

# Study of pregnancy outcome in relation to first trimester body mass index

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## Abstract

**Background:** The early pregnancy BMI (body mass index) has a significant impact on the pregnancy outcome. Women with a low or high BMI are more likely to have an unfavorable pregnancy result. All pregnant women should have their BMI calculated at their initial visit, according to the American College of Obstetricians and Gynecologists (ACOG). **Aim:** The aim of this study was to evaluate maternal and fetal outcomes in women based on their BMI in the first trimester. **Materials and Methods:** From February 2019 to February 2020, a one-year prospective observational study was conducted in the Department of Obstetrics and Gynecology. Based on inclusion and exclusion criteria, a total of 150 pregnant women in their first trimesters were evaluated for various prenatal and postnatal problems. **Results:** Anemia and intrauterine growth restriction (IUGR) were shown to be more common in underweight patients. Patients who were overweight or obese had a higher risk of postpartum haemorrhage (PIH), gestational diabetes, and macrosomia. Lower (uterine) segment caesarean section (LSCS), instrumental delivery, wound infection, and PPH were all more common in patients with a higher BMI. SGA newborns were more common in patients with a low BMI, while LGA babies were more common in patients with a high BMI. Patients with a low or high BMI were more likely to be admitted to the neonatal intensive care unit (NICU). **Conclusion:** Patients on either side of BMI had significantly greater complications during pregnancy, as well as severe pregnancy and neonatal complications (underweight and obese). As a result, it may be stated that a patient's BMI has a direct impact on the pregnancy outcome.

**Keywords:** Pregnancy induced hypertension, Postpartum haemorrhage, Intrauterine growth restriction, Body mass index.

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gestational weight gain (GWG) have detrimental effects on pregnancy outcomes, amplifying the burden of chronic diseases and jeopardizing the health of both the mother and the baby<sup>3</sup>. Gestational diabetes, pregnancy-induced hypertension, postpartum haemorrhage, caesarean section, shoulder dystocia, difficult labour, macrosomia infants, assisted delivery, birth asphyxia, and postpartum haemorrhage are all more likely in women with a higher BMI<sup>4</sup>. Preterm birth, low birth weight, anaemia, and prematurity are all risks for women with a low BMI<sup>5</sup>. To promote a good mother and newborn outcome, maternal BMI and maternal nutrition should be given appropriate significance during pregnancy and should be a standard element of antenatal evaluation. The American College of Obstetricians and Gynecologists recommends that all pregnant women have their BMI calculated at their initial appointment<sup>6</sup>. Because gestational weight increase is a modifiable risk factor in pregnancy, emphasizing its importance during antenatal care can lead to a better

## INTRODUCTION

Pregnancy in its early stages, the BMI has a significant impact on the pregnancy outcome<sup>1</sup>. Both women with a low BMI and those with a high BMI have a poor pregnancy outcome. BMI is computed by multiplying a person's weight in kilograms by their height in meters squared. (BMI=kg/m<sup>2</sup>). Obesity has become more prevalent in recent years<sup>2</sup>. High BMI before pregnancy and/or excessive

mother and fetal outcome. The Institute of Medicine has issued guidelines regarding weight growth during pregnancy<sup>7</sup>. The aim of this study was to examine maternal and fetal outcome in patients with high and low BMI in order to ensure more careful monitoring of these patients to ensure a favorable maternal and fetal outcome.

## MATERIALS AND METHODS

This was a one-year prospective observational study that took place in the Department of Obstetrics and Gynecology from February 2019 to February 2020. Patients who booked in the first trimester of pregnancy with a singleton pregnancy were eligible for inclusion.

## RESULTS

The study comprised 150 patients who met the inclusion and exclusion criteria. In terms of demographics, the patients were comparable. Patients were separated into five groups based on their BMI.

**Table 1:** Distribution of patients based on BMI.

Group	BMI
Group I (Underweight)	≤ 19.9 kg/m <sup>2</sup>
Group II (Normal)	20-24.9 kg/m <sup>2</sup>
Group III (Overweight)	25-29.9 kg/m <sup>2</sup>
Group IV (Obese)	30-34.9 kg/m <sup>2</sup>
Group V (Morbidity Obese)	>35 kg/m <sup>2</sup>

**Table 2:** Distribution based on BMI of patients

Group	BMI	No. of patients	% of patients
Group I (Underweight)	≤ 19.9 kg/m <sup>2</sup>	23	15.3%
Group II (Normal)	20-24.9 kg/m <sup>2</sup>	80	53.3%
Group III (Overweight)	25-29.9 kg/m <sup>2</sup>	30	20%
Group IV (Obese)	30-34.9 kg/m <sup>2</sup>	17	11.4%
Group V (Morbidity Obese)	>35 kg/m <sup>2</sup>	0	0

Table 2 shows that majority of patients (53.3%) were normal with BMI of 20-24.9 kg/m<sup>2</sup>, followed by overweight (20%) who had BMI of 25-29.9 kg/m<sup>2</sup> followed by underweight (15.3%) who had BMI of ≤ 19.9 kg/m<sup>2</sup> and obese (11.4%) who had a BMI of 30-34.9 kg/m<sup>2</sup>.

