Original Research Article

Maternal and perinatal outcome in pregnancy with high BMI

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ABSTRACT

Background: BMI, body mass index is an important predictor of nutritional status of pregnant woman which has been considered as an important prognostic indicator of pregnancy outcomes. High maternal body mass index is related to various adverse pregnancy outcomes. This study is designed to see the effect of maternal BMI on pregnancy outcome and perinatal outcome.

Methods: this is a prospective hospital based study conducted from January 2015 to June 2015 in department of Obstetrics and Gynecology, Sultania Zanana Hospital, Bhopal, India. 20 Antenatal women attending OPD in Sultania Zanana hospital randomly selected for the study in their first trimester in their first visit fulfilling inclusion criteria. Their consent for the study was obtained.

Results: It was observed that majority of morbidly obese (66.6%) and obese (47.6%) women were belonging to upper socioeconomic class. Obesity is associated with increased incidence of pre-eclampsia, gestational hypertension, gestational diabetes, induced delivery, Instrument/assisted deliveries, caesarean delivery, ICU admissions complicating maternal outcome and LGA, NICU admissions and perinatal mortality complicating perinatal outcome.

Conclusions: Maternal BMI shows strong associations with pregnancy complications and outcomes. Obesity is associated with increased incidence of pre-eclampsia, gestational hypertension, gestational diabetes, induced delivery, Instrument/assisted deliveries, caesarean delivery, ICU admissions complicating maternal outcome and LGA, NICU admissions and perinatal mortality complicating perinatal outcome.

Keywords: Abnormal uterine bleeding, Body mass index, Intensive care unit, Large for gestational age, Neonatal intensive care unit, Post-partum hemorrhage, Small for gestational age

INTRODUCTION

A healthy foetus from a healthy mother, was coined by Sir Juleus Huxley. The global safe motherhood initiative launched in 1987, is Designed to improve antenatal care and councelling throughout the world. Nutritional status of a women in her pregnancy is one of the main modifiable factors influencing pregnancy and perinatal outcome.[1]

BMI, body mass index is an important predictor of nutritional status of pregnant woman which has been considered as an important prognostic indicator of pregnancy outcomes. High maternal body mass index is related to adverse pregnancy outcomes such as preeclamsia, gestational hypertension, pre-and post-term delivery, induction of labour, macrosomia, caesarean section and post-partum haemorrage.

BMI, body mass index, or quetelet index is a value derived from the weight and height of an individual. The BMI is defined as the body mass divided by the square of the body height, and is universally expressed in units of kg/m², resulting from mass in kilogram and height in

metres. The BMI is an attempt to quantify the nutritional status of an individual, and then categorize that person as underweight, normal weight, overweight, or obese based on that value.[2]

During the last two decades, there has been an alarming rise in the incidence of obesity all over the world. 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).[3]

METHODS

The present study titled is a prospective hospital based study conducted from January 2015 to June 2015 in Department of Obstetrics and Gynecology, Sultaniazanana Hospital Bhopal, India. Antenatal women in their first trimester in their first visit to OPD insultaniazanana hospital. 205 antenatal women attending OPD in sultaniazanana hospital were taken into the study. Data collected using pre- designed Proforma.

Exclusion criteria

- Antenatal women in their first visit in their first trimester of pregnancy.
- singleton pregnancy

Antenatal women attending OPD in Sultania Zanana Hospital, 205 randomly selected for the study in their first trimester in their first visit fulfilling inclusion criteria. Their consent for the study is obtained. Then they are allocated for the study. BMI, body mass index of these antenatal women calculated using formula[3]

$BMI = weight\ kg / height\ m^2$

The women were categorized into five groups according to their BMI as follows (on the basis of the WHO and the National Institute of Health guidelines):[4-5]

- Normal (group II): BMI 18.50-24.9 kg/m^2
- Overweight (group III): BMI 25-29.9 kg/m^2
- Obese (group IV): BMI 30-34.9 kg/m^2
- Morbidly Obese (group V): BMI greater than 35 $kg/m^{2.}$
- The group with normal BMI (18.50 - 24.9 kg/m^2) was used as reference group for the analysis.

Follow up

Women were followed in their subsequent visits in relation to any complication developed during pregnancy and and perinatal outcome. Women were given green strip cards to be brought in further visits for their identification.

RESULTS

Table 1 shows comparison between socio economic status and BMI. It is seen that amongst 3 morbid obese patients, 2 belong to upper class I (66.6%) Among obese 47.6% belonged to upper class.

As observed in above table highest percentage of pre-eclampsia (66.67%) was seen in women in category of morbidly obese (V) BMI and was found to statistically significant (p=0.001). It is also seen that BMI and pre-eclampsia shows linear trend. As BMI decreases the percentage of pre-eclampsia also decreases as evident from Table 2.

Table 1: Comparison of socio-economic status and BMI.

