International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622

www.gynaecologyjournal.com
2021; 5(6): 126-131
Received: 18-09-2021
Accepted: 22-10-2021

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Body weight's impact on pregnancy's results

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DOI: https://doi.org/10.33545/gynae.2021.v5.i6b.1259

Abstract
Background and Objective: The goal of this research is to better understand the link between maternal obesity and risk for problems during pregnancy. To learn how prenatal body mass index correlates with labor outcomes. The goal of this study is to examine how prenatal BMI affects the health of the newborn.
Method: This prospective observational study was performed by Department of OBG, Surabhi Institute of Medical Sciences, Siddipet, Telangana, India, between January 2021 to October 2021 on a total of 200 pregnant women with singleton, healthy pregnancies who were booked at PSG Hospital within the first 12 weeks of pregnancy.
Result: In this study, participants' ages ranged from 18 to 40. The study's participants had an average age of 25. In the sample population, there were 46.2% multiparas and 53.8% nulliparas. Nine percent of the participants were preterm, whereas ninety-two percent were full-term patients. One-seventh of the subjects gained 0–7 kg in weight. 53 percent of the pregnant participants in the research acquired 8 to 13 kg or more in weight. More than 25% of the women put on more than 13 kg.
Conclusion: The negative effects of obesity during pregnancy may be measured thanks to this research. This study's significance lies in the fact that it is among the few to examine the possibility of a variety of pregnancy outcomes in a patient with both extremely high and extremely low BMI. The Indian context allowed us to study the relationships between BMI and maternal weight gain during pregnancy, where we identified some significant findings.

Keywords: Pregnancy, gestational age, parity, BMI, diabetes mellitus, anemia

Introduction

Early-stage pregnancy BMI and weight gain during pregnancy are both significant predictors of unfavorable pregnancy outcomes. Problems during pregnancy were previously more closely associated with low BMI, but as lifestyles change, obesity is rapidly increasing, particularly in urban areas, and may become a serious health issue in the future [1, 2]. According to studies, obese and overweight mothers were more likely to experience fetal death in utero, large for gestational age (LGA), emergency caesarean sections, postpartum hemorrhage, wound infections, and gestational diabetes.1 On the other hand, underweight women were more likely to experience anemia and have babies who suffer from conditions like intrauterine growth restriction (IUGR) and prematurity [3, 4].

A pregnant woman's and her unborn child's health and quality of life are significantly impacted by the nutritional status of the mother. Due to the fact that they are modifiable risk factors for unfavorable pregnancy outcomes, BMI and the patterns of weight gain during pregnancy need to be given the utmost importance [5]. One ought to be familiar with the symptoms and warning signs of unfavorable pregnancy outcomes. An enormous improvement in antenatal recommendations has resulted from a better understanding of the intricate relationships between the mother and fetus. To achieve healthy pregnancy outcomes, the Institute of Medicine (IOM) established guidelines regarding weight gain during pregnancy based on pre-pregnancy BMI [6, 7].

Fewer studies have been conducted on the Asian population than have been conducted in the Western countries. The purpose of the study is to assess how body weight affects pregnancy outcomes in our Indian population. It would be possible to assess the relationship between BMI and its negative impact on pregnancy outcomes by carrying out this study [8, 9]. The relationship between BMI and gestational weight gain in our Indian context could also be examined. By conducting this study, it would also be possible to assess the relative risk of various pregnancy outcomes that a patient with extremes of BMI can develop.

Material and Methods

Between January 2021 to October 2021, researchers at Department of OBG, Surabhi Institute of Medical Sciences, Siddipet, Telangana, India conducted a prospective observational study involving 200 expectant women with singleton, uncomplicated pregnancies. For our investigation, we used these criteria:

Inclusion criteria

1. Only pregnant women in their antenatal visits
2. making reservations during the first trimester
3. Pregnancy with only one baby

Exclusion criteria

1. Patients with certain preexisting conditions will be excluded, including those with chronic hypertension, obvious diabetes, excessively low thyroid function, and connective tissue illnesses including systemic lupus erythematosus. Multifetal gestation
2. First trimester prenatal care is not provided.
3. These are the methods that were used to conduct the study:

Women who were booked at hospital with a singleton pregnancy within the first 12 weeks of pregnancy were included in my study. Subjects gave their consent after being fully informed of the risks. At the first exam, the patient's weight and height were recorded on a standard form to determine the body mass index (BMI).

