

Obesity or Underweight—What is Worse in Pregnancy?

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About the Author



Dr. Sumi Agrawal is currently working as an assistant professor at Pt. J.N.M Medical College, Raipur, Chhattisgarh. She did her MBBS and MD from the same medical college. She has expertise in all types of obstetric and gynecological surgeries. She is also a lifetime member of Indian Menopause Society and FOGSI. Her field of interests includes high-risk pregnancies and infertility. She is also actively involved in organizing and managing academic activities in her department.

Abstract

Objective This study was conducted to compare underweight and obese women and their weight gain during pregnancy on fetomaternal outcome.

Method This is a prospective, non-interventional, observational study on 1000 women (BMI between 20 and 30 were excluded). Women attending ANC OPD with singleton pregnancy at or before 16 weeks were included and BMI calculated in early pregnancy. Their weight gain during pregnancy was noted. Any complications in the mother or perinate were noted.

Results Incidence of obesity in our institute was 17 % and that of underweight was 18 %. Pre-eclampsia, gestational hypertensions, gestational DM, antepartum hemorrhage, all were more common among obese women, while anemia was more common in the underweight. Post-dated pregnancy, induction of labor, cesarean delivery, and postpartum complications were more common in obese women. Fetal complications were also higher in obese patients.

Conclusion Lower as well as higher prepregnancy BMI is an independent risk factor that is associated with increased morbidity and mortality in both the mother and the fetus.

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Introduction

Obesity is attaining the status of global epidemic worldwide. Overall, in 2014, about 13 % of the world's adult populations (11 % of men and 15 % of women) were obese. In 2014, more than 1.9 billion adults, 18 years and above, were overweight. Of these, over 600 million were obese [1]. According to National Family Health Survey (NFHS) [2], the percentage of married women (15–49 years) who are overweight or obese increased from 11 % (NFHS 2) to 15 % (NFHS 3). Undernutrition is more prevalent in rural areas, whereas obesity is three times higher in urban area.

India is unique as it suffers from a dual burden of obesity and malnutrition. More than one-third (36 %) women have BMI lower than 18.5. In India, a higher number of malnourished women reside in Chhattisgarh, Bihar, and Jharkhand, whereas most of the obese women are from Punjab, Delhi, and Kerala [3].

Obesity during pregnancy carries a higher risk (1.32 times) of morbidity and mortality for both mother and the fetus. On the other hand, underweight is associated with IUGR & anemia. Weight gain during pregnancy has a recommended range throughout 40 weeks of pregnancy. If the weight gain is more or less than the proposed, it is associated with an adverse outcome for both the mother and the baby [4].

Material and Method

This was a prospective, non-interventional, observational study on 1000 pregnant underweight women with BMI less than 19.9 and obese women with BMI more than 30.

Inclusion criteria: Singleton pregnancy at/before 16 weeks of gestational age (before any significant impact of weight gain).

Exclusion criteria:

- Women with BMI 20–29.9,
- Multiple pregnancies,
- Major structural anomaly and
- Medical complications such as diabetes and hypertension.

BMI was calculated and women were categorized into 5 groups:

- Group A, Underweight <19.9 kg/m²;
- Group B, Normal = 20–24.9 kg/m² (excluded);
- Group C, Overweight = 25–29.9 kg/m² (excluded);
- Group D, Obese = 30–34.9 kg/m²;
- Group E, Morbidly obese > 35 kg/m² (no woman was in this group).

In both groups, weight gain was noted according to Institute of Medicine (IOM) [5] criteria on regular basis till delivery, along with the complications and outcome. The outcomes of labor and delivery were compared between both groups. Descriptive statistics were calculated for all study variables. Continuous variables were presented as the mean and standard deviation, while categorical data were calculated as percentage. Bivariate analysis was done to examine the association between prepregnancy BMI and fetomaternal outcomes. A value of $P < 0.05$ was considered statistically significant. All statistical analyses were performed using SPSS for windows version 20.

Results

A total of 2700 women were enrolled in this study from 2011 to 2014. After applying inclusion and exclusion criteria, 1000 women were included in the study sample. Among these 1000 women, 486 were obese and 514 were underweight. There was not a single woman in the morbidly obese group.

