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Relation of High Maternal Body Mass Index to Perinatal and Maternal Outcome

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Introduction- Worldwide, obesity is the prevalent, chronic medical condition [(1)]. The rate of obesity in pregnant women is rising, increasing the significance of its impact on obesity-related pregnancy complications. [(2)]

Maternal body mass index (BMI) is one of the predictors of the nutritional status of pregnant ladies. The problem of rising obesity is not unique to India. In earlier research, the relationship between maternal height and weight with pregnancy complications have been extensively explored, but in recent times, BMI is widely accepted as a better measure of over or underweight [3].

Most of the developing countries, including India, are now facing double burden because of extreme socioeconomic distribution. On one side, there is overweight and obesity which has reached epidemic proportions and on the other side, there is underweight and undernourishment. In India, 26% of pregnant women are overweight, and 8% are obese [(4)].

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Relation of High Maternal Body Mass Index to Perinatal and Maternal Outcome

Dr. Khushboo Patel [α] & Dr. Smita Baheti [σ]

I. Introduction

Worldwide, obesity is the prevalent, chronic medical condition [(1)]. The rate of obesity in pregnant women is rising, increasing the significance of its impact on obesity-related pregnancy complications. [(2)]

Maternal body mass index (BMI) is one of the predictors of the nutritional status of pregnant ladies. The problem of rising obesity is not unique to India. In earlier research, the relationship between maternal height and weight with pregnancy complications have been extensively explored, but in recent times, BMI is widely accepted as a better measure of over or underweight [3].

Most of the developing countries, including India, are now facing double burden because of extreme socioeconomic distribution. On one side, there is overweight and obesity which has reached epidemic proportions and on the other side, there is underweight and undernourishment. In India, 26% of pregnant women are overweight, and 8% are obese [(4)].

Obesity influences not only the chance of conception but also reduces the response to fertility treatment and increases the risk of miscarriage, congenital anomalies[(5)] as well as pregnancy complications like gestational diabetes, pregnancy-induced hypertension, cesarean delivery, macrosomia, and infections in addition to potential adverse effects on long term health of both mother and infant[(6)]

The World Health Organization [(7)] and the National Institutes of Health [(8)] define normal weight as a BMI of 18.5–24.9,

overweight as a BMI of 25–29.9

obesity as a BMI of 30 or greater.

Obesity has further been characterized by BMI into Class I (30–34.9), Class II (35–39.9), and Class III (greater than 40).

An increased association of morbidity and mortality with obesity is well established in both pregnant and nonpregnant women. [9] Pregnancy with obesity is considered as high risk, and it causes substantial feto-maternal morbidity and mortality. Hence the purpose of this study was to examine the association between high BMI and feto-maternal outcome in primigravida women delivering singleton babies.

II. Aim & Objectives

a) Aim

To find out the effect of high body mass index on pregnancy outcomes and perinatal outcomes in nulliparous women delivering singleton babies.

b) Objective

- To determine the maternal risk in terms of antepartum, intrapartum, and postpartum complications about maternal BMI.
- To determine the perinatal outcome about high maternal BMI.

III. Material and Methods

Following approval from Institutional Research Ethical Board and written informed patient consent, this study has been conducted at Geetanjali Medical College and Hospital (GMCH) Udaipur from January 2019 to January 2020.

Study area- department of obstetrics and gynecology of GMCH, Udaipur

Study design- A longitudinal observational study

Source of data– All the antenatal patients attending OPD and admitted to GMCH from January 2019 to January 2020.

Inclusion criteria–

- Patients who give consent for the study
- Women with singleton pregnancies with high BMI (> 25)
- Booked cases with their first visit before 12 weeks of gestation.

Exclusion criteria-

- Women with multiple pregnancy
- Congenital malformation in the fetus
- Women with pre-existing medical disorders.

a) Methodology

After obtaining approval from the Institutional research Ethical board and written informed patient consent, this study was conducted at Geetanjali Medical College and Hospital Udaipur from Jan 2019 to January 2020.

