ISSN: 2581 – 3633

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: https://www.ijmacr.com

Volume – 9, Issue – 6, November – 2026, Page No.: 19 – 25

Association of High Maternal Body Mass Index with Feto-Maternal Outcomes: An Observational Study

[1]Dr. Patole Sakshi Nanabhau, Junior resident in department of Obstetrics and Gynaecology, RCSMGMC and CPR Hospital, Kolhapur, India.

[2]Dr. Anusha N, Assistant Professor in department of Obstetrics and Gynaecology, RCSMGMC and CPR Hospital, Kolhapur, India.

[3]Dr. Rushikesh Raghunath Mane, Assistant Professor in department of Obstetrics and Gynaecology, RCSMGMC and CPR Hospital, Kolhapur, India.

Corresponding Author: Dr. Anusha N, Assistant Professor in department of Obstetrics and Gynaecology, RCSMGMC and CPR hospital, Kolhapur, India

How to citation this article: Dr. Patole Sakshi Nanabhau, Dr. Anusha N, Dr. Rushikesh Raghunath Mane, "Association of High Maternal Body Mass Index with Feto-Maternal Outcomes: An Observational Study", IJMACR– November – 2026, Volume – 9, Issue – 6, P. No. 19 – 25.

Open Access Article: © 2026, Dr. Patole Sakshi Nanabhau, et al. This is an open access journal and article distributed under the terms of the creative common's attribution license (http://creativecommons.org/licenses/by/4.0). Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: High maternal body mass index (BMI) is associated with metabolic and obstetric complications that may affect both mother and newborn. This study assessed feto-maternal outcomes among pregnant women with elevated BMI and examined their association with BMI category.

Methods: This observational study was conducted over 18 months in a tertiary care hospital and included 48 women with singleton pregnancies and BMI above 25 kg/m² in the first or early second trimester. Maternal characteristics, pregnancy complications, mode of delivery and neonatal outcomes were recorded. Associations between overweight and obesity categories and outcomes were assessed using the chi-square test; $p<0.05$ was considered statistically significant.

Results: Of 48 participants, 43 (89.6%) were overweight and 5 (10.4%) were obese. Gestational hypertension (68.8%) was the most frequent comorbidity. LSCS was performed in 34 (70.8%) women. Obesity was significantly associated with hypothyroidism diagnosed during pregnancy (40.0% vs 2.3%; p=0.025) and preterm delivery (80.0% vs 16.3%; p=0.006). Low birth weight was more frequent among neonates of obese mothers (60.0% vs 20.9%; p=0.029). The association of BMI category with mode of delivery, GDM, gestational hypertension, Apgar scores, NICU admission, ventilatory support and neonatal survival was not statistically significant.

Conclusion: In this small cohort of women with elevated BMI, obesity was associated with preterm delivery and low birth weight, while caesarean delivery and maternal comorbidities were common overall. Early BMI assessment and closer antenatal and neonatal surveillance may help identify pregnancies requiring additional care.

Keywords: Body Mass Index, Feto-Maternal Outcome, Maternal Obesity, Pregnancy, Preterm Delivery.

Introduction

Overweight and obesity among women of reproductive age are increasing public health concerns. Maternal adiposity is associated with insulin resistance, chronic low-grade inflammation and altered metabolic adaptation during pregnancy, which may contribute to gestational diabetes mellitus, hypertensive disorders, operative delivery and adverse neonatal outcomes[1,2].

Body mass index (BMI), calculated as weight in kilograms divided by height in metres squared, is a practical measure used to classify nutritional status. Asian Indian populations may experience metabolic risk at lower BMI values than those used in conventional international classifications; consensus recommendations therefore identify BMI ≥23 kg/m² as overweight and ≥25 kg/m² as obesity for Asian Indians[3].

The effects of elevated maternal BMI are clinically relevant in obstetric practice because maternal complications may coexist with prematurity, altered birth weight, low Apgar scores and increased neonatal intensive care requirements. Local data can support risk stratification and counselling. The present study assessed maternal and neonatal outcomes among pregnant women with high BMI and evaluated their association with overweight and obese BMI categories.

Aim and Objectives

To determine the relationship between high maternal BMI and feto-maternal outcomes. The objectives were to study the effect of High BMI and maternal outcome and to study the neonatal outcome of pregnant women with High BMI.

Materials and Methods

Study design and setting: This was an observational study conducted in the Department of Obstetrics and Gynaecology at a tertiary care hospital over a period of 18 months.

Study population: The study included 48 women with singleton pregnancies, identified as having high BMI (>25 kg/m²) in the first or early second trimester, registered for antenatal care and subsequently delivering at the tertiary care centre.