Women who were obese before pregnancy had a mean age of 27.00 as compared to lean women with mean age of 24.25. Lean women were mostly from rural area.

Significant number of the women had recommended weight gain in both groups. In the obese group, 55.9 % women had induced labor and 57.8 % delivered by cesarean section (Table 1).

Obese women suffered more complications such as gestational diabetes, gestational hypertension, pre-eclampsia, macrosomia, antepartum hemorrhage, etc. Birth weight and proportion of babies weighing over 4 kg increased in the obese group (Table 2).

Table 1 Comparison of weight gain and mode of delivery in both groups

	Obese <i>N</i> = 486 (%)	Underweight <i>N</i> = 514 (%)	<i>P</i> value
Weight gain			
Below normal	62 (12.7)	160 (31.1)	0.00001
Normal	281 (57.8)	217 (42.2)	0.00001
Above normal	143 (29.4)	137 (26.6)	0.327
Mode of delivery			
Vaginal	205 (42.1)	405 (78.79)	0.00001
LSCS	281 (57.8)	109 (21.2)	0.00001
Labor process			
Spontaneous	214 (44.03)	456 (88.7)	0.00001
Induced	272 (55.9)	58 (11.2)	0.00001

Table 2 Comparison of maternal complications in both groups

	Obese N = 486	Underweight N = 514	P value
Maternal complication			
GDM	23	0	0.00001
Macrosomia	36	0	0.00001
PRE-Eclampsia	177	94	0.00001
GHTN	129	96	0.002
IUGR	46	43	0.541
Anemia	46	77	0.008
APH	54	38	0.042
Fetal weight			
<2 KG	46 (9.4 %)	43 (8.3 %)	0.541
2–3 KG	151 (31.06 %)	351 (68.28 %)	0.00001
3–4 KG	243 (50 %)	120 (23.3 %)	0.00001
>4 KG	46 (9.4 %)	0	0.00001
Fetal complications			
Still birth	23	9	0.007
Early neonatal death	12	9	0.0429

An interesting observation was that a higher total weight gain in pregnancy led to more antenatal complications (Table 3).

Preterm as well as post-term delivery are more common in the obese women (Table 4).

Anemia was more prevalent in lean women, whereas postpartum complications such as PPH and infections were frequently seen in obese women.

Discussion

Pregnancy is a valuable event in the life of a woman. During pregnancy, a woman often visits the antenatal clinics. Small and simple parameter like weight gain over the past visit is often ignored by the busy obstetricians. Ideal weight gain is an important factor for a good fetomaternal outcome. Obesity is emerging as an epidemic worldwide. We were surprised to see the incidence of

Table 4 Comparison of time of delivery between the two groups

	Obese N = 486 (%)	Underweight N = 514 (%)	P value
Preterm	88 (18.1)	67 (13)	0.0264
Term	259 (53.3)	341 (66.3)	0.00001
Post-term	139 (28.6)	106 (20.6)	0.0033

obesity in the antenatal woman as 17 %, not too far behind from that of the U.S, where it is 20 % in some antenatal clinics [6]. Incidence of underweight was 18 %, almost similar to that of obesity.

Although pregnancy complications in obese women are well documented, the evidence in relation to problems of underweight is less clear [7]. In this study, we have compared both the extremes of BMI with fetomaternal outcome.

In 2009, IOM put forth new guidelines regarding the gestational weight gain in relation to BMI [5]. The pregnancy and gestational weight gain, whether excessive or inadequate, are associated with a poor fetomaternal outcome.

The women in our study were mostly 25 years old in the underweight group and 27 years old in the obese group. They usually had unplanned pregnancy and low awareness about nutrition and its impact on pregnancy.

Evidence across different obstetric populations is consistent that increased prepregnancy BMI associates with increased obstetric interventions such as labor induction and surgical interventions [8, 9]. In support of these reports, Table 1 results showed that intranatal problems such as induction and cesarean section were more likely in the obese group. Increase in the risk of cesarean section rate after induction was independent of obstetric complications and confounding factors. One hypothesis for increased risk of cesarean section after induction includes altered uterine contractility combined with dysfunctional labor. Furthermore, priming the myometrium for transitioning from quiescence to contractility may be altered with increased BMI and adipose tissue mass [10].

