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A Prospective observational study co-relating maternal body mass index and perinatal outcomes: Aftermath on future

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Abstract
Introduction: Nutritional status of pregnant women is one of the main modifiable factors affecting pregnancy and perinatal outcome. 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 caesarean deliveries.
Methodology: It is a prospective observational study conducted in Dept. of Obstetrics and Gynaecology in a tertiary care centre extending from March 2017 to August 2017
(6 months). A total number of 300 cases who attended antenatal checkup outpatient Department were taken. All the cases were primigravida and booked patient in first trimester. Maternal and perinatal variables were also studied.
Results: Majority of patients in our study belonged to age group of 18 to 25 years.
In present study, 2% cases had their socioeconomic status I and 7% II, 38%, 31% and 22% patients had their socioeconomic status III, IV and V respectively. In the present study, among the antepartum complications, the risk of GDM increased significantly with the increase in BMI ($p=0.02$). In our study the risk of PIH increased significantly with the increase in BMI ($p=0.001$). The mean birth weight of babies in this study increased significantly with increase in BMI ($p<0.05$). The risk of macrosomia increased significantly with the increase in BMI ($p=0.04$) in the present study.
Conclusion: Attempt should be made to prevent obesity in women of childbearing age and encourage weight loss to attain ideal weight before pregnancy with appropriate preconceptional counselling and dietary modification.

Keywords: Body mass index, maternal outcome, perinatal outcome, PPH, Macrosomia, IUGR, LSCS, vaginal delivery

Introduction

According to Sir Huxley *"A healthy foetus from a healthy mother*". The global safe motherhood initiative (1987), aims to improve antenatal care all over the world. 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 cm. BMI is used to categorize that person as underweight, normal weight, overweight, or obese. The National Family Health Surveys (NFHS) in India indicated only a marginal decrease in the incidence of underweight from 36.2% (1998-1999) to 33.0% (2005-2006) [1, 4].

. Nutritional status of pregnant women is one of the main modifiable factors affecting pregnancy and perinatal outcome. 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 caesarean deliveries [3, 10]. Pre-pregnancy obesity is considered as a significant predictor for neonatal and maternal morbidity and mortality. Underweight (a BMI of < 19.9 kg / m2) 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, obstetric intervention and post-partum haemorrhage [10, 11]. Several studies have indicated conflicting associations between body mass index (BMI) and pregnancy outcomes. The present study has been designed to evaluate the maternal and perinatal outcome in patients in different BMI categories.

Methodology

It is a prospective observational study conducted in Dept. of Obstetrics and Gynaecology in a tertiary care centre extending from March 2017 to August 2017
(6 months).

- **Inclusion criteria**
  - Singleton pregnancy
  - Primigravidas

- **Exclusion criteria**
  - Patients not giving consent.
  - Multifocal gestation
  - Patient with known Medical Disorders.

- Informed & written consent was taken from all the patients who had participated in the study. A total number of 300 cases who attended antenatal check-up outpatient Department were taken. All the cases were primigravida and booked patient in first trimester. Maternal and perinatal variables were also noted.

- **Maternal outcome variable**
  - Pregnancy induced hypertension
  - Mode of Delivery
  - Preterm delivery
  - Gestational diabetes mellitus

- **Perinatal Outcome variable**
  - Low Birth Weight
  - NICU admission
  - Macrosomia

Patients were categorized according to first trimester BMI.
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):

- **Normal:** BMI 18.50-24.9 kg/m2
- **Overweight:** BMI 25-29.9 kg/m2
- **Obese:** BMI 30-34.9 kg/m2
- **Morbidly Obese:** BMI greater than 35 kg/m2.

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Results

Statistical analysis

Results were expressed in numbers, percentage and mean ± standard deviation. All results were analyzed statistically with the help of SPSS Computer software system. The difference was considered significant at p value<= 0.05.