**Table 3:** Distribution on basis of complications during antenatal period according to BMI.

BMI Group	I (n=23)	II (n=80)	III (n=30)	IV (n=17)	P value
PIH	1(4.35%)	1(1.25%)	3(10%)	3(17.6%)	<0.01
Gestational Diabetes	1(4.35%)	10(12.5%)	11(36.6%)	8(47%)	<0.01
Anemia	5 (21.7%)	8(10%)	4(13.3%)	1(5.9%)	<0.05
IUGR	10 (43.5%)	10(12.5%)	5(16.6%)	4(23.5%)	<0.05
Macrosomia	0	1(1.25%)	1(3.3%)	3(17.6%)	<0.01

PIH: Pregnancy induced hypertension, IUGR: Intrauterine growth restriction.

Table 3 shows that the patients were compared based on the presence of prenatal problems. PIH, anaemia, gestational diabetes, IUGR, and macrosomia were all investigated as complications. Anemia and IUGR were shown to be more prevalent in underweight patients, whereas PIH, gestational diabetes, and macrosomia were found to be more prevalent in overweight or obese patients. These problems were less common in patients with a normal BMI. The occurrence of these problems was linked to BMI in a significant way.

**Table 4:** Distribution based on delivery mode.

Delivery Mode	I (n=23)	II (n=80)	III (n=30)	IV (n=17)	P value
LSCS	9(39.1%)	25(31.3%)	14(46.6%)	7(41.2%)	<0.05
Instrumental	1(4.35%)	5(6.3%)	2(6.6%)	2(11.8%)	<0.01
Normal Vaginal	13(56.5%)	50(62.5%)	14(46.6%)	8(47%)	<0.05

LSCS: Lower segment caesarean section.

Table 4 shows that patients with a greater BMI had a higher rate of LSCS and instrumental delivery. It was determined that the difference was statistically significant.

Women who had several pregnancies, as well as those who had diabetes, chronic hypertension, heart disease, or hypothyroidism, were excluded from the study. Patients who met these criteria were enrolled in the trial, and a thorough history and examination were conducted. According to WHO and National Institute of Health recommendations, patients were split into five groups (Table 1). During the entire prenatal period, patients were closely monitored. Weight gain was kept track of. Prenatal, postnatal, maternal, and fetal problems were all documented. Mann Whitney test, ANOVA, and chi square analysis were used to conduct statistical tests. Significant was defined as a P value of less than 0.05.

**Table 5:** Distribution on basis of complications in early postpartum period.

Complications	I (n=23)	II (n=80)	III (n=30)	IV (n=17)	P value
PPH	2(8.7%)	3(3.75%)	4(13.3%)	3(17.6%)	<0.05
Wound sepsis	3(13.04%)	2(2.5%)	2(6.6%)	3(17.6%)	<0.05

Table 5 shows that wound sepsis and PPH were also more common in these patients. It was determined that the difference was statistically significant.

**Table 6:** Distribution based on neonatal outcome.

Neonatal outcome	I (n=23)	II (n=80)	III (n=30)	IV (n=17)	P value
SGA	10 (43.5%)	9(11.25%)	5(16.6%)	7(41.2%)	<0.05
LGA	0	1(1.25%)	3(10%)	4(23.5%)	<0.01
NICU admission	2(8.7%)	1(1.25%)	4(13.3%)	2(11.8%)	<0.05
Perinatal death	0	0	0	0	0

SGA: Small for gestational age, LGA: Large for gestational age, NICU: Neonatal intensive care unit

Table 6 shows that patients with a low BMI had more SGA babies, while those with a high BMI had more LGA babies. NICU admissions were necessary for more newborns in individuals with low or high BMI. There was a statistically significant difference. There were no perinatal deaths in any of the groups.