Eligibility criteria: Women with singleton pregnancies, primigravidae and multigravidae meeting the study criteria, and those willing to participate were included. Women with a previous uterine scar and those with pre-existing diabetes mellitus, hypertension or other chronic medical disorders diagnosed before pregnancy were excluded.

Data collection: After obtaining informed consent, demographic details, obstetric and medical history, antenatal complications, maternal weight and height were recorded in a structured proforma. BMI was calculated as weight (kg)/height (m²). Participants were classified as overweight (25–29.99 kg/m²) or obese (≥30 kg/m²). Labour was monitored using a partogram. Maternal outcomes included comorbidities, mode and indication of delivery, and gestational age at delivery. Neonatal outcomes included birth weight, Apgar scores at one and five minutes, NICU admission, ventilatory support and final outcome.

©2026, IJMACR

Statistical analysis: Data were entered into Microsoft Excel and analysed using SPSS version 22. Categorical variables were summarised as frequencies and percentages. Associations between BMI category and categorical outcomes were assessed using the chi-square test. A p-value <0.05 was considered statistically significant.

Ethical considerations: Ethical clearance has been obtained from Institutional Ethical Committee. Written informed consent was obtained before the conduct of the study.

Results

A total of 48 pregnant women with elevated maternal BMI were included in the study. Of these, 43 (89.6%) were overweight and 5 (10.4%) were obese.

Sociodemographic, obstetric and maternal characteristics

The majority of participants belonged to the 26–30 years age group (47.9%), followed by 18–25 years (39.6%). Regarding parity, 54.2% were multiparous and 43.8% were primiparous. Excessive gestational weight gain was observed in 32 (66.7%) participants, while 16 (33.3%) had adequate weight gain.

Gestational hypertension was the most frequently observed maternal comorbidity, affecting 33 (68.8%) women, followed by anaemia in 18 (37.5%) and gestational diabetes mellitus in 12 (25.0%). Hypothyroidism diagnosed during pregnancy was observed in 3 (6.3%) participants. Seven women (14.6%) had no documented comorbidities.

Regarding mode of delivery, lower segment caesarean section (LSCS) was the most common, accounting for 34 (70.8%) deliveries. Spontaneous normal vaginal delivery occurred in 7 (14.6%), induced vaginal delivery in 4 (8.3%) and assisted vaginal delivery in 3 (6.3%) women. Among the 34 LSCS deliveries, fetal distress was the leading indication (55.9%), followed by cephalopelvic disproportion (17.6%), non-progress of labour (14.7%) and malpresentation (11.8%).

Table 1: Sociodemographic, obstetric and maternal characteristics of the study participants (N=48)

Variable	Category	Frequency n (%)
Age	18–25 years	19 (39.6%)
	26–30 years	23 (47.9%)
	31–35 years	6 (12.5%)
Parity	Primipara	21 (43.8%)
	Multipara	26 (54.2%)
	Grand multipara	1 (2.1%)
BMI category	Overweight (25–29.99 kg/m²)	43 (89.6%)
	Obese (≥30 kg/m²)	5 (10.4%)
Gestational weight gain	Adequate	16 (33.3%)
	Excessive	32 (66.7%)
Comorbidities*	Hypothyroidism diagnosed in pregnancy	3 (6.3%)
	Anaemia diagnosed in pregnancy	18 (37.5%)
	Gestational diabetes mellitus	12 (25.0%)
	Gestational hypertension	33 (68.8%)
	No comorbidities	7 (14.6%)
Mode of delivery	Spontaneous normal vaginal delivery	7 (14.6%)
	Induced normal vaginal delivery	4 (8.3%)
	Assisted normal vaginal delivery	3 (6.3%)
	LSCS	34 (70.8%)
Indications for LSCS**	Fetal distress	19 (55.9%)
	Cephalopelvic	6 (17.6%)

	disproportion	
	Non-progress of labour	5 (14.7%)
	Malpresentation	4 (11.8%)

*Comorbidities may coexist; percentages are calculated using all 48 participants. **Percentages for LSCS indications are calculated among 34 caesarean deliveries.

Association between BMI category and maternal morbidities

On analyzing the association between BMI category and maternal morbidities, hypothyroidism diagnosed during pregnancy was significantly more frequent among obese women than overweight women (40.0% versus 2.3%; χ^2=10.850; p=0.025).

Anaemia was observed in 20.0% of obese women and 39.5% of overweight women, with no statistically significant association (p=0.637). Similarly, gestational diabetes mellitus was observed in 40.0% of obese women compared with 23.3% of overweight women (p=0.587). Gestational hypertension was present in all five obese women (100%) and 65.1% of overweight women; however, this association was not statistically significant (p=0.167).