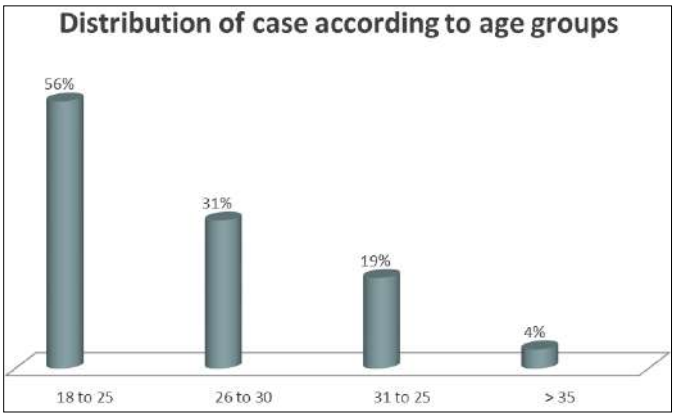

Fig 1: Distribution of cases according to age groups.

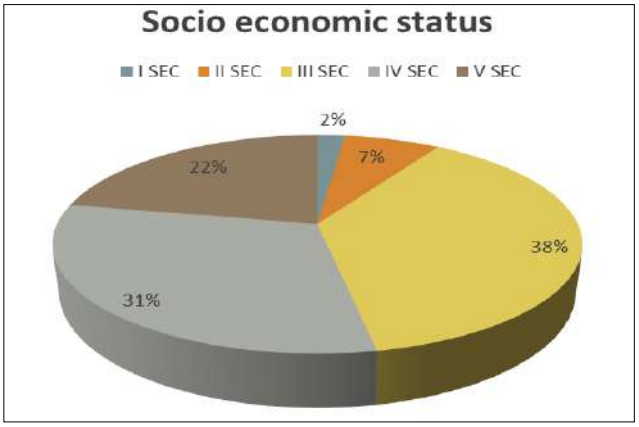

Fig 2: Distribution of cases with relation to modified BJ Prasad Classification of socio economic status.

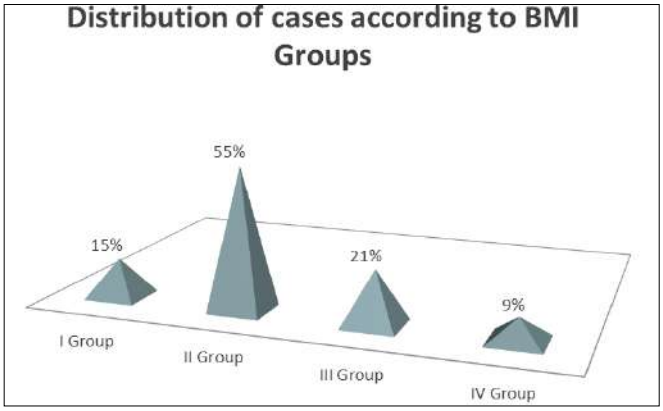

Fig 3: Distribution of cases with respect to different BMI groups.

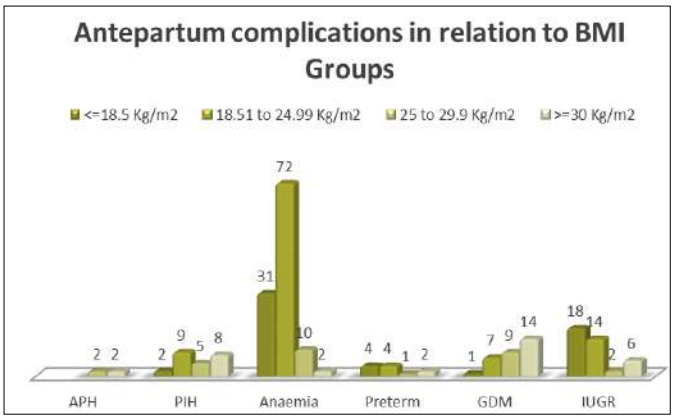

Fig 4: Distribution of cases with respect to different age groups.

