.84% (n=14), obese 60% (n=6). Among 6% of women with instrumental delivery normal BMI 2.77% (n=1). Over weight were 5.26% (n=2), obese 30% (n=3). Significant increase in instrumental delivery as BMI increases CHI SQUARE: 10.753. P-Value 0.013, statistically significant increase in operative delivery as BMI increases. Increased rate of LSCS seen in obese group 60% (n=6) and overweight group 36.84% (n=14) P Value – 0.013. Significant linear trends in the increase of LSCS rates as BMI increases. Increased rate of vaginal delivery in underweight group 87.5% (n=14) P Value- 0.013. Significant linear trend in the decrease in normal delivery as BMI increases.

Table 3: BMI and baby weight

Birth weight	<2.5	2.6-3.0	3.1-3.5	>3.6	Total
Underweight	13 (81.25%)	3 (18.75%)	-	-	16
Normal	11 (30.55%)	19 (52.77%)	5 (13.88%)	1 (2.77%)	36
Overweight	6 (15.78%)	15 (39.4%)	14 (36.84%)	3 (7.89%)	38
Obese	-	3 (30%)	4 (40%)	3 (30%)	10
Total	30	40	23	7	100

Table 3 shows; 30% babies with birth weight <2.5 kg 81.25% (n=13)

were in underweight group, 30.55% (n=11) were in normal group, 15.78% (n=6) were in over weight group.

40% babies with birth weight 2.6-3kg 18.75% (n=3) were in underweight group 52, 77% (n=19) were in normal group, 39.47% (n=15) were in overweight group, 30% (n=3) were in obese group. 23% babies with birth weight 3.1- 3.5kg 0% (n=0) were in underweight group, 13.88% (n=5) were in normal group, 36.84% (n=14) were in over weight group, 40% (n=4) were in obese group. 7% babies with birth weight >3.6kg 0% (n=0) were in under weight group, 2.77% (n=1) were in normal group, 7.89% (n=3) were in over weight group, 3% (n=3) were in obese

Majority of babies birth weight 40% (n=40) were in between 2.6-3kg. Mean weight of babies in the studies was 2.80kg. Also shows that majority of underweight women significantly associated with low birth weight, as BMI increases birth weight increases.

Table 4: BMI and Complications

Complications	Mean BMI (Kg/m2)	Frequency (%)
PIH	39	21
GDM	40	32
Pre Eclampsia	38	21
Wound Infection	35	05
Threatened miscarriage	38	31
PPH	34	07

The analysis of maternal obesity on different complications showed that, patients who developed pregnancy induced hypertension had mean BMI of 39 kg/m. The mean BMI of patients with gestational diabetes was 40 kg/m2, patients who developed pre eclampsia had mean BMI of 38 kg/m2. Patients who developed PPH, their mean BMI was 34 kg/m2 and with wound infection their mean BMI was 35 kg/m2, who had Threatened miscarriage, their mean BMI was 38 kg/m2. Over all according to our study maternal obesity has adverse effect on PIH, GDM, pre eclampsia, mode of delivery, threatened miscarriage.

Discussion:

In this study women were divided into 4 BMI group, out of 100 women 16% (n= 16) in present study were in underweight group with BMI less than 18.5 kg per metre square, 36% (n= 36) were in normal group with BMI 18.5 to 24.9 KG per metre square. Overweight group were 38% (n=38) with BMI 25 - 29.9 KG per metre square and obese were 10% (n=10) with BMI>30kg/sq m. Maternal obesity during pregnancy is an increasing problem globally populations in developing countries as well as affluent ones are at risk. The findings of our study is consistent with other studies in which increased maternal weight increases the risk of other factors like pregnancy induced hypertension, gestational diabetes, caesarean section, pre-eclampsia, threatened miscarriages, PPH, weight of baby, and Post-operative infection.(9)(10) The women who were overweight/obese/morbidly obese had significantly higher risk of gestational hypertension, PE and IGT. Rate of lower segment cesarean section (LSCS) was also higher in these groups. This is in line with other studies like Bhattacharya et al.(11) In underweight group, there was high incidence of anemia which has affected 35% of patients. This is due to lower socioeconomic status and nutritional deficiencies. This correlates with other studies like Jain et al.(12) In our study, we have found out that underweight mothers are associated with increased risk of giving birth to LBW babies. This is consistent with other studies such as Han et al., 2011(13) and Kanady 2007.(14) Factors responsible for high BMI are poor dietary habits, improvement in standards of living, decrease in physical activities and dietary changes might be responsible for the higher frequency of obesity in our urban population.(15) In 100 women, 66% (n=66) of women had normal vaginal delivery, 28% (n=28) of women had LSCS with 6% (n=6) women had instrumental delivery. Statistically significant increase in LSCS as BMI increases with P value 0.0131. Poobalon et al metaanalysis found that risk of LSCS was higher in overweight or obese women than with normal BMI.

Limitation:

Since this study was based on a single hospital and could not represent the entire population, large multi-centric trials are required for better assessment of the risks of obesity in our population.

CONCLUSION:

It can be concluded from our study that extremes of maternal BMI is associated with adverse maternal and perinatal outcome. While underweight was associated with anemia, nutritional deficiencies and LBW babies, obese and overweight was associated with gestational hypertension, PE, GDM, increased LSCS rate and increased neonatal morbidity.

Body mass index plays a significant role in adverse pregnancy outcome. The study of maternal BMI shows strong associations with pregnancy complications and outcomes. Hence, adequate preconceptional counselling should be given to all women in reproductive age group so that they can attain normal BMI before conception. With proper management of pregnant women with abnormal BMI during antepartum, intrapartum, and postpartum period, by improving the awareness, and by increasing the accessibility to medical facilities, maternal and perinatal morbidity and mortality can be minimized.

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