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Cases were taken from the obstetrics and gynecology department attending the OPD and admitted in maternity having high BMI. Detailed history and examination, height, weight and co morbidities were documented with the help of Performa. Women were followed up till deliveries, and their babies were followed up till discharge from the hospital. Various maternal, fetal, and perinatal outcomes were observed in this observational study.

b) Proposed Statistical Analysis

Analysis of collected data was done on based of statistical tools and techniques. Data was presented in the form of tables, and charts and graphs such as bar diagrams and pie charts. Analysis of data will be done on based of inferential statistics and descriptive statistics, whatever is required to fulfill the objective.

c) Statistical Analysis

The collected data was cross-checked and entered into Microsoft Excel Software and was exported to SPSS, IBM Inc version 21 for statistic analysis.

IV. Results

Total of 150 primigravida patients of single tone pregnancy with BMI more than or equal to 25 Kg/metre2 were included in our study, and divided these patients into three groups having BMI 25-29.9 (group 1), 30-34.9(group 2), and more than and equal to 35(group 3).

Table 1: Age-wise distribution

	Age group (years)			
BMI Group	21-30	31-40	41-50	Total
25-29.9	63 (67.7%)	24 (25.8%)	6 (6.45%)	93 (62%)
30-34.9	23 (58.9%)	16 (41.0%)	0 (0%)	39 (26%)
>35	11 (61.1%)	5 (27.7%)	2 (11.1%)	18 (12%)
Total	97 (64.7%)	45 (30%)	8 (44.4%)	150

p=0.203 (NS)

In our study we found maximum patients of BMI 25-29.9 among 21 to 30 years of age.

Among 150 patients 93(62%) fall in 25-29.9 kg/metre^2 BMI group, 39(26%) in 30-34.9 BMI group and 18(12%) in more than and equal to 35 BMI group.

For BMI 25-29.9 group, 67.7% of patients from the 21-30 years age group.

For BMI 30-34.9 group maximum 58.9% patients were from 21-30 years age group.

For BMI more than and equal to 35 groups again maximum of 61.1% patients from 21-30 years age group (table 1).

Table 2: APGAR SCORE

	BMI Group			
	25-29.9	30-34.9	>35	Total
APGAR <9	47 (50.5%)	31 (79.5%)	17 (94.4%)	95 (63.3%)
APGAR =9	46 (49.5%)	8 (20.5%)	1 (5.6%)	55 (36.7%)
Total	93	39	18	150

p<0.001 (HS)

Among 150 newborns of 150 mothers of BMI more than or equal to 25, we found 95 newborns, having APGAR at one minute of birth was less than 9.

Among 39 obese mother' newborns 31(79.5%) had APGAR less than 9

Among 18 BMI more than or equal to 35mothers' newborns, we found 17(94.4%), newborns. With low APGAR which was highly significant with a p-value of < 0.001(table 2).

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Table 3: Maternal Complications

Table 3: Complications of pregnancy and their relationship with BMI during early pregnancy

	BMI Group				
Complications	25-29.9 (n=93)	30-34.9 (n=39)	>35 (n=18)	Total	p value
Mode of delivery (LSCS)	8 (62.4%)	24 (61.5%)	14 (77.8%)	96	0.429
GDM	17 (18.28%)	6 (15.4%)	7 (38.9%)	30	0.095
Pre-eclampsia	34 (36.6%)	25 (64.1%)	11 (61.1%)	70	0.006
PRETERM LABOR	36 (38.7%)	26 (66.7%)	14 (77.8%)	75	0.001
Macrosomia	17 (18.3%)	6 (15.4%)	7 (38.9%)	30	0.095
Oligohydramnios	18 (19.4%)	5 (12.8%)	0 (0%)	23	0.100
GHTN	49 (52.7%)	13 (33.3%)	3 (16.7%)	65	0.006
Anemia	38 (40.9%)	23 (60%)	3 (16.7%)	64	0.009

In our study, we found a high incidence of GDM in BMI more than or equal to 35patients with BMI more than or equals to 35 kg/metre^2 (38.9%), but it was not statistically significant.

Incidence of preeclampsia was high among more than or equal to 35 BMI group (61.1%) with p Value of 0.006, which suggest it is highly significant.

The present study showed the increasing incidence of preterm labor among BMI more than and equal to 35 patients 14 out of 18 patients (77.8%) with a p-value of 0.001 which suggested strong association between high maternal BMI and preterm labor.

The present study showed a high incidence of macrosomia among BMI more than or equal to 35mothers (38.9%), which was not statistically found significant.