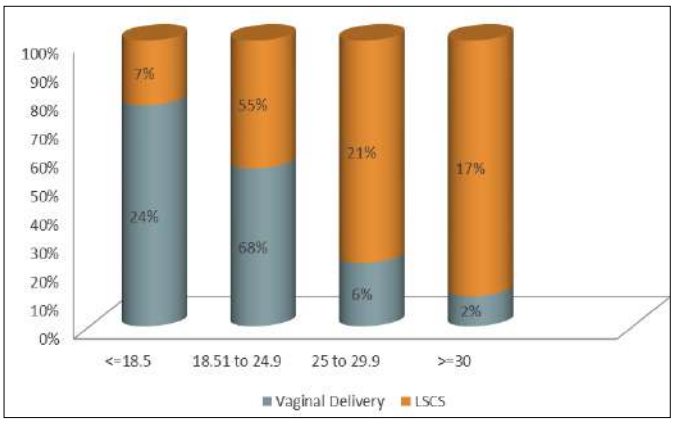

Fig 5: Distribution of cases according to mode of delivery in BMI Groups.

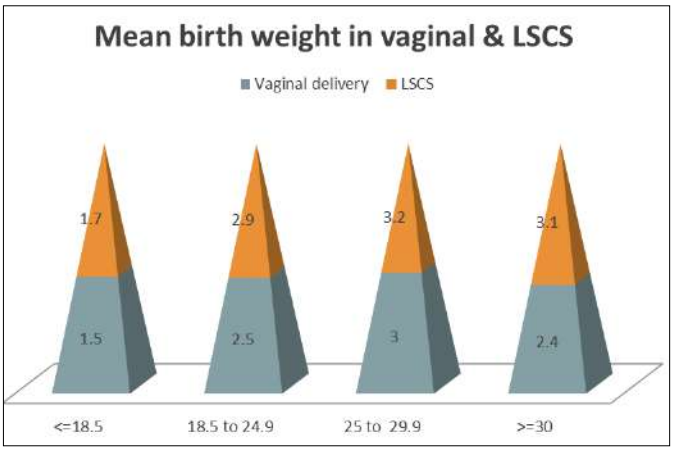

Fig 6: Comparison of mean birth weight (kg) in vaginal delivery & LSCS.

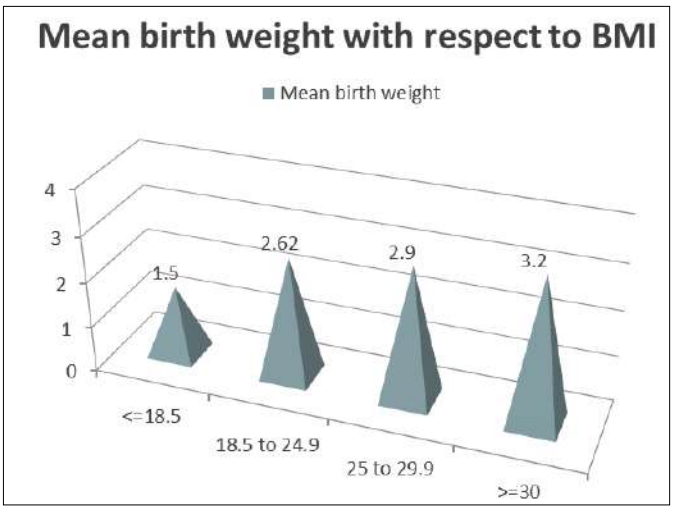

Fig 7: Correlation between mean baby birth weight (kg) and maternal BMI.

Table 8: Distribution of cases according to fetal outcome in relation to BMI (kg/m2).

	<=18.5 kg/m2	18.5 to 24.9 kg/m2	25 to 29.9 kg/m2	>=30 kg/m2
Fetal distress	5	16	12	4
Macrosomia	0	6	5	7
HIE	2	5	2	1
NICU Admission	10	13	9	8

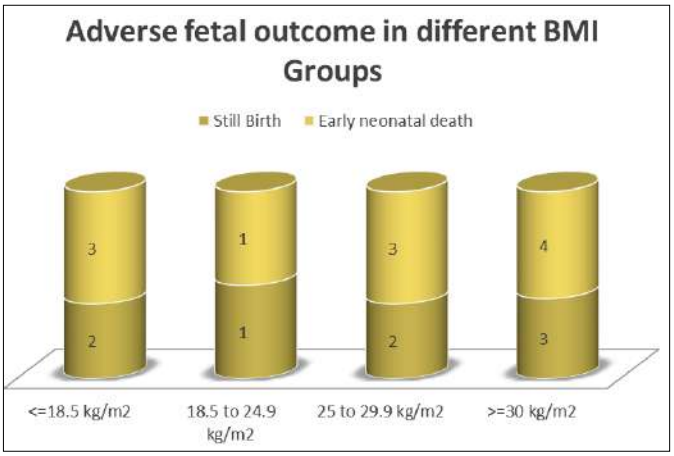

Fig 9: Distribution of cases according to fetal outcome (at birth and within 28 days) in relation to BMI (kg/m2).

