



## MATERNAL BODY MASS INDEX AND PREGNANCY OUTCOMES

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### ABSTRACT

**Objectives:** To evaluate the impact of the maternal body mass index on the pregnancy outcome.  
**Materials and Methods:** 100 women with singleton pregnancies during a 2-month period, were categorized into 5 groups based on their maternal Body Mass Index (BMI). The maternal and the neonatal outcome were noted in all the groups.  
**Results:** In the underweight group, the incidences of anaemia and postpartum hemorrhage were more, while the overweight and the obese women had a higher risk for PIH, gestational diabetes and postdatism. There was no significant increase in the perinatal mortality rate.  
**Conclusion:** The health of women, throughout their childbearing ages, should be addressed, to improve their obstetrical and perinatal outcomes. Also, the high-risk groups should be managed at tertiary centres.

## INTRODUCTION

During the last two decades, there has been an alarming rise in the incidence of obesity all over the world. India is now facing a double burden of this disease with under nutrition and underweight on one side, and a rapid upsurge in obesity and overweight, particularly in the urban settings on the other side. The National Family Health Surveys (NFHS) in India indicated an increase in the obesity from 10.6% in 1998–1999 to 14.8% in 2005–2006, while there was only a marginal decrease in the incidence of underweight from 36.2% (1998–1999) to 33.0% (2005–2006). Both lean and obese women carry a risk for adverse pregnancy outcomes. An increasing BMI is associated with an increased incidence of pre-eclampsia, gestational hypertension, macrosomia, induction of labour and operative deliveries. The BMI is a simple index of the weight-for-height and it is calculated by dividing a person's weight in kilograms by the square of their height in meters ( $\text{kg}/\text{m}^2$ ). Underweight (a BMI of  $< 19.9 \text{ kg}/\text{m}^2$ ) has been shown to be associated with an increased risk of preterm deliveries, low birth weight and anaemia and a decreased risk of pre-eclampsia, gestational diabetes and obstetric intervention. The aim of the study was to examine the association of the maternal Body Mass Index (BMI) and the obstetric and the perinatal outcomes in singleton pregnancies.

## MATERIALS AND METHODS

The present study was a prospective evaluation of 100 women with singleton pregnancies, which was carried out at B.J. Medical College and Hospital, Ahmedabad, Gujarat, India from July 2017- August 2017. The women with multiple pregnancies and pre-existing hypertension or diabetes or any other medical conditions were excluded from the study. The women were categorized into five groups according to their BMI as follows (based on the WHO and the National Institute of Health guidelines):

- Underweight (group I):** Less than or equal to BMI  $19.9 \text{ kg}/\text{m}^2$
- Normal (group II):** BMI  $20-24.9 \text{ kg}/\text{m}^2$
- Overweight (group III):** BMI  $25-29.9 \text{ kg}/\text{m}^2$
- Obese (group IV):** BMI  $30-34.9 \text{ kg}/\text{m}^2$
- Morbidly Obese (group V):** BMI greater than  $35 \text{ kg}/\text{m}^2$

The group with the BMI in the normal range ( $20-24.9 \text{ kg}/\text{m}^2$ ) was used as the reference or the comparison group for the analysis. The obstetrical outcomes which were included were gestational hypertension, pre-eclampsia, antepartum haemorrhage, preterm delivery, anaemia, intrauterine growth retardation, the mode of the delivery and any early postpartum morbidity (within 7 days of the delivery).

**Table 1. Distribution of women according to BMI**

Group	BMI	No. of women	Percentage
I Underweight	<19.9	10	10%
II Normal	20-24.9	32	32%
III Overweight	25-29.9	45	45%
IV Obese	30-34.9	11	11%
V Severely obese	>35	2	2%
Total		100	

**Table 2. Demographic characteristics of women in different BMI groups****Table 2A.**

BMI groups	I (n=10)	II (n=32)	III (n=45)	IV (n=11)	V (n=2)	Total(100)
AGE (yrs.)						
<18	0	1 (25%)	3 (75%)	0	0	4
18-30	8(10.2%)	30(38.4%)	31(39.7%)	7(8.9%)	2(2.5%)	78
>30	2(11.1%)	1 (5.5%)	11(61.1%)	4(22.2%)	0	18

**Table 2B.**

PARITY	I(n=10)	II (n=32)	III (n=45)	IV (n=11)	V (n=2)	Total (100)
Nulliparous	3(7.1%)	18(42.8%)	15(35.7%)	5(11.9%)	1(2.38%)	42
1-4	5(9.8%)	10(19.6%)	29(56.8%)	6(11.7%)	1(1.9%)	51
>4	2 (28.5%)	4 (57.1%)	1 (14.2%)	0	0	7