Patients were categorized into four groups, including:

Normal (18.5-24.9) (18.5-24.9)

Overweight (25-29.9) (25-29.9) Obese (30 and above) (30 and above)

The body mass index (BMI) was determined using the following formula: weight (kg) / height2 (m2). Any prenatal difficulties that arose were also noted, as was the amount of weight gained at each checkup. The neonate's birth weight and Apgar score, as well as any difficulties that arose after delivery, were recorded after the birth and compiled from the case sheets.

Those who could not be reached were removed from the study and replaced with new participants so that the total number of participants in the study remained at 200. The information was gathered using a preconceived questionnaire, then analysis was done. Maternal and fetal problems, weight growth throughout pregnancy, birth weight, and the correlation between BMI and other factors were all investigated.

SPSS 15.0 was used for the descriptive analysis, with data visualizations including tables and charts made in Excel and Word. The mean and standard deviation (min-max) for continuous data, and the number and percentage for categorical data, are provided. Early pregnancy body mass index, weight gain, and mother and fetal outcomes were correlated using a chi-squared test. Overweight, obese, and underweight women have been compared to women of normal body mass index to determine their relative risk of having a negative pregnancy result.

Result

Table 1: Age distribution of the study population

	Total number (n)	Minimum	Maximum	Mean	Std. Deviation
Age in years	200	18.00	45.00	31.5	4.00260

The subjects were between the ages of 18 and 40. The subjects in my study were on average 25 years old.

Table 2: Distribution of study participants based on Parity status

Parity status	Number of subjects	Percentage
Nullipara	110	55
Multipara	90	45
Total	200	100

The table above displays frequency and percentage distribution. 55% of the study population in my study was nullipara, and 45% of the study population was multipara.

Table 3: Distribution of study participants based on Gestational Age

Gestational Age	Number of subjects	Percent
Term	180	90
Preterm	20	10
Total	200	100

The table above displays frequency and percentage distribution. 90% of the subjects were term patients with gestational ages between 37 and 40 weeks, and 10% were preterm patients with ages under 37 weeks.

Table 4: Frequency and distribution of BMI at First Visit

BMI	Number of subjects	Percent
Normal	115	57.5
Overweight	51	25.5
Obese	9	4.5
Underweight	25	12.5
Total	200	100.0

The table above displays frequency and percentage distribution. 57.5% of the subjects belonged to the group with normal BMI. Overweight people made up 25.5% of the subjects. 4.5 percent of the participants were obese. 12.5% of the female population was underweight.

Table 5: Distribution of subjects based on Weight Gain In Pregnancy

Weight Gain	Number of Subjects	Percentage
0 – 7	30	15
8 – 13	115	57.5
> 13	55	27.5
Total	200	100

15% of the participants demonstrated a weight gain of 0 to 7 kg. During pregnancy, 57.5% of the subjects gained 8–13 kg in weight. More than 13 kg had been gained by 27.5% of the female participants.

Table 6: Weight gain in Association To BMI

BMI		Weight Gain(kg)			Total
		0 - 7	8 - 13	> 13	
Normal	Number	15	74	30	119
	%	12.6%	62.1%	25.2%	100%
Overweight	Number	10	24	15	49
	%	21%	48.4%	30.6%	100%
Obese	Number	6	2	2	10
	%	60%	20%	20%	100%
Underweight	Number	5	10	7	22
	%	22.7%	45.5%	32%	100%
Total	Number	36	110	54	200
	%	18%	55%	27%	100%

Analysis of weight gain in relation to BMI was done. In my study, obese participants experienced the highest weight gain (60%) while underweight participants (22.7%) and participants with a normal BMI experienced the lowest weight gain. Chi-Square analysis was used to determine the relationship between weight gain and BMI. BMI is significantly correlated with overall weight gain (X 2 = 17.09, P 0.01).

Table 7: Association between BMI and Diabetes Mellitus (DM)

BMI		Diabetes Mellitus (DM)		Total
		DM (-)	DM (+)	
Normal	Number %	115 86%	19 14%	134 100%
Overweight	Number %	30 69.7%	13 30.23%	33 100%
Obese	Number %	6 66.6%	3 33.3%	9 100%
Underweight	Number %	23 96%	1 4%	24 100%
Total	Number %	174 87.0%	36 18%	200 100.0%

The relationship between BMI and diabetes mellitus was examined. In my study, the number of patients who developed DM was highest in the obese group (33.3%) and lowest in the underweight group (1%). Using Chi-Square analysis and the results shown in the above table, an association between Diabetes Mellitus and BMI was determined. Diabetes Mellitus has been found to have a strong correlation with BMI (X2 = 17.04, p 0.01).