			Normal (n=121)	Over weight (n=60)	Obese (n=21)	Morbid obese (n=03)
Socio- economic status	Upper class I	Number	16	07	10	02
		%	13.2	11.6	47.6	66.6
	Upper middle class II	Number	59	18	08	01
		%	48.7	30.0	38.0	33.3
	Lower middle class III	Number	39	31	02	00
		%	32.2	51.6	9.5	0
	Upper lower class IV	Number	07	04	01	0
		%	5.8	6.6	4.7	0
	Lower class V	Number	0	0	0	0
		%	0	0	0	0

When BMI was compared with gestational hypertension it is found that as BMI increases, the percentage of gestational hypertension also increases. Amongst 21

obese women, 7 presented with gestational hypertension (33.33%) and is found to be statistically highly significant.

Table 2: Comparison between BMI and pregnancy outcome.

Characteristics	II Normal (n=121)	III Over weight (n=60)	IV Obese (n=21)	V Morbidly obese (n=3)	P value
Pre-eclampsia	07 (5.7)	07 (11.66)	04 (19.04)	02 (66.67)	0.001
Gestational hypertension	16 (13.22)	16 (26.67)	07 (33.33)	01(33.33)	<0.001
Abruptio placentae	02 (1.65)	01 (1.66)	01 (4.76)	01 (33.33)	0.091 *
Placenta previa	00 (0)	01 (1.66)	00 (0)	0 (0)	0.336 *
Anemia	20 (16.52)	10 (16.66)	02 (09.52)	0 (0)	0.001
IUGR	04 (3.30)	02 (3.30)	01 (4.76)	0 (0)	0.003
Gestational diabetes	01 (0.82)	01 (1.66)	02 (9.52)	01 (33.33)	<0.001*
Preterm labour	07 (5.78)	05 (8.33)	02 (9.52)	01 (33.33)	0.264
Abortion	02 (1.65)	01 (1.67)	03 (14.28)	01 (33.33)	<0.001*
Need for induction of labour	08 (6.61)	05 (8.33)	07 (34.33)	02 (66.67)	<0.001

Figures in parenthesis indicates percentage

Maternal outcomes like Abruptio placentae and placenta previa does not show any statistical significance with BMI. Although in morbidly obese patients the prevalence of abruptio placentae was seen in 33.3%.

Percentage of Gestational Diabetes, preterm labour and Abortion is mostly seen amongst obese and morbidly obese patients and is found to be highly statistically significant with p <0.001.

Table 3: Comparison between BMI and mode of delivery.

Mode of delivery	II Normal (n=121)	III Over weight (n= 60)	IV Obese (n= 21)	V Morbidly obese (n= 3)
Vaginal	72 (59.50)	29 (48.33)	10 (48.61)	01 (33.33)
LSCS (Total)	31 (25.61)	16 (26.67)	07 (33.33)	02 (66.67)
Instrumental/assisted	18 (14.87)	15 (25.00)	04 (19.04)	00 (0)

Table 4: Comparison between BMI and pregnancy outcome (post-partum).

Pregnancy outcome (early post-partum)	II Normal (n=121)	III Over weight (n= 60)	IV Obese (n= 21)	V Morbidly obese (n= 3)	P value
PPH	07 (5.78)	03 (5.00)	03 (14.28)	01 (33.33)	0.068
Infections	07 (5.78)	05 (8.33)	03 (14.28)	00 (0)	0.101
ICU admission	05 (4.13)	04 (6.67)	05 (23.80)	01 (33.33)	<0.001

Table 5: Comparison of BMI and perinatal outcome.

Perinatal outcome	II Normal (n=121)	III Over weight (n= 60)	IV Obese (n=21)	V Morbidly obese (n=3)	P value
SGA	04 (3.30)	02 (3.33)	01 (4.76)	0 (0)	<0.001
LGA	02 (1.65)	04 (6.66)	04 (19.04)	01 (33.33)	<0.001*
Preterm	07 (5.78)	05 (8.33)	03 (14.28)	0 (0)	0.264
NICU admission	05 (4.13)	04 (6.66)	02 (09.52)	01 (33.33)	0.026
Perinatal Mortality	01 (0.82)	01 (1.67)	01 (4.76)	01 (33.33)	0.024*

As observed in Table 3 which shows different modes of delivery and their comparison between different BMI

categories, it is seen that Out of total LSCS (either emergency or elective) highest percentage was seen in

morbidly obese patients (66.67%). Comparison of LSCS and BMI shows linear trend of increasing. Table 4 explains comparison of BMI and pregnancy outcome (post-partum) amongst patients. As observed PPH (post-partum hemorrhage) is mostly seen amongst obese (14.28%) and morbidly obese category (33.33%). While infections (either LSCS wound/episiotomy or other) is also common in obese category (14.28%). LGA was found in Morbidly obese category (33.33%), followed by 19.04 % in obese, 6.66% in overweight. LGA shows linear decreasing trend with BMI and is highly significant (p<0.001). As BMI decreases, percentage of LGA babies decreases. Perinatal outcome in terms of NICU admission and perinatal mortality was also significantly higher in high BMI group.

