

Original Article**Pregnancy Complications and Fetal Outcomes in Obese Pregnant Women in a Tertiary Care Center in Eastern Nepal****Bhanubhakta Neupane *, Gyanendra Man Singh Karki, Siddhartha Kumar Yadav, Shuvechha Pandey**

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Article Received: 10th June, 2025; Accepted: 14th July, 2025; Published: 31st July, 2025**DOI:** <https://doi.org/10.3126/jonmc.v14i1.83254>**Abstract****Background**

Weight gain in pregnancy is normal, but obesity prior to pregnancy may be associated with increased risk of pregnancy and neonatal complications.

Materials and Methods

This comparative cross sectional study was conducted in Birat Medical College Teaching Hospital from 2024 August 15 to 2025 May 15, over the period of 9 months. Three hundreds and thirty participants were enrolled in the study, 165 women with Body Mass Index BMI ≥ 30 kg/m² as study group and 165 women with normal BMI as reference group. Obstetric and neonatal outcomes were compared between the two groups using student's t test and Chi-square test.


Results

The mean BMI was 32.5 ± 2.56 kg/m² in study group and 23.20 ± 1.5 kg/m² in reference or normal weight group. The incidence of Gestational diabetes mellitus (GDM) was 16.97% vs 6.66% (RR 2.54, 95% CI 1.62-3.20, $p=0.02$), hypertensive disease in pregnancy (HDP) was 21.21% vs 8.48%, (RR 2.5, 95% CI 1.84-2.60, $p=0.01$) and caesarean section rate was 56.96% vs 30.30% (RR 1.88, 95% CI 1.52-2.70) in study group and reference group respectively. Neonatal admission rate was 23.03% in obese group and 16.36% in normal weight group. Incidence of neonatal death was similar in both groups.

Conclusion

Obese pregnant women have higher risk of pregnancy and neonatal complications when compared with normal BMI women.

Keywords: *Body mass index, Gestational diabetes mellitus, Hypertension, Meconium stained liquor, Obesity*

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Citation

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Introduction

Maternal obesity may increase the risk adverse maternal and fetal outcomes during pregnancy and delivery [1]. Obesity is classified by using the Body Mass Index (BMI). It is obtained by dividing a person's weight in kilos by height in square meters [2]. A BMI of 18.5 to 24.9 kg/m² is normal weight, 25 to 29.9 kg/m² is overweight, and over 30 kg/m² is obese [1]. National Demographic and Health Survey of Nepal 2016 reported that among reproductive women, 22% were overweight and 5% were obese [3].

Obesity is associated with increased risk of hypertension, gestational diabetes mellitus (GDM), large for gestational age infants and instrumental deliveries [4,5]. Obese women have higher rates of caesarean sections and prolonged labor [6,7,8]. Hypertension developed in 19.5% of obese women and 8.5% in normal BMI women and GDM developed in 29.2% of obese pregnant women and 14.1% of normal BMI women [9]. Another study found the hypertension in 44% of high BMI women and 7% in normal BMI women. Caesarean section rate was 38% in normal BMI group and 72.4% in obese pregnant women [10]. Poor Apgar score was observed in 15.1% of babies of obese mother and only in 4.8% in babies of normal weight mother. Neonatal admission rate was 33.7% and 9% of neonates of obese mothers and normal weight mothers respectively [11]. Obese pregnant women had higher frequency of cesarean deliveries and other major maternal and fetal complications [12,13]

This study is designed to study the incidences of the above mentioned adverse maternal and fetal outcome in obese pregnant women. Results of this study will be helpful for anticipation and management of complications in obese pregnant women.

