

DOI: <http://dx.doi.org/10.18203/2320-1770.ijrcog20190844>

Original Research Article

Maternal body mass index and feto-maternal outcome: a comparative study

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Received: 25 January 2019

Accepted: 20 February 2019

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ABSTRACT

Background: Increasing BMI in women poses multiple threat of illness especially in the reproductive age group impacting pregnancy. Pregnant women with overweight and obesity are at a higher risk of developing complications at all stages of the physiological pregnancy. A focus on the methods to prevent this trend of increasing weight gain in adolescence is essential curb the complications due to obesity.

Methods: This prospective study was conducted in the Department of Obstetrics and Gynecology, Madras Medical College, Chennai. Written informed consent was obtained and pregnant women visiting the antenatal OP were registered. Detailed history taking and examination was carried out with the measurement of body mass index as weight in kg/height in meter square. The women were followed up for the antepartum, intrapartum, post-partum variables and neonatal outcome.

Results: Two hundred pregnant women with high BMI >25 kg/m² and two hundred pregnant women with normal BMI were selected and were followed prospectively. Present study showed an increased incidence of pre-eclampsia in patients with high BMI (28% as compared to 8% of the normal BMI) and a higher incidence of Gestational diabetes mellitus among women with high BMI with a value of 27.5 % compared to a value of 7.5% in women with normal BMI. Caesarean delivery was found in 54.5% of the high BMI mothers compared to 31.5% in normal BMI mothers. Postoperatively, wound gaping was found with an incidence of 4.5% in high BMI mothers. IUGR was found in 10% of babies of women with high BMI and still birth occurred in 2.5% of deliveries of high BMI mothers compared to 0.5% in mothers of normal BMI group.

Conclusions: The obstetrician needs to be well versed with dietary advice and life style pattern advice to the women of the reproductive age group in order to prevent the complications of high Body mass index in pregnancy. Its imperative to counsel these women about the pre-pregnancy loss of weight, healthy food and exercise, and healthy life style pattern during pregnancy in order to have a healthy outcome.

Keywords: Body mass index, Caesarean delivery, Feto-maternal outcome

INTRODUCTION

With the rapid rate of socio-economic development and socio-cultural changes, changes in dietary pattern and changes in lifestyle, increasing BMI has become a healthcare burden to the nation. This increasing rate of BMI has affected all age groups universally. It causes

major medical ailments like hypertension, Diabetes, cardiovascular, neurovascular diseases, arthritis and causes a lot of morbidity and mortality.¹ The World Health Organization and the National Institutes of Health define body mass index (BMI) less than 18.5 as underweight, 18.5-22.9 as normal weight, 23-24.9 as overweight and ≥ 25 BMI as obesity.² About 13 % of the

world's adult populations are obese. According to National Family Health Survey, the percentage of married women (15-49 years) who are overweight or obese increased from 11 % (NFHS 2) to 15% (NFHS 3).³

Maternal obesity has been reported as a risk factor for various antenatal, intrapartum, postpartum and neonatal complications such as postdates, induction of labour, macrosomia, shoulder dystocia, prolonged duration of labour, increased blood loss, caesarean section rates and neonatal admissions.⁴

Many factors associated with perinatal morbidity and mortality are not amenable to intervention. Recent epidemiologic findings indicate that weight control may offer the potential for affecting gestational outcomes. A focus on the methods to prevent this trend of increasing weight gain in adolescence is essential curb the complications due to obesity.

The objective of the present study was to compare the antepartum, intrapartum, postpartum and neonatal outcome in pregnant mothers with high body mass index in the first trimester with those of normal body mass index and to find the incidence of complications in mothers with high body mass index.

METHODS

This prospective study was conducted in the Department of Obstetrics and Gynecology, Madras Medical College, Chennai. Written informed consent was obtained from all antenatal women who participated in the study. Detailed history taking and examination were carried out with the measurement of body mass index as weight in kg/height in meter square.

Inclusion criteria

- Primi gravida pregnant mothers below 12 weeks of gestation.

Exclusion criteria

- Patients not willing for the study
- Multiple pregnancies
- Women with medical disorders
- Diabetes, hypertension.

Pregnant women visiting the antenatal op, in the early trimester after getting written consent were registered. Detailed history taking and examination were carried out with the measurement of body mass index as weight in kg/height in meter square.

The subjects were classified into 2 groups

- Group 1- Normal: BMI (20-24.9)
- Group 2- Overweight and obese (BMI 25 and above)

The women were followed up for the antepartum, intrapartum, post-partum variables and neonatal outcome.

The data were analysed for the 2 groups of patients in the study.