Discussion

The present study evaluated the impact of maternal BMI on maternal and perinatal outcomes among 300 women divided in four categories according to their BMI. Category I included women with BMI<=18.5 Kg/m2, Category II included normal women (BMI 20-24.9 kg/m2), Category III included overweight women (BMI 25-29.9 kg/m2) and Category IV included obese women (BMI >30 kg/m2) [2, 3]. Under anthropometric parameters, the differences in mean age, mean weight, mean height and mean BMI among the three categories women were statistically significant (p=0.05). Majority of patients in our study belonged to age group of 18 to 25 years.

In present study, 2% cases had their socioeconomic status I and 7% II, 38%, 31% and 22% patients had their socioeconomic status III, IV and V respectively. Similar results were observed by Srivastava *et al.* [9] where they found 0%, 2%, 30%, 36% and 32% patients in socioeconomic status I, II, III, IV and V respectively.

In the present study, among the antepartum complications, the risk of GDM increased significantly with the increase in BMI (p=0.02). Sahu *et al.* [7]. Bhushan *et al.* [5] and Hincz *et al.* [8]. also found that obese women had a significant risk for GDM (p=0.0004 and p<0.001 respectively). Therefore, weight loss prior to pregnancy may be important in preventing the development of gestational diabetes and avoiding the additional burden of diabetes and obesity.

In our study the risk of PIH increased significantly with the increase in BMI (p=0.001). Sahu *et al.* [7], Hincz *et al.* [8] and Bhattacharya *et al.* [12] also found that obese women had a significant risk for PIH (p=0.004, p <0.05, p<0.001 respectively). In the present study, the risk of cesarean sections increased significantly with increase in BMI (p=0.002). Sahu *et al.* and Hincz *et al.* also reported a significantly higher risk for caesarean delivery in these women (p=0.01). Similarly, Sahu *et al.*. found a significant risk of cesarean deliveries in obese women.

The risk of PPH in the present study did not increase significantly with the increase in BMI (p=0.7). Sahu *et al.* [7], Bhushan *et al.* [5] also did not find a statistically significant difference in the occurrence of PPH in obese, overweight and normal BMI women (p>0.05). However, Bhattacharya *et al.*[12] in their study found that obese women were more likely to have PPH (OR 1.5; CI 1.3-1.7). This difference might be attributed to higher number of women in their study.

The mean birth weight of babies in this study increased significantly with increase in BMI (p<0.05). Hincz *et al.* [8], Bhushan *et al.* [5] and Mazumder *et al.* [13] also supported the same (p<0.05). Moreover, in the present study the incidence of low birth babies decreased significantly with increase in BMI (p<0.05). Sahu *et al.* found the incidence of LBW babies (<2 kgs) to be 19.11% in obese, 14.10% in overweight and 6.82% in the normal BMI group (p<0.05). Bhushan *et al.* [5] and Choudhary *et al.* [6] also supported the same finding.

The risk of macro somia increased significantly with the increase in BMI (p=0.04) in the present study. It is supported by Sahu *et al.*, Hincz *et al.* Bhushan *et al.* & Choudhary *et al.*

Conclusion

A general awareness regarding weight control, eating habits, harms of sedentary life and lifestyle modification is required as there are increasing trends of being overweight and obese both in developing as well as developed nations. Increased maternal BMI is associated with increased risk of adverse maternal and perinatal outcomes like preeclampsia, GDM, fetal macrosomia,

IUGR, low birth weight, still birth and preterm deliveries respectively.

Attempt should be made to prevent obesity in women of childbearing age and encourage weight loss to attain ideal weight before pregnancy with appropriate preconceptional counselling and dietary modification.

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