Methods and Materials

This is a hospital based comparative cross-sectional study done for 9 months, from August 2024 to May, 2025 in Departments of Obstetrics and Gynecology, Birat Medical College Teaching Hospital, Biratnagar, Nepal. The ethical clearance for the study was taken from the Institutional Review Committee of the institute prior to commencement of data collection (IRC-PA-397/2024). Informed consents were taken from all the participants after explaining the study objectives and procedure. Confidentiality of the participants were maintained. All singleton pregnancies with/without booking visit in our hospital, with documented weight taken pre-pregnancy or in the first trimester <14 weeks and delivering at our

facility after 28 weeks were included in the study. Multiple pregnancies, pregnancies with previous caesarean section and pre-existing hypertension and diabetes mellitus, and fourth or more than fourth gravidas were excluded from the study. Taking prevalence of hypertensive disorder of pregnancy as 19.5% in obese (exposure) and 8.8% in normal weight (no exposure) group from Giri et al (2022) [9], with 95% confidence interval and 80% power, We applied the following formula to calculate the sample size for study group and reference group.

$$n = [(p_0q_0 + p_1q_1) \times (Z_{1-\alpha/2} + Z_{1-\beta})^2] / (p_1 - p_0)^2$$

The minimum sample size calculated for each group was 163.

The weight of the women was documented at their first antenatal visit to the hospital. For those without booking visit before 14 weeks in this hospital, the weight was recorded from document provided by any health facility where they had their first antenatal visit. If pre-pregnancy weight was not known during first antenatal visit, weight taken during 14 weeks pregnancy was taken as pre-pregnancy weight and BMI was calculated. It has been shown that the maternal weight does not increase much in the first trimester and hence the baseline body mass index during pregnancy can be calculated accurately up to 18-20 weeks gestation [14].

On the first visit to this hospital, the height and weight were measured in the standard fashion in our out-patient department (OPD). Based on BMI, participants were categorized into two groups: normal or reference group with BMI 18.5–24.9 kg/m², and obese or study group with BMI >30 kg/m². Women delivering immediately before or after the index case with normal BMI and matched to age (±5 years) and gestational age (±2 weeks) were included for the reference group. The information on maternal characteristics as age, parity, and gestational age at delivery were obtained from interview and hospital documents. Maternal complications like gestational hypertension, preeclampsia, gestational diabetes mellitus (GDM) and meconium stained liquor (MSL) and preterm deliveries were recorded.

Neonatal outcomes like birth weight, APGAR scores at 1 and 5 minutes, NICU admission and neonatal deaths were recorded. Obstetrical and neonatal outcomes were evaluated taking the normal BMI group as reference. A low APGAR score was defined as a score less than seven at 5 minutes after birth. Birth weight was measured and recorded at birth by the attending nurse or pediatrician. All the data were collected by one of the investigators and recorded in a preformed



proforma. The data collected were entered in Statistical Package for Social Sciences (SPSS) software version 26. The frequencies with percentages of the various outcomes of pregnancy were calculated within the maternal BMI groups. Quantitative data were presented in means with standard deviation. Qualitative data were expressed in frequency and percentages. Statistical analysis was done using student's t-test and Chi square test. Risks are presented as relative risk (RR) with 95% confidence intervals (CI). P value < 0.05 was taken as statistically significant.

Results

The study was conducted for 9 months from 2024 August 15 to 2025 May 15. A total of 330 participants, 165 obese pregnant women (Study Group) and 165 normal BMI pregnant women (reference group) were enrolled in the study. In study group, the weight ranges from 70 kg to 95 kg, with mean weight of 74.22 ± 5.65 kg while in reference group, the weight ranges from 51-58 kg, with mean weight of 52.25 ± 3.2 kg. The mean height was 151 ± 2.8 cm, with range of 142 cm to 154 cm in study group and it was 150 ± 3.2 cm with range of 141 cm to 156 cm in reference group. Mean Body Mass Index (BMI) was 32.5 ± 2.56 , with range of 30 to 38 kg/m^2 in obese (study) group while in normal BMI (group, mean BMI was 23.20 ± 1.5 , with range of 21 – 24.5 kg/m^2 .