Antenatal variables

- Abortion, Preeclampsia, Gestational diabetes mellitus, Oligohydramnios, Abruptio placenta, Anaemia, PROM

Intrapartum variables

- Vaginal delivery, Caesarean section, Instrumental delivery

Postpartum variables

- PPH, Duration of hospital stay, Wound infection/gaping, Pyrexia, Lactational dysfunction

Neonatal variables

- IUGR, Preterm, Macrosomia (>4 kg), Post-term, Still birth, NICU Admission, Need for intubation.

Statistical analysis

Statistical comparison between data of cases (BMI>25) and controls (BMI<25) was performed with Chi-square test and a P value of less than 0.05 denotes statistical significance.

RESULTS

Two hundred pregnant women with high BMI >25 kg/m² and two hundred pregnant women with normal BMI were selected and were followed prospectively.

Maternal age distribution

The age distribution in present study showed that about 50% of women with normal BMI are in the age group between 20 to 24 years and in the high BMI group about 43.5% fall in the age group between 20 to 24 years.

As age advances, the percentage of women in high BMI group are more than in normal BMI.

Antepartum parameters

Abortion

In present study, abortion was found to be more in high BMI group when compared to normal BMI group in accordance with the above studies but p-value was found to be less than 0.05, may be owing to the small size of the sample (Table 1).

Table 1: Various complications occurring in women with normal BMI and high BMI.

Complications	Normal BMI		High BMI		P value	Chi square
	N	%	N	%		
Preeclampsia	16	8	56	28	<0.05	27.1
GDM	15	7.5	55	27.5	<0.05	27.7
Oligo	26	13	29	14.5	0.66	0.19
Abruption	8	4	10	5	0.63	0.23
Anemia	20	10	14	7	0.28	1.15
PROM	26	13	28	14	0.77	0.09

Pre-eclampsia

Present study showed an increased incidence of pre-eclampsia in patients with high BMI (28% as compared to 8% of the normal BMI. p value was found to be less than 0.05 and was statistically significant in accordance with other studies.

Gestational diabetes mellitus

Present study showed a higher incidence of Gestational diabetes mellitus among women with high BMI with a value of 27.5 % compared to a value of 7.5% in women with normal BMI. GDM on insulin was found to be 16.5% in the high BMI group and 1.5% in women with normal BMI. The p-value was found to be less than 0.05 and it was statistically significant.

Oligohydramnios

Oligohydramnios was found to occur in 13% of women with normal BMI and 14.5% of women with high BMI. It was found that oligohydramnios occurs independently of BMI and was not statistically significant.

Abruption

In present study, placental abruption was found to occur in 4% of normal BMI group and 5% of mothers in higher BMI group. the result was not statistically significant, not conforming with the following studies, may be due to a small sample size.

Anaemia

The incidence of anaemia in women with normal BMI was 10% and in high BMI was 7%. P value was not statistically significant.

Premature rupture of membranes

In present study preterm delivery was found to be more in women with normal BMI with a value of 12.5% compared to the value of 6% in women with high BMI. As the p-value was less than 0.5, it was found that preterm delivery and BMI were dependent on each other.

Pre-eclampsia

Table 2: Incidence of preeclampsia in normal BMI and high BMI.

Preeclampsia	Normal BMI n=200		High BMI n=200	
	N	%	N	%
Mild	12	6	21	10.5
Severe	4	2	35	17.5
Total	16	8	56	28

Chi square = 27.100, p = 0.001(p<0.05)

In present study, women with high BMI had 28% incidence of pre-eclampsia and those with normal BMI had 8% incidence (Table 2).

As the p value is less than 0.05, BMI and pre-eclampsia was found to be dependent of each other.

Gestational diabetes mellitus

Table 3: Incidence of GDM in normal BMI and high BMI.

GDM	Normal BMI n=200		High BMI n=200	
	N	%	N	%
Meal plan	12	6	22	11
Insulin	3	1.5	33	16.5
Total	15	7.5	55	27.5

Chi square = 27.706, p = 0.001(p<0.05)

In present study, women with high BMI had 27.5% incidence of gestational diabetes mellitus and those with normal BMI had 7.5% incidence (Table 3).

As the p-value is less than 0.05, BMI and gestational diabetes mellitus were found to be dependent on each other.

Induction of labour

Among the patients with high BMI, the induction rate was 36.78% and for normal BMI, the induction rate was 26.39% (Table 4).

Table 4: Induction of labour in normal BMI vs High BMI.