Current study showed more cases of gestational hypertension among the BMI 25-29.9 group (552.7%) and less among BMI more than or equal to 35 patients of 16.7%, which was statistically significant.

We found a 40.9% incidence of anemia in overweight patients compared to that 16% among BMI more than or equal to 35mothers (table 3).

Table 4: Birth weight and BMI

	BMI Group			
Birth weight (Kg)	25-29.9 N=93	30-34.9 N=39	>35 N=18	Total
<2.5	43 (46.2%)	30 (76.9%)	15 (83.3%)	88
2.5-4	40 (43%)	7 (17.9%)	2 (11.1%)	49
4-5.5	10 (10.8%)	2 (5.1%)	1 (5.6%)	13
Total	93	39	18	150

p=0.003

Table 4 shows the association between maternal high BMI and birth weight of the newborns.

Among all mothers hiving high BMI, the incidence of low birth weight baby was 58.7%.

Incidence of low birth weight is higher in BMI more than or equal to 35group (83.3%) whereas 76.9% among obese mothers and 46.2% in overweight mothers were found in our study. Which is having p-value 0.003, and so it was statistically highly significant.

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Table 5: Neonatal Outcome

	BMI Group				
Neonatal Outcome	25-29.9 N=93	30-34.9 N=39	>35 N=18	Total	p value
IUGR	40 (43%)	22 (56.4%)	14 (77.8%)	76	0.018
NICU Admission	44 (47.3%)	31 (79.5%)	17 (94.4%)	101	<0.001
Mortality	4 (4.3%)	0 (0%)	1 (5.6%)	5	0.388

Table 5 shows neonatal outcomes and their relation with maternal BMI.

The present study showed 40 IUGR babies among overweight mothers (43.01%), 22 among obese mothers (56.4%), 14 among BMI more than or equal to 35mothers (77.8%).Which is statistically significant with a p-value of 0.018.

The present study showed maximum NICU admission of newborns among BMI more than or equal to 35 patients (94.4%), which was statistically highly significant with p-value less than 0.001.

In our study, we found four mortalities of baby among overweight mothers, o mortality among obese and one mortality among BMI more than or equal to 35mothers. It was found mortality occurs independently of maternal BMI and was statistically not significant (Table 5).

V. Discussion

In our study, we found the maximum number of patients from 21 to 30 years of age group 64.7%, 30% from 31 to 40 years of age, and 8% from 41 to 50 years. We found the maximum number of patients in the overweight group. We didn't find a significant association between age and BMI. That may be because, as age advances the reproductivity decreases[10].

In our study, we found a low APGAR score in the newborns as maternal BMI advances. Kumar HSA et al, 2017[11] have similar results.

In our study, we found a strong association of maternal complications like preeclampsia with maternal BMI more than or equals to 35 kg/metre^2.Which is like Doi L et al. [12] 2020 results.

We found a high incidence of preterm labor among mothers hiving more than or equal to 35 BMI which is comparable with Vinturache A et al, 2017 study[13].

In our study, we didn't get a significant association between a high maternal BMI and caesarean rates but overall LSCS rate was high in our study. Pettersen-Dahletal[14]. The study showed a high incidence of caesarean section among overweight and obese compared to normal and underweight those were 23.2 and 29.1%, respectively. In our study, we found much more 62.4 and 61.5%, respectively.

We found a significantly rising incidence of low birth weight babies among BMI more than or equal to 35mothers 83.3%. which is similar to Takai et al, 2017[15] results which may be due to dysregulation of pro-inflammatory cytokines as well as increased risk of infection in obese and overweight individuals as they will lead to reduced placental surface area and also their vasculature with consequent uteroplacental insufficiency[16]

In our study, we found more incidence of IUGR and NICU admissions in the BMI group more than or equal to 35, which is like Shah PM et al 2018 results [17].

VI. Conclusion

Through this study, it has been concluded that obese mothers have more risk of preterm LABOR and preeclampsia. Babies with high maternal BMI have high risk of Intra uterine growth retardation, preterm birth, low APGAR score at birth, low birth weight and high NICU admissions. Overall, patients have high risk of cesarean section. As obesity is modifiable and preventable, preconception counseling, weight loss before conception, diet and lifestyle modification before and during pregnancy, and creating awareness regarding associated health risks are highly required.

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