Table 1: Distribution of maternal age, weight, height and BMI (n=165 each group)

Parameters	Study Group BMI > 30 (%)	Reference Group BMI < 25 (%)	
Age 20-29 years	106 (64.24%)	95 (57.57%)	
Age 30-39 years	59 (35.75%)	70 (42.42%)	
Mean age (years)	30.452 ± 5.4	28.28 ± 1.76	$P = 0.80$
Weight (kg)	74.22 ± 5.67	52.15 ± 7.2	
Height (cm)	151 ± 2.8	150 ± 3.2	
BMI (kg/m^2)	32.5 ± 2.56	23.2 ± 1.5	$P = 0.01$

BMI = body mass index

Number of participants were comparable in both groups with regard to gravidity and age distribution. (Table 1)

Distribution of participants according to number of pregnancies was similar in both groups. Primigravidae were 81 (49.09%) in study group and 88 (53.33%) in reference group, second gravidas were 55 (33.33%) in study group and 51 (30.90%) in reference group and third gravidas were 29 (17.57%) in study group and 26 (15.75%) in reference group. (Figure 1)

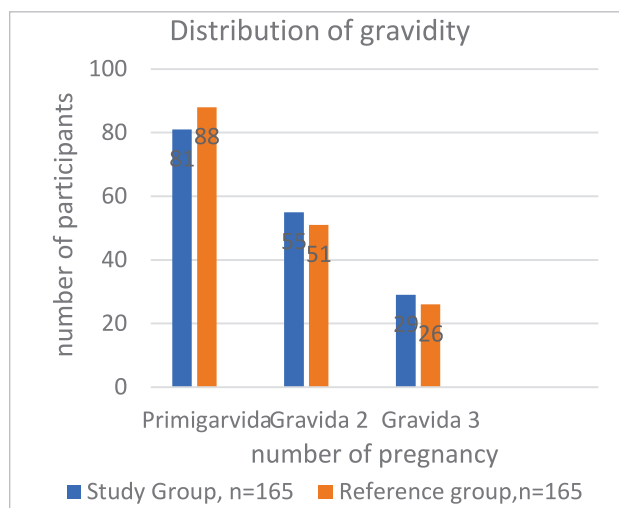


Figure 1: Distribution of gravidity

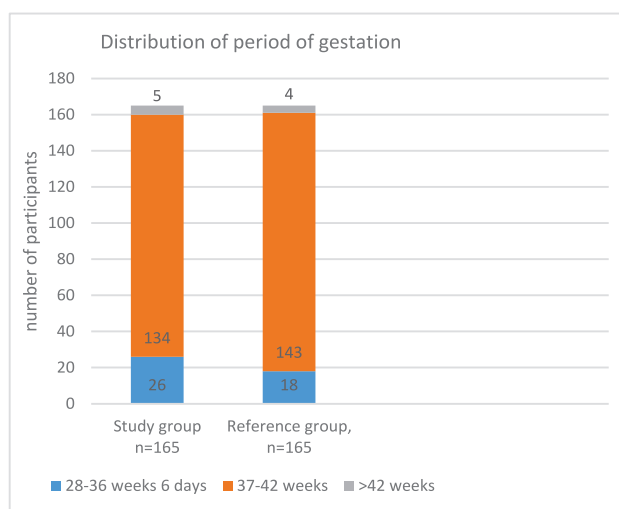


Figure 2: Distribution of Period of gestation (weeks)

Distribution of participants according to period of gestation at the time of delivery was similar in both groups. The mean gestational period at delivery was 38.32 ± 2.45 weeks in study group and 39.67 ± 1.95 weeks in reference group. (Figure 2)

Table 2: Obstetric outcomes

Outcomes	Study group (n=165)	Reference group (n=165)	p value	Relative Risk (95% CI)
Gestational Diabetes Mellitus	28 (16.97%)	11 (6.66%)	0.02	2.54 (1.62-3.20)
Hypertension	35 (21.21%)	14 (8.48%)	0.01	2.5 (1.8-3.2)
Preterm delivery	20 (12.12%)	12 (7.27%)	0.06	1.66 (1.28-1.95)
Meconium stained liquor	22 (13.33%)	18 (10.90%)	0.20	1.22 (1.0-1.42)
Caesarean section	94 (56.96%)	50 (30.30%)	0.02	1.88 (1.52-2.70)
Instrumental delivery	15 (9.09%)	12 (7.27%)	0.8	1.25 (1.1-1.5)