Relative Risk

Table 7.1: Obesity and DM

BMI	DM (+)	DM (-)	Total
Obese	6	3	9
Normal	115	19	134

RR = 3.2

According to my research, compared to people with normal BMI, obese people have a more than threefold increased risk of developing diabetes.

Table 8: Association between BMI and Pregnancy Induced Hypertension

BMI (kg/m2)		PIH		Total
		PIH (-)	PIH (+)	
Normal	Number %	133 99.2%	1 0.8%	134 100.0%
Overweight	Number %	28 90%	5 10%	33 100.0%
Obese	Number %	8 80%	1 20%	9 100.0%
Underweight	Number %	23 93.7%	1 6.25%	24 100.0%
Total	Number %	192 96%	8 4.0%	200 100.0%

When compared to women with normal BMI (0. 8%), the highest percentage of obese patients (20%) in my study developed PIH. Chi-square was used for the analysis. BMI and PIH were strongly correlated, according to the findings (X 2 = 14.73, p 0.01).

Relative Risk

Table 8.1: Obesity and PIH

BMI	PIH (+)	PIH (-)	Total
OBESE	1	8	9
Normal	1	118	119

RR = 25.1

Obesity is associated with a more than twenty-five fold increased risk of PIH in my study when compared to normal BMI.

Table 8.2: Overweight and PIH

BMI	PIH (+)	PIH (-)	Total
Overweight	5	28	55
Normal	1	118	119

RR = 13.7

In my study, overweight women had a more than thirteen fold increased risk of PIH compared to women with normal BMI.

Table 8.3: Underweight and PIH

BMI	PIH (+)	PIH (-)	Total
Underweight	1	23	24
Normal	1	118	119

RR = 8.2

According to my research, compared to women with a normal BMI, underweight women are more than eight times more likely to develop PIH

Table 9: Association between Anemia and BMI

BMI		Anaemia		Total
		Anaemia (-)	Anaemia (+)	
Normal	Number %	129 96.3%	5 3.7%	134 100.0%
Overweight	Number %	29 87.8%	4 12.2%	33 100.0%
Obese	Number %	9 100.0%	0 .0%	9 100.0%
Underweight	Number %	20 83.3%	4 16.7%	24 100.0%
Total	Number %	187 93.5%	13 6.5%	200 100.0%

When compared to the women with normal BMI group (3.7%), the percentage of underweight women who developed anemia in my study was highest (16.7%), then the percentage of overweight women (12.2%). Chi square was used for analysis. Results of my study revealed a significant relationship between BMI and anemia (X2 = 11.37, p 0.05).

Relative Risk

Table 9.1: Obesity and Anemia

BMI	Anemia (+)	Anemia (-)	Total
Obese	0	9	9
Normal	5	129	134

The relative risk could not be determined because in my study none of the obese participants experienced anemia.

Table 9.2: Overweight and Anemia

BMI	Anemia (+)	Anemia (-)	Total
Overweight	4	29	33
Normal	5	129	134

RR = 1.31

According to my research, compared to women with normal BMI, overweight women have a more than one-fold increased risk of anemia.

Table 9.3: Underweight and Anemia

BMI	Anemia (+)	Anemia (-)	Total
Underweight	4	20	24
Normal	5	129	134

RR = 2.4

In my study underweight people are associated with more than a two fold increased risk of Anemia compared with normal BMI.

Table 10: Association between Liquor volume and BMI

BMI		Liquor Volume			Total
		Normal	High liquor	Low liquor	
Normal	Number	128	1	5	134
	%	95.5%	0.7%	3.7%	100.0%
Overweight	Number	29	2	2	33
	%	87.8%	6.06%	6.06%	100.0%
Obese	Number	7	1	1	9
	%	77.7%	11.1%	11.11%	100.0%
Underweight	Number	20	0	4	24
	%	83.3%	.0%	16.6%	100.0%
Total	Number	184	4	12	200
	%	92%	2%	6%	100.0%

There was analysis. In my study, polyhydraminos were found in the majority of patients with increased BMI (11.11%), whereas oligohydraminos were found in the majority of underweight patients (16.6%). According to Chi square analysis, there was a significant correlation between BMI and alcohol consumption (X 2 = 13.244, p 0.05).