	Normal BMI n=200		High BMI n=200	
	N	%	N	%
Induced	52	26.39	71	36.78
Not induced	145	73.60	122	63.21

Mode of delivery

The incidence of vaginal delivery, instrumental delivery and LSCS was found to be 57.5%, 9.5% and 31.5% respectively in women with normal BMI and 32.5%, 9.5% and 54.5% in women with high BMI respectively (Table 5).

Table 5: Mode of delivery in normal BMI vs high BMI.

	Normal BMI		High BMI		P value	Chi square
	N	%	N	%		
Vaginal	115	57.5	65	32.5	0.001	25.25
Instrumental	19	9.5	19	9.5	1	0
LSCS	63	31.5	109	54.5	0.001	21.58

The table shows that vaginal delivery and LSCS are dependent on BMI as their corresponding P value is found to be less than 0.05.

Postpartum complication

The incidence of wound gaping in women with high BMI was found to be 4.5% and the incidence of women with low BMI was 1.5%, the p-value was less than 0.05 (statistically significant) (Table 6).

Table 6: Various postpartum complications occurring in normal BMI and high BMI.

Complications	Normal BMI		High BMI		P value	Chi square
	N	%	N	%		
PPH	11	5.5	7	3.5	0.335	0.931
Pyrexia	1	0.5	2	1	0.562	0.336
Wound gaping	3	1.5	9	4.5	0.079	3.093
Prolonged stay	1	0.5	6	3	0.057	3.635
Lactation dysfunction	0	0	5	2.5	0.024	5.063

The incidence of lactational dysfunction in women with high BMI was found to be 2.5% and the incidence of women with low BMI was 0, the p-value was less than 0.05 (statistically significant).

Neonatal complication

The incidence of preterm in babies born to mother with normal BMI is 12.5% and those born to high BMI is 6%.

the p-value is less than 0.05. (statistically significant). The incidence of macrosomia in babies born to mother with normal BMI is 1% and those born to high BMI is 8.5%. the p-value is less than 0.05. (statistically significant). The incidence of NICU stay in babies born to mother with normal BMI is 16.5% and those born to high BMI is 24.5%. p-value is less than 0.05. (statistically significant).

DISCUSSION

Obesity is a growing epidemic and its effect on the outcome of pregnancy and delivery in the healthy population has not hitherto been extensively studied. This study aims to report the effect of maternal obesity on pregnancy complications with minimal confounding bias.⁵

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. All pregnancies in obese women be acknowledged as high risk and managed according to strict guidelines.⁶ Management should include pre-pregnancy counselling to reduce weight; shared antenatal care and appropriate management of complications. The evidence for obesity as an important complication in pregnancy is mounting; it is time to inform practice based on this evidence.⁷

As age advances, the percentage of women with obesity seems to increase. Present study showed an increased incidence of pre-eclampsia in patients with high BMI (28% as compared to 8% of the normal BMI, which was statistically significant.⁸ A higher incidence of Gestational diabetes mellitus among women with high BMI with a value of 27.5% compared to a value of 7.5% in women with normal BMI was seen and 16.5% in the high BMI group required insulin. In present study preterm delivery was found to be more in women with normal BMI with a value of 12.5% compared to the value of 6% in women with high BMI. Caesarean delivery was found in 54.5% of the high BMI mothers compared to 31.5% in normal BMI mothers, statistically significant.⁹ Vaginal delivery was found to occur more in normal BMI mothers with a percentage of 57.5 compared to 32.5% in the high BMI group. The most common indication for Caesarean in high BMI mothers was cephalo-pelvic disproportion (27.62%). In present study, pyrexia was found in 1% of mothers with high BMI and wound gaping was found with an incidence of 4.5% in high BMI mothers with a p-value of 0.079 (statistically significant). There was prolonged stay in 3% of mothers with high BMI and lactational dysfunction was found in 2.5% (p < 0.05).

IUGR was found in 10% of babies of women with high BMI. Still birth occurred in 2.5% of deliveries of high BMI mothers compared to 0.5% in mothers of normal BMI group. Maternal obesity more often leads to

intrauterine fetal death. NICU admission was found in 24.5% of babies born to mothers with high BMI compared to 16.5% of babies born to mothers with normal BMI with a significant p-value of less than 0.05.¹⁰

CONCLUSION

The inference from present study is that the obstetric and neonatal complications are more in women with high body mass index and obesity, which pose a challenge to the obstetrician. Counselling women about pre-pregnancy loss of weight, healthy food and exercise, and healthy life style pattern during pregnancy is prudent for a health pregnancy.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Hemalatha N, Shanthini. Maternal body mass index and fetomaternal outcome: a comparative study. *Int J Reprod Contracept Obstet Gynecol* 2019;8:840-4.