In this study, development of gestational diabetes mellitus and hypertensive diseases in pregnancy was significantly more in obese pregnant women than in normal BMI women. Caesarean section rate was also significantly higher in obese women. The incidence of preterm delivery, meconium stained liquor and instrumental delivery was similar in both groups. (Table2)

Table 3: Neonatal outcomes

Birth weights(kg)	Study group (n=165)	Reference group (n= 165)	p value
<2.5	23(13.93%)	18 (10.90%)	
2.5 – 3.5	101(61.21%)	105(63.63%)	
3.5 – 3.9	35 (21.21%)	38(23.03%)	
>4	10 (6.06%)	4 (2.42%)	
Mean birth weight (Kg)	3.20±1.16	2.87±0.82	0.86
Apgar score <7 after 5 minutes	31(18.78%)	21(12.72%)	0.60
Neonatal admissions	38 (23.03%)	20 (12.12%)	0.02 (RR 1.9, 95% CI 1.35-2.44)
Neonatal death	4 (2.42%)	3 (1.81%)	0.89

The neonatal admission rate was significantly higher in babies born of obese women than of normal BMI women. Other parameters were similar in both groups. (Table 3)

Discussion

In this study, 16.97% (28 of 165) obese pregnant women developed gestational diabetes mellitus (GDM) while only 6.66% (11 of 165) of normal weight women developed GDM, the difference was statistically significant. Similarly, 21.21% (35 of 165) of obese pregnant women developed hypertensive disease during pregnancy while only 8.48% (14/165) of normal BMI women developed hypertension during pregnancy, which was also statistically significant. These findings suggest that obese pregnant women have significantly higher risk of developing hypertension and GDM during pregnancy in comparison to normal BMI pregnant women.

These results are consistent with findings of the other studies. In a study by Giri A et al (2022), gestational hypertension and preeclampsia developed in 19.5% of obese women and 8.5% in normal BMI women. Similarly, GDM developed in 29.2% of obese pregnant women and 14.1% of normal BMI women, the differences were statistically significant [9]. In another retrospective study by Ojha N (2018), hypertensive disease in pregnancy (HDP) occurred in 44.8% of high BMI women and in 7% in normal BMI group [10]. Preeclampsia was seen in 42.1% vs 14.1%, and GDM in 14.5% vs 10.3% in obese and normal BMI pregnant women respectively [15]. Another study

by Kumar M and Mali KA (2023) revealed that GDM developed in 18% and hypertensive disease developed in 30% of pregnant women with BMI >30 [16].

Other studies have also revealed higher incidence of GDM and HDP in obese pregnant women. Schrauwers C et al (2009) revealed that pregnancy hypertension and gestational diabetes mellitus occurred significantly more in obese women with an Odds Ratio (OR) of 2.38 and 8.82 respectively [17], while Bhattacharya S et al (2007) found 3 times higher risk of developing preeclampsia in obese mothers in comparison to normal weight mothers [18]. Similarly, another study demonstrated that pre-pregnancy obesity was significantly higher risk of gestational hypertension (OR 2.5, 95% CI 2.1-3.0), preeclampsia (OR 1.6, 95% CI 1.1-2.3) and gestational diabetes mellitus (OR 2.6, 95% CI 2.1-3.4) when compared to controls [19]. Robinson HE et al (2004) also showed that pre-pregnancy obesity had higher risk of developing gestational hypertension (OR 2.4, 95% CI 2.2-2.5), preeclampsia (OR 1.6, 95% CI 1.4-1.8) and gestational diabetes mellitus (OR 2.8, 95% CI 2.5-3.1) than in controls [20].