Discussion

Participants ranged in age from 18 to 40 for this particular study. In this study, the average age of the participants was 25. There were 53.8% nulliparas and 46.2% multiparas in the sample population. Ninety-two percent of the participants were full-term patients (gestational ages 37 to 40 weeks), whereas nine percent were premature (gestational ages fewer than 37 weeks). One-seventh of the participants had a weight gain of 0-7 kg. A majority, or 53 percent, of the pregnant women in the study gained between 8 and 13 kilograms (kg) in weight. Over a quarter of the ladies (29.5%) gained more than 13 kilograms [9, 10].

Women participated in the study, and their early pregnancy body mass index (BMI) was used to categorize them into four categories. Only 13.4 percent of the population had a body mass index (BMI) upon presentation of less than 18.5 kilograms per square meter. The majority of women (55.3%) had a body mass index (BMI) between 18.5 and 24.9. Twenty-four percent of the female population had a body mass index (BMI) between 25.0 and 29.9 kg/m2. About 7% of the female population had a body mass index of 30 or higher [11, 12].

It was found that while 55.3% of the women in the research population had a normal body mass index, 31.2% were either overweight or obese. Obesity is on the rise due to changes in diet and exercise habits, which is especially concerning in metropolitan areas because it has the potential to become a serious public health issue in the near future. People who were already overweight had the most weight gain, while underweight women saw the least. Chi-square tests were used to determine the correlation between early pregnancy BMI and total weight gain during pregnancy. (p<0.01) Similarly, Ihunnya O [13, 14]. Pregnant women who were already overweight gained more weight, while those who were already underweight gained less weight, according to research by Frederick *et al*. (p 0.001). According to J.E. Brown *et al*.'sfindingsin another study, babies born to obese mothers were heavier than those who had low birth weight babies. Consequentially, it is essential to gain an appropriate amount of weight during pregnancy, as failure to do so or gaining too much can have unfavorable effects on the fetus. In the months leading up to their deliveries, mothers should IOM advises that women's pre-pregnancy BMI be used to guide their total weight gain throughout pregnancy. Patients with a normal body mass index had a 10.7 percent incidence of diabetes in this study. Diabetes mellitus occurred in 25.8% of the overweight BMI cohort. Patients with a high body mass index were more likely to acquire diabetes (35.3 percent). Diabetes mellitus affected only 1% of those with a low body mass index [15, 16].

Patients who were overweight were more likely to develop diabetes (35.3%) than those who were underweight (1%). The Chi-Square test for association between Diabetes Mellitus and BMI found a statistically significant correlation between the two conditions (p 0.01). D.A. Dohertya conducted a study involving 331 women and discovered that 188 of them (6.6%) were obese, with the finding that obese women had a higher risk of developing gestational diabetes having a significant statistical significance (p0.001). 45 Obese women have a threefold increased risk of developing diabetes compared to women of normal body mass index (BMI), while overweight women had a twofold increased risk. connected with a doubling of risk, while women who maintain a healthy weight show no such increase. Only 0.7% of the study's Normal BMI group participants were diagnosed with PIH. Out of the underweight population, 5.9% were diagnosed with PIH. The prevalence of PIH increased from 9.7% in the overweight BMI group to 17.6% in the obese group [17, 18].

Women with normal body mass indexes were less likely to acquire PIH (0.7%) than their obese counterparts (17.6%). Chi-square testing revealed a robust correlation between expanding waist circumference and pulmonary arterial hypertension. (p< 0.01) Meenakshi, Srivastava, and Reena (FOGSI) conducted a similar study and found a significant association between obesity and negative outcomes like PIH in women [19].

Obese women had a 25-fold higher relative risk of developing PIH compared with those with a normal body mass index. For women, the risk of PIH is thirteen times higher in the obese than in the normal-weight group, and it is eight times higher in the underweight group. With a Normal Body Mass Index, 8.6% of people were found to have anemia. In the overweight category, 11.3% of people developed anemia. Patients who were considered obese did not suffer from any cases of anemia. Twenty-six percent of underweight patients experienced anemia. Whereas 8.6% of women in the normal BMI group got anemia, 20.6% of women who were underweight and 11.3% of women who were overweight also acquired anemia. My study found a substantial correlation between low BMI and anemia using Chi-square analysis. (p<0.05). In a study of 1136 women by Adam I,

[20, 21], it was discovered that anemia was significantly (p 0.05) associated with low body mass index (BMI).

Given that no one who was overweight or obese in this trial had the onset of anemia, researchers were unable to determine the relative risk. Women who were already overweight were found to have a one-fold increased risk of Anemia compared with normal BMI individuals, whereas underweight women showed the highest risk of acquiring Anemia (two-fold). Ours is a developing country, and anemia is particularly prevalent in the country's rural parts, thus this issue must be given serious consideration.