Table 2: Association between BMI category and maternal morbidities (N=48)

Maternal morbidity / status	Overweight (n=43)	Obese (n=5)	Chi-square	p-value*
Hypothyroidism diagnosed in pregnancy – Yes	1 (2.3%)	2 (40%)	10.850	0.025
Hypothyroidism diagnosed in pregnancy – No	42 (97.7%)	3 (60%)		
Anaemia diagnosed in pregnancy – Yes	17 (39.5%)	1 (20%)	0.729	0.637
Anaemia diagnosed in pregnancy – No	26 (60.5%)	4 (80%)		
GDM – Yes	10 (23.3%)	2 (40%)	0.670	0.587
GDM – No	33 (76.7%)	3 (60%)		
GHTN – Yes	28 (65.1%)	5 (100%)	2.537	0.167
GHTN – No	15 (34.9%)	0 (0%)		

*p value <0.05 was considered as statistically significant

Association between BMI category and neonatal outcomes

Regarding neonatal outcomes, low birth weight was observed in 3 (60.0%) neonates born to obese mothers compared with 9 (20.9%) neonates born to overweight mothers. This association was statistically significant (χ^2=3.647; p=0.029).

An Apgar score below 7 at one minute was observed in 60.0% of neonates in the obese group compared with 39.5% in the overweight group. At five minutes, the corresponding proportions were 20.0% and 14.0%, respectively. Neither association was statistically significant (p=0.703 and p=0.389, respectively).

NICU admission was required for 60.0% of neonates born to obese mothers and 37.2% of those born to overweight mothers; this difference was not statistically significant (p=0.372). Ventilatory support was required in 4.7% of neonates in the overweight group, while none in the obese group required it (p=0.622).

Overall, 46 (95.8%) neonates were discharged, while 2 (4.2%) neonatal deaths were recorded. There was no

©2026, IJMACR

statistically significant association between BMI category and final neonatal outcome (p=0.622).

Table 3: Association between BMI category and neonatal outcomes (N=48)

Neonatal outcome / category	Overweight (n=43)	Obese (n=5)	Chi-square	p-value
Birth weight – Normal	34 (79.1%)	2 (40.0%)	3.647	0.029
Birth weight – Low	9 (20.9%)	3 (60.0%)		
Apgar at 1 min – <7	17 (39.5%)	3 (60.0%)	2.980	0.703
Apgar at 1 min – ≥7	26 (60.5%)	2 (40.0%)		
Apgar at 5 min – <7	6 (14.0%)	1 (20.0%)	5.22	0.389
Apgar at 5 min – ≥7	37 (86.0%)	4 (80.0%)		
NICU admission – Yes	16 (37.2%)	3 (60.0%)	0.973	0.372
NICU admission – No	27 (62.8%)	2 (40.0%)		
Ventilatory support– Yes	2 (4.7%)	0 (0.0%)	0.243	0.622
Ventilatory support – No	41 (95.3%)	5 (100.0%)		
Outcome – Discharge	41 (95.3%)	5 (100.0%)	0.243	0.622
Outcome – Died	2 (4.7%)	0 (0.0%)		

*p value <0.05 was considered as statistically significant

The figure shows a higher proportion of low birth weight, low Apgar scores and NICU admissions among neonates born to obese mothers compared with overweight mothers. Ventilatory support and neonatal death were observed only in the overweight group. The most notable difference was in low birth weight (60% vs 20.9%).

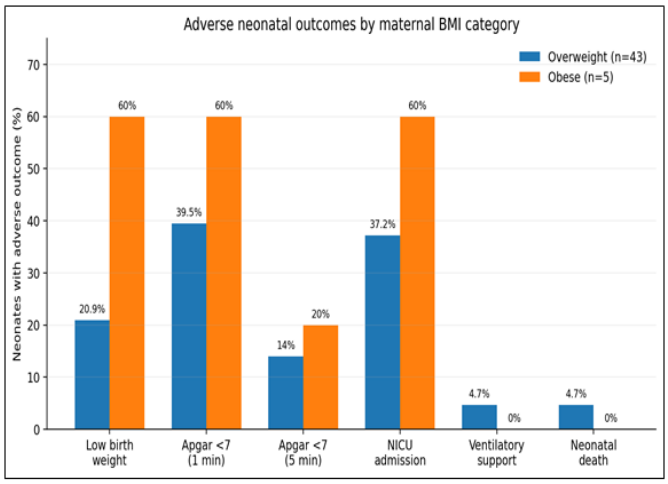


Figure 1: Adverse neonatal outcomes by maternal BMI category (N=48)

Discussion

In this observational cohort of 48 women with elevated BMI, most participants were overweight rather than obese, and excessive gestational weight gain was common. Gestational hypertension was the most frequently documented maternal comorbidity. The high proportion of LSCS (70.8%) indicates a substantial operative delivery burden in this selected tertiary-care cohort. Fetal distress accounted for more than half of the caesarean deliveries.