The incidence of preterm delivery in obese pregnant women is variable in different studies. In a study in Nepal, 10.3% of obese pregnant women delivered prematurely while only 3.4% did so by normal weight group [9]. Another study showed the preterm delivery rate 8.8% in normal weight and 27.6% in obese pregnant women [10]. Shrestha D et al (2021) found that the incidence of preterm delivery was 18.75% in obese women while 7.69% in normal weight group [13]. Kumar M and Mali KA (2022) observed much higher (37.2%) preterm delivery rate in obese pregnant women [16]. In this study, preterm delivery occurred in 12.12% and 7.27% in obese and normal BMI pregnant women respectively, but the difference was statistically not significant, $p=0.06$

In a retrospective study by Ojha N (2016), incidence of meconium stained liquor was more (13.2%) in normal weight women in comparison to 6.9% in obese pregnant women [10]. In our study, the incidence of meconium stained liquor was 13.33% (22 of 165) and 10.90% (18 of 165) in obese and normal weight women respectively, which was statistically not significant. In another study done in Nepal, vaginal delivery occurred in 88% of normal BMI group and in only 8% in obese group [13]. Among 166 obese and 166 normal weight pregnant women, instrumental vaginal delivery (16.3% vs 5.4%) and caesarean section



(36.1% vs 10.2%) were significantly higher in obese women as compared to non-obese women [11]. In another study, the cesarean section rate was 44% and instrumental vaginal delivery rate was 12.7% [16]. Ajmani SN et al (2021) showed the Caesarean section rate to be 37.5% in obese and 13.8% in normal weight mothers [15]. In our study, the caesarean section rate was 56.96% (94 of 165) and 30.30% (50 of 165) in obese and normal weight pregnant women respectively. Similarly, instrumental assisted vaginal delivery was required in 16.36% (27 of 165) and 7.27% (12 of 165) in obese and normal weight women respectively.

In two studies done in Nepal, mean birth weight was almost similar in both groups, 3.18 kg in higher BMI pregnant women and 2.9 kg in normal BMI group [9,10]. In this study too, the mean birth weight was 3.20 ± 1.16 kg and 2.87 ± 0.82 kg in obese and normal weight pregnant women respectively.

Maternal overweight/obesity in early pregnancy was associated with higher risk of adverse neonatal outcome. Apgar score < 7 in 5 minutes was similar in both groups (3.4% vs 1.7%) but NICU admission rate was 28.3% among the babies born by obese women while it was only 10.6% in normal BMI group [9]. Conversely, in a study by Shrestha D et al (2021), the NICU admission rate was lower in babies born to higher BMI mothers in comparison to normal BMI group. APGAR score at 5 minutes was similar in both groups [13].

In this study, Apgar score of <7 at 5 minutes occurred in 18.78% (31 of 165) and 12.72% (21 of 165) of neonates born by obese and normal weight women respectively, the difference was statistically not significant, $p=0.6$. Likewise, 23.03% (38 of 165) of neonates born by obese women needed NICU admission while 12.12% (20 of 165) of neonates born by normal weight women, the difference was statistically significant, $p=0.02$. These observations were consistent with findings of other studies. Ajani SN et al (2021) enrolled 160 pregnant women with 80 women with >25 BMI and 80 women with < 25 BMI. NICU admission rate was 12.7% in babies born to obese mothers compared to 6.6% in normal weight mothers [15]. In a study which included 100 obese pregnant women, neonatal admission rate was 19.1 % [16]. Azhar R et al (2022) found that the frequency of poor Apgar score (15.1% vs. 4.8%) & NICU admission (33.7% vs. 9.0) was significantly higher in obese women compared to non-obese [11].

Conclusion

Maternal obesity is associated with significantly higher pregnancy and neonatal complications in comparison to normal weight pregnant women. The incidences of hypertensive disease in pregnancy (HDP), gestational diabetes mellitus (GDM) and caesarean section rate were significantly higher in obese pregnant women than in normal weight pregnant women. Though preterm delivery and instrumental delivery rates were higher in obese participants, the difference was statistically not significant. Regarding neonatal outcomes, NICU admission rate was significantly higher in babies born to obese mother in comparison to babies born to normal weight mothers. But, mean birth weight, Apgar scores after <7 after 5 minutes and neonatal death were similar in both groups.

Conflict of interest: None

Acknowledgement: None

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