In my study, I used Chi-square analysis to find that body mass index (BMI) was not linked to fever. (p = 0.407). My research shows that the risk of developing Pyrexia is doubled in overweight women compared to women of normal weight. Since no women in the over- or underweight categories experienced fever, we were unable to determine their proportional risk.

Postpartum hemorrhage (PPH) was more common among the obese (23.5% of cases) and overweight (6.5% of cases) in my study compared to the normal (3.6% of cases) and underweight categories (0% of cases). (2.9%) Chi-square analysis revealed a robust correlation between body mass index and PPH [21].

Because just one patient in the research group of 253 with an obese BMI experienced thromboembolism, the relative risk could not be estimated. A strong correlation exists between BMI and thromboembolism, as shown by the p value. Results showed that 17.6% more LGA babies were born to obese mothers than to those with normal body mass index. Similarly, the highest rate of small-for-gestational-age infants (38.2%) was found among mothers who were underweight throughout pregnancy. Obesity was associated with high birth weight, and low BMI was associated with low birth weight. (p<0.001). Consistent results were also observed in a study by Ihunnaya O. Frederick *et al*.2 and another by J.E. Brown *et al*. using a significance level of p0.001 and a significance level of p=0.0009, respectively. Meenakshi, Srivastava Reena (FOGSI) 1 conducted a study including 215 women and found that 66 of 170 obese and overweight women had kids with a low Apgar score at birth (p 0.05). The chance of having a baby born small for their gestational age was three times as high in my study for women in the underweight group as it was for those in the overweight or obese groups, respectively.

Patients with a BMI over the normal range have a 28-fold increased risk of having a baby who is born small for their gestational age, whereas those with a BMI between 25 and 29.9 have a 1-fold increased risk and those below 25 have no risk [19-20].

In my research, I found that the percentage of babies with a good Apgar score was much greater among mothers with a normal body mass index (BMI) than it was among those with an abnormal BMI (underweight, 35.3%) or obesity (64.7%). (Apgar> 7 - 88.6%). The correlation between BMI and Apgar score was statistically significant (p<0.001), according to a Pearson Chi-square test. Women with a BMI greater than 30 were five times more likely to have a baby with a low Apgar score than women with a BMI less than 25, whereas women with a BMI greater than 30 had no elevated risk [20, 21].

The health and well-being of both mother and child are profoundly impacted by the woman's nutritional state throughout pregnancy. Both high body mass index (BMI) at the beginning of pregnancy and rapid weight growth later in pregnancy are strong indicators of pregnancy complications. My research examines the link between extremely high or extremely low body mass index (BMI) during the first trimester of pregnancy and negative effects for both the mother and the baby. With a p value of 0.05, it was found that maternal obesity and other negative outcomes were linked to higher body mass index. Obese or overweight women were more likely to have complications during pregnancy and childbirth, such as gestational diabetes, pregnancy-induced hypertension, increased alcohol volume, PPROM, an increased rate of cesarean sections and instrumental deliveries, and postpartum complications such as postpartum hemorrhage, delayed wound healing, giving birth to low-birth-weight babies, and a low Apgar score. SGA and low birth weight infants were more common in pregnancies where the mother was underweighted, and anemia, decreased fluid volume, and cesarean section rates were also observed in these pregnancies [21, 22].

Apgar score that's not very high. The correlation between pregnant weight growth and body mass index was also studied. Weight gain was greatest for those already overweight or obese, then decreased for those already at a healthy weight. The purpose of my research, which was entirely valid, was to determine whether or not pre-pregnancy BMI and weight gain were linked to any of a number of adverse outcomes for the mother and her baby. My research also analyzed the relative risk of various pregnancy outcomes that a patient with high or low BMI can develop, and the findings were supported.

Conclusion

Numerous studies have shown that high maternal body mass index and/or gestational weight gain greatly increase the risk of death for both the mother and her child. Western populations have been studied extensively, whereas Asian groups have received much less attention. There is growing concern that obesity, particularly in urban areas, would become a major public health issue in India. Pregnancy problems have historically been linked to a low body mass index in India. This study enabled an evaluation of the association between BMI and its adverse effects on pregnancy outcome. This research was important since it compared the likelihood of various pregnancy outcomes in a patient with very high and very low BMI. Important findings were found in both the domains of body mass index and maternal weight growth during pregnancy, which we were able to investigate because to our Indian setting.

Funding support
Nil

Conflict of interest
Nil

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