DISCUSSION

Comparison of pregnancy outcomes in different studies

Preeclamsia

In present study pre-eclampsia, as maternal outcome was majorly seen in obese (19.04%) and morbidly obese (66.67%) with p value of 0.001. In another study carried out by Dasgupta et al showed 55.5% of pre-eclampsia in morbidly obese.[4] Also a study by Bhattacharya S et al it was found to be 28.2% with p value <0.05.[5] In obese the percentage in present study was 17.07 % compare with 14.7 % and 12.2 % (Bhattacharya S et al and Yazdani S et al respectively).[5,6] In present study as well as other studies above, preeclampsia was found to be statistically significant with women with raised body mass index.

Gestational hypertension

Present study shows increase in percentage of gestational hypertension with increase in BMI (p value 0.001) Maximum was seen in 33.33 % in obese and morbidly obese compared with study by Dasgupta, et al (71.4%).[4] Other studies by Bhattacharya S et al and Verma A et al the percentage was 42.2 and 30.7 respectively with p value <0.05 and 0.01.[5,7] Gestational hypertension in underweight in present study was found to 11.8% while in study by Bhattacharya S et al it was 13.6% and least 1.8% in study by Demont-Heinrich C et al.[8]

Need for induction of labour

In present study Induced labour as maternal outcome was mostly seen in Morbidly obese category (66.6%) with p value <0.001 which is highly significant. When we compare present study with other studies, the percentage of induced labour in almost every study in morbidly obese was high with p value statistically significant. Dasgupta et al found 64.2% induced labour in morbidly obese, while Yazdani S et al, Bhattacharya S et al, Demont-Heinrich C showed 50%, 49% and 41.4% respectively.[4,5,8]

Gestational diabetes

Gestational Diabetes in present study was seen in obese (9.52%) & morbidly obese with 33.3% and found to be statistically significant (p<0.001). Similar studies showed the percentage of 23 (p<0.001) and 7.5 (p<0.05) by Verma A et al and Demont-Heinrich C et al. In underweight no prevalence of gestational diabetes was seen. While studies carried by Demont-Heinrich C et al and Pakniat H et al showed 1.4% and 1.1%.[9]

Preterm labour

Present study shows no significance of Preterm labour and BMI with maximum percentage is seen in morbidly obese group (14.28%) followed by obese (9.52%). Other studies by Bhattacharya S et al, Kalk P et al and Demont-Heinrich C et al shows statistical significance.[5,8,10]

Abortions

Abortions in present study is majorly seen in obese (14.28%) and morbidly obese group with 33.3% (p<0.001) while in another study by Dasgupta A et al shows no women in morbidly obese group with abortion.[4]

Caesarian section

In present study, women underwent LSCS were more in morbidly obese 66.6% followed by obese in 33.3%. Study by Bhattacharya S et al it is seen in 42.7% and 30.8% in morbidly obese and obese.[5] Other studies by Yazdani S et al, Verma A et al, Demont-Heinrich C et al and Dasgupta A et al in morbidly obese who underwent LSCS were 7.6%, 69.2%, 51.4% and 68.7% respectively.

Thus, most of studies showed relationship between raised BMI and LSCS. Also, instrumental/assisted delivery in present study was most seen in morbidly obese (28.57%), while in study by Bhattacharya S et al it is seen in 24.2%. Other studies by Verma A et al showed no women required assisted/instrumental delivery in morbidly obese BMI group, while in a study by Dasgupta A et al it was seen in 37.5%.

Post-partum haemorhage

In early post-partum period, PPH in present study were seen in morbidly obese (33.3%). A similar study by Verma A et al showed no women with PPH in morbidly obese group. A study by Dasgupta A et al showed 31.6% PPH in morbidly obese group.[4]

A study by Yazdani S et al showed no infection in underweight group while in morbidly obese it was found to be 4% compared to 14.28 in present study, while study by Verma A et al showed infection in underweight as 14.2% and 22.2% in morbidly obese. In a study by Dasgupta A et al the prevalence of infection in morbidly obese was seen in 15.8%.

Perinatal outcome in different studies

LGA

Large for gestational age (LGA) in present study was seen predominantly in obese (19.04%) and morbidly obese (28.57%) with p value<0.001 and was statistically significant. Similar studies carried out by Verma A et al and Demont-Heinrich C et al showed that LGA in morbidly obese BMI was seen in 23% and 14% respectively with statistical significance.[7,8] Present study shows no LGA as perinatal outcome in underweight while another study by Kalket P et al showed 7.8% LGA in underweight BMI category.[10]

CONCLUSION

Obesity and is a leading, preventable cause of mortality worldwide and it is one of the most serious public health problems of the 21st century. Maternal BMI shows strong associations with pregnancy complications and outcomes. Obesity is associated with increased incidence of pre-eclampsia, gestational hypertension, gestational diabetes, induced delivery, Instrument/assisted deliveries, caesarean delivery, ICU admissions complicating maternal outcome and LGA, NICU admissions and perinatal mortality complicating perinatal outcome. Therefore, we advise pregnant woman to gain a normal BMI before and during pregnancy, with advice of their dietitian and doctor prior to getting pregnant. Thus, the health of women throughout their child bearing years should be addressed, to improve the pregnancy and the perinatal outcomes. Therefore, education programs, health services and nutrition consultation are recommended for women in reproductive age.

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