**Table 3. Complications during pregnancy**

BMI group	I (n=10)	II (n=32)	III (n=45)	IV (n=11)	V (n=2)	Total (100)
Haemorrhage		3 (60%)	2(40%)			5
PIH	1(3.5%)	5(17.8%)	18 (64.2%)	3(10.7%)	1(3.5%)	28
GDM		2 (14.2%)	7 (50%)	4(28.5%)	1(7.1%)	14
Anaemia	6(37.5%)	7(43.7%)	3(18.7%)			16
Postdate		9(36%)	12(48%)	4(16%)		25
PROM		2 (50%)	2(50%)			4
IUGR	3(37.5%)	4(50%)	1(12.5%)			8

**Table 4. Labor and early postpartum complications****Table 4A.**

BMI group	I (n=10)	II (n=32)	III (n=45)	IV (n=11)	V (n=2)	Total (100)
Spontaneous normal delivery	7(16.2%)	17(39.5%)	16(37.2%)	3(6.9%)	-	43
Caesarean section	3(6.8%)	12(27.2%)	20(45.4%)	7(15.9%)	2(4.5%)	44
Instrumental delivery	-	3(23.1)	9(69.2%)	1(7.6%)	-	13

**Table 4B.**

Postpartum haemorrhage	2 (50%)	-	2 (50%)	-	-	4
Postpartum wound sepsis	2 (33.3%)	1 (16.6%)	3 (50%)	-	-	6

**Table 5. Neonatal outcome**

BMI group	I (n=10)	II (n=32)	III (n=45)	IV (n=11)	V (n=2)	Total (100)
Preterm	3(23.1%)	5(38.4%)	3(23.1%)	2(15.3%)	-	13
AGA	4(8.1%)	15(30.6%)	24(48.9%)	5(10.2%)	1(2.04%)	49
SGA	-	5(35.7%)	8(57.1%)	1(7.1%)	-	14
LGA	-	1(14.2%)	2(28.5%)	3(42.8%)	1(14.2%)	7
NICU admission	-	1(25)	3(75%)	-	-	4
Mortality	3(23.1%)	5(38.4%)	5(38.4%)	-	-	13

The neonatal outcomes included: birth weight, admission to the neonatal intensive care unit and perinatal mortality.

## RESULTS

On the basis of the BMI, out of the 100 women, 10% were underweight and 32% belonged to the normal weight category,

while 45%, 11% and 2% women were from the overweight, obese and the morbidly obese categories respectively (Table 1). The distribution of the BMI across the selected demographic characteristics has been displayed in (Table 2). Overall, in my study, 75% patients in <18 years age group and 61% of those in >30 years age group were overweight. Maximum patients in nulliparous group had a normal BMI

while majority of patients in multiparous group were overweight. The antenatal complications according to the BMI, have been displayed in (Table 3). In the underweight group, anaemia and growth retardation were seen in 37.5% of underweight patients. The overweight women groups had a higher incidence of pregnancy induced hypertension (PIH) (64.2%), GDM (50%) and postdatism (48%). The mode of labour and the early post-partum complications as per the BMI groups, have been shown in (Table 4). The incidence of caesarean sections and instrumental deliveries was more in the group III. In this study, incidence of post-partum haemorrhage (PPH) was seen comparable in the underweight and overweight groups while that of wound sepsis was more in group III. In this study, the incidence of preterm births was comparable in groups I and III. The incidence of the Large for Gestational Age (LGA) babies was significantly more in group IV. Most of the babies in all the groups were appropriate for gestational age with good prognosis. There was no significant difference in the perinatal mortality rates in all the groups.

## DISCUSSION

The results of this study showed that underweight as well as overweight and obesity were associated with adverse maternal and perinatal outcomes. The women who were overweight, obese, or morbidly obese had significantly increased risks for gestational hypertension, postdatism, instrumental deliveries, caesarean sections mainly attributable to non-progress of labor and large for gestational age babies. In the present study, no increased risk of APH was seen in the overweight and the obese groups. The caesarean section rate was found to be increased with a higher maternal BMI, thus carrying an extra risk of a higher perioperative morbidity, which included an aesthetic problems, infections and prolonged hospitalization. We found an increased rate of wound sepsis in the overweight group in the present study. The neonatal ICU admission rate was more in the overweight group which was attributed mainly to the IUGR babies due to gestational hypertension. In the underweight group, a high incidence of anaemia was seen to affect almost 37.5% of the women.

## Conclusion

Both the extremes of the maternal BMI showed a strong association with the pregnancy complications and the perinatal outcomes. While obesity was associated with an increased incidence of pre-eclampsia, gestational hypertension, macrosomia and increased caesarean rates, the underweight women's group faced complications like postpartum haemorrhage and anaemia.

To conclude, the health of women throughout their child bearing years should be addressed, to improve the obstetrical and the perinatal outcomes.

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