The principal BMI-related findings were the significant associations of obesity with hypothyroidism diagnosed during pregnancy and preterm delivery. Preterm birth occurred in 80.0% of the obese group compared with 16.3% of the overweight group. This direction of association is consistent with reports describing increased preterm birth and other adverse outcomes at higher maternal BMI[4-7]. However, the obese subgroup in the present study comprised only five women, so these

©2026, IJMACR

estimates are imprecise and should be interpreted cautiously.

Low birth weight was also significantly more frequent among neonates of obese mothers (60.0% vs 20.9%). This finding should be considered in the context of the small obese subgroup and the absence of detailed adjustment for gestational age and other potential confounders. The study did not demonstrate statistically significant associations between BMI category and Apgar scores, NICU admission, ventilatory support or neonatal mortality. The lack of statistical significance does not exclude clinically relevant differences, particularly with a sample of this size.

The LSCS rate was higher in obese than overweight women, but the difference was not statistically significant. Similar studies have reported increased operative delivery and adverse maternal or perinatal outcomes with increasing BMI, although the magnitude varies with study population, BMI classification and obstetric practice[8-11]. Differences between studies may also reflect referral patterns and the inclusion or exclusion of women with pre-existing medical disorders.

The findings are limited by the small sample size, particularly the five participants in the obese category; the single-centre tertiary-care setting; and the observational design. The study included only women with elevated BMI and therefore had no normal-BMI comparison group. The results are unadjusted, and the thesis does not provide regression estimates.

Conclusion

Among 48 pregnant women with elevated BMI, gestational hypertension and LSCS were common. Obesity was significantly associated with hypothyroidism diagnosed during pregnancy, preterm delivery and low birth weight in this cohort. Associations with LSCS, gestational diabetes, gestational hypertension, Apgar scores and NICU admission were not statistically significant. Early identification of high BMI, appropriate gestational weight-gain counselling and close maternal and fetal surveillance are warranted; larger studies are needed to confirm these findings.

References

1. Popkin BM, Corvalan C, Grummer-Strawn LM. Dynamics of the double burden of malnutrition and the changing nutrition reality. Lancet. 2020;395(10217):65-74.
2. Catalano PM, Shankar K. Obesity and pregnancy: mechanisms of short term and long term adverse consequences for mother and child. BMJ. 2017;356:j1.
3. Misra A, Chowbey P, Makkar BM, Vikram NK, Wasir JS, Chadha D, et al. Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. J Assoc Physicians India. 2009;57:163-70.
4. Deshmukh VL, Jadhav M, Yelikar K. Impact of high BMI on pregnancy: maternal and foetal outcome. J Obstet Gynecol India. 2016;66(Suppl 1):S192-S197.
5. Hemalatha N, Shanthini. Maternal body mass index and feto-maternal outcome: a comparative study. Int J Reprod Contracept Obstet Gynecol. 2019;8(3):840-844.
6. Kumar RN, Fadadu S. Association between maternal high body mass index and obstetrical outcome. Int J Health Sci. 2022;6(Suppl 6):5032-5038.
7. Kumari L, Tigga S, Kamal S, Rani S, Singh S. Association of maternal BMI with fetomaternal

©2026, IJMACR

outcomes: a prospective observational study in Jharkhand, India. Int J Life Sci Biotechnol Pharma Res. 2024;13(8):703-708.

8. Patil S, Yatam S. First trimester maternal body mass index and gestational weight gain and their association with feto-maternal outcomes. Natl J Med Res. 2023.
9. Qazi Q, Liaqat N, Afridi F, Khattak S. Association of high pre-pregnancy body mass index with adverse maternal and perinatal outcomes. Pak J Med Sci. 2024;40(3):313-317.
10. Mande SA, Jayadas J, Mote P, Rachakonda L. Association of maternal body mass index with materno-fetal outcome. Int J Med Sci Clin Res Rev. 2024;7(1):42-53.
11. Sowmya D, Haseena O, Mamatha S, Somashekar HK. A study of impact of maternal overweight and obesity on feto-maternal outcome at tertiary care center. Int J Med Pharm Res. 2025;6(5):1627-1632.

©2026, IJMACR