Table 3 Effect of maternal weight gain on maternal complications

	Below normal N = 62	Normal N = 281	Above normal N = 143	P value
GDM	3 (0.61)	8 (1.6)	12 (2.4)	P_1 0.418, P_2 0.0107
Macrosomia	0	12 (4.3)	24 (4.9)	P_1 0.09, P_2 0.00001
Pre-Eclampsia	43 (8.8)	57 (11.7)	77 (15.8)	P_1 0.00001, P_2 0.00001
GHTN	34 (6.9)	52 (10.7)	43 (8.85)	P_1 0.00001, P_2 0.00694
IUGR	14 (2.9)	17 (3.5)	15 (3.1)	P_1 0.00001, P_2 0.101
APH	17 (3.5)	23 (4.7)	14 (2.9)	P^1 0.00001, P_2 0.582

P_1 comparison between weight gain below the normal recommended range and within the recommended range

P_2 comparison between weight gain above the normal recommended range and within the recommended range

After adjusting for all confounding factors, we found positive association of BMI with GDM, pre-eclampsia, GHTN, and APH (Table 2). Nan Li et al. [11] and other previous studies concluded that obesity is associated with adverse pregnancy outcomes such as GDM and pregnancy-induced hypertension.

Consistent with the previous results, we found significantly high incidence of still birth with high BMI. Single most common modifiable factor for still birth in developed world is maternal obesity [12]. According to Auckland prospective stillbirth study [13], obesity is an independent risk factor.

We found a significant correlation of obese women with fetal weight. The same has been shown in other study. Maternal obesity is a strong predictor of fetal birth weight or large for gestational age [14–17]. Recently, Modi et al. [18] have shown that increasing maternal BMI is associated with the increasing abdominal and intrahepatocellular lipid content in neonatal offspring. It was observed that with the increase in abdominal circumference, neonatal morbidity increased.

We found positive association between gestational weight gain and GDM, Macrosomia, GHTN, and Pre-eclampsia (Table 3). This association was consistent with the previous results [11].

Table 4 showed that incidences of preterm and post-term delivery both are high in the obese group. However, data supporting the preterm delivery in obesity are less conclusive [19–21]. A recent meta-analysis provided evidence that the association between preterm birth and obesity may vary depending upon the subtype of preterm births [22]. Obesity and excess weight gain are associated with preterm birth, macrosomia, and stillbirth, while underweight BMI and low weight gain have been associated with small for gestation or IUGR and preterm births.

Among studies related to risk factors for PPH, BMI is rarely considered as a risk factor for PPH. In these studies, results are inconsistent with the one showing no association of BMI with PPH [23], but others showing positive association [24].

There is a direct impact of high or low BMI on hospital admission and short-term costs to the health services.

Conclusion

In our study, we observed that both groups correlated well with various adverse fetomaternal outcomes. Apart from deleterious impact on pregnancy, obesity may also affect clinical decision for the management of labor and delivery, which ultimately may have repercussion on health care cost and maternity services. Thus, not only the antenatal period, but the intranatal as well as the postnatal period may be adversely affected in relation to BMI.

There is a lack of studies on underweight pregnant women. Our study shows its association with anemia only. Given a choice, obesity is more commonly associated with worse fetomaternal outcome. Weight is a very simple parameter which can be easily measured. So weight gain during pregnancy is an important clinical parameter to be followed. Identifying an obese or an underweight pregnant woman allows a proper planning throughout the antenatal period for any risk management. So referral to a dietician for dietary assessment and counseling should be considered for both lean and obese women.

Compliance with Ethical Requirements and Conflict of Interests Abha Singh and Sumi Agrawal declares that they have no conflict of interest. As this was prospective observational study, not an interventional or case control study, informed consent with human subjects for being included in the study was not necessary, however all procedures followed were in accordance with ethical standard of the responsible committee on human experiments (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008(5).

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