## DISCUSSION

From February 2019 to February 2020, a one-year prospective observational study was conducted in the Department of Obstetrics and Gynecology. Based on inclusion and exclusion criteria, a total of 150 pregnant women in their first trimesters were evaluated for various prenatal and postnatal problems. Patients with similar demographic profiles were compared. In our study, anaemia and IUGR were more common in patients who were underweight [lower BMI (group I)] during the antenatal period, whereas PIH, gestational diabetes, and macrosomia were more common in patients with overweight and obese mothers (group III and IV). This finding was in line with studies conducted by Prachi Srivastava<sup>8</sup> and Sahu MT *et al.*<sup>4</sup> who found that Obese women had a higher risk of gestational diabetes, pre-eclampsia, caesarean delivery, and macrosomia, while obese women had a higher risk of gestational diabetes, pre-eclampsia, caesarean delivery, and macrosomia. According to Verma A *et al.*<sup>9</sup> underweight women had a higher risk of anaemia and growth retardation, whereas overweight and obese women had a higher risk of PIH and gestational diabetes. According to Bhattacharya S *et al.*<sup>10</sup> morbidly obese women had the highest risk of pre-eclampsia, while underweight women had the lowest. According to Fujiwara K *et al.*<sup>11</sup> the higher the pre-pregnancy BMI, the greater the risk of pregnancy-induced hypertension and gestational diabetes mellitus. Takai IU *et al.*<sup>12</sup> observed that hypertensive problems in pregnancy (42.0 percent) and gestational diabetes mellitus were the most common maternal outcomes related with obesity and overweight (41.3 percent). In O'Brien *et al.*<sup>13</sup> study, a meta-analysis of PIH and maternal BMI was conducted, the risk of pre-eclampsia increased with every 5-7 kg/m<sup>2</sup> rise in BMI. Higher BMI was linked to a higher rate of caesarean section and assisted vaginal delivery. These

patients experienced a higher rate of perioperative morbidity, such as anesthesia difficulties, infections, and prolonged hospitalization, due to the increased rate of caesarean section. We discovered that patients who were underweight or obese had a greater rate of wound sepsis, and patients with a higher BMI had a higher rate of PPH. LSCS and wound sepsis were found to be more common in overweight and obese women in research conducted by Verma A *et al.*<sup>9</sup>. Overweight and obese women had a considerably greater rate of caesarean delivery and macrosomia, according to Sahu MT *et al.*<sup>4</sup>. Bhattacharya S *et al.*<sup>10</sup> also found that obese women had a greater rate of caesarean section and PPH, while underweight and normal weight women had lower rates and were comparable. Women with a higher BMI had a greater incidence of caesarean section and PPH, according to Fujikara K *et al.*<sup>11</sup> Takai IU *et al.*<sup>12</sup> also found a higher rate of caesarean section in overweight and obese women, but a higher rate of PPH in normal weight women than in overweight or underweight women, which they attributed to likely less labour monitoring in normal weight women compared to underweight, overweight, or obese women. Bainco *et al.*<sup>14</sup> however reported no change in incidence of PPH in relation to BMI. Low birth weight was more common with underweight patients, and the frequency of large for date infants was more common in overweight and obese women. Verma A *et al.*<sup>5</sup> Sahu MT *et al.*<sup>4</sup> Bhattacharya S *et al.*<sup>10</sup> Fujikara K *et al.*<sup>11</sup> and O'Brien TE *et al.*<sup>13</sup> all came to the same conclusion. Obese women have an 18-26 percent chance of delivering large for date infants, according to studies by Sebire NJ *et al.*<sup>15</sup> and Weiss JL *et al.*<sup>16</sup>, compared to women with a normal BMI. NICU admissions were more common in the underweight group due to IUGR, and in the overweight and obese group due to macrosomia and maternal diabetes. In a study by Orskou J *et al.*<sup>18</sup> the percentage of macrosomic newborns increased from

16.7% to 20.9 percent in ten years, with increasing mother BMI being one main cause. In BH Narayani *et al.*<sup>17</sup> study, pregnant ladies were on average 26.2 years old. Obese women were found to be significantly older (28.0 years) than other women at the time of booking. Obese women (8.25 percent) had a considerably higher family history of diabetes than other women. Obese women had more caesarean sections than non-obese women. Obesity was associated with a higher rate of macrosomia than the other groups. Obese women had a much higher rate of preeclampsia (1.89 percent) than other women.

## CONCLUSION

Patients on either side of BMI had considerably higher complications in pregnancy throughout the antenatal period, during labour, and postnatal period, as well as a poor newborn outcome (underweight and obese). In our study, we did not include a morbidly obese group. As a result, it may be stated that a patient's BMI has a direct impact on the pregnancy outcome. To maintain optimal BMI and thereby reduce difficulties during pregnancy and assure a better neonatal result, it is recommended that all patients' BMI be recorded at their first visit, and patients' weight be documented at every subsequent visit.

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