Open Access

Original Article

Adverse Fetomaternal Outcomes in Overweight Pregnant Women

Rimla Ijaz, Faiza Khanam, Ghanwa Bareach, Faiza Rasool, Haleema Sadia, Semab Qamar

Department of Gynaecology and Obstetrics, Combined Military Hospital Rawalpindi/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To determine adverse fetomaternal outcomes in overweight pregnant women.
Study Design: Prospective observational study
Place and Duration of Study: Department of Gynaecology and Obstetrics, Combined Military Hospital Rawalpindi, Pakistan from Nov 2023 to Apr 2024.
Methodology: This study enrolled pregnant women with singleton pregnancy presenting for their first-trimester antenatal visit. Participants were classified into two groups based on body mass index (BMI): the overweight/obese group (Group-A), comprising 75 women with a BMI ≥25 kg/m2, and the normal-weight group (Group-B), consisting of 75 women with a BMI between 18.5-24.9kg/m2. Each participant underwent at least four scheduled assessments during pregnancy to monitor maternal and fetal outcomes. Data were analysed using SPSS version 27.0.
Results: The mean age was 28.10 ± 2.96 years. In normal-weight versus overweight/obese women, the outcomes were: cesarean section 25.33% vs. 29.33%, pre-eclampsia 9.33% vs. 25.33%, pregnancy-induced hypertension 12.00% vs. 16.00%, gestational diabetes mellitus 16.00% vs. 12.00%, assisted vaginal delivery 4.00% vs. 1.33%, wound infection 4.00% vs. 5.33%, postpartum hemorrhage 8.00% vs. 5.33%, shoulder dystocia 0.00% vs. 2.67%, stillbirth 0.00% vs. 0.00%, Apgar score ≤7 at one minute 33.33% vs. 13.33%, Apgar score ≤7 at five minutes 20.00% vs. 6.67%, early neonatal death 4.00% vs. 4.00%, and neonatal intensive care unit admissions 24.00% vs. 45.33%.
Conclusion: Maternal obesity is significantly associated with adverse maternal and fetal outcomes.

Keywords: Intensive Care Units, Maternal, Neonatal, Obesity, Overweight, Pre-Eclampsia, Pregnancy

How to Cite This Article: *Ijaz R, Khanam F, Bareach G, Rasool F, Sadia H, Qamar S. Adverse Fetomaternal Outcomes In Overweight Pregnant Women. Pak Armed Forces Med J 2026; 76(Suppl-7): S1148-S1152. DOI: https://doi.org/10.51253/pafmj.v76iSUPPL-7.13683*

INTRODUCTION

Obesity is now regarded as one of the leading global health challenges. The World Health Organization (WHO) has estimated that in 2022, nearly 2.5 billion adults were overweight, including more than 890 million classified as obese.[1] This trend continues to rise, particularly among women of reproductive age, where reduced physical activity and pregnancy-related weight gain play an important role.[2-3] Pakistan faces a severe obesity crisis, with over half the population overweight and projections showing 5.4 million obese school-aged children by 2030. WHO data reveals 58.1% are overweight and 43.9% obese, rising further under Asian cutoffs.[4]

Maternal obesity is linked with several complications during pregnancy, including gestational hypertension, preeclampsia, gestational diabetes, failed labour induction, and higher rates of cesarean delivery.[5-6] Neonatal consequences include macrosomia, birth trauma, increased admissions to the neonatal intensive care unit (NICU), and prolonged hospitalization.[7-8]

Both international and local research support these associations. Melchor *et al*. documented that obese women were more likely to experience preeclampsia, induced labour, cesarean section, and the birth of infants weighing ≥4000 g, along with increased NICU admissions, though they did not find a significant link with preterm birth or neonatal mortality. Anwar *et al*. reported in Pakistani women that obesity was strongly associated with gestational hypertension, preeclampsia, gestational diabetes, labour induction, cesarean section, and delivery of large-for-gestational-age infants, although rates of small-for-gestational-age births and low Apgar scores were unaffected.[9-10]

Given the rising prevalence of obesity in Pakistan, the present study aimed to investigate its impact on adverse fetomaternal outcomes, to generate evidence to guide preventive strategies, and to improve maternal and neonatal health care.

METHODOLOGY

This prospective observational study was carried out in the Department of Gynecology and Obstetrics, Combined Military Hospital Rawalpindi, Pakistan

Correspondence: Dr Rimla Ijaz, Department of Gynaecology and Obstetrics, Combined Military Hospital Rawalpindi Pakistan
Received: 24 Jul 2025; revision received: 27 Dec 2025; accepted: 29 Dec 2025

from November 2023 to April 2024 after taking approval from the institutional ethical review committee (vide letter no 703, dated 23 October 2023).

Inclusion Criteria: Pregnant women with a confirmed singleton pregnancy who attended the Department of Obstetrics and Gynaecology for their first antenatal visit during the first trimester of gestation were included in the study.

Exclusion Criteria: Patients with Chronic hypertension, diabetes mellitus, and prior cesarean sections were excluded.

Participants were stratified into two cohorts according to BMI. The overweight/obese cohort (Group-A) included 75 women with BMI ≥25 kg/m² (50 women with BMI 25–29.9 and 25 women with BMI ≥30). The normal-weight cohort (Group-B) comprised 75 women with a BMI of 18.5–24.9 kg/m² (Figure). To minimize bias, recruitment was matched for gestational age at the first antenatal visit. Sampling was done using a non-probability consecutive technique. Written informed consent was obtained from all participants.

The sample size was calculated as 71 using the WHO calculator, based on an estimated frequency of cesarean delivery among obese women (43.6%) compared with non-obese women (16.4%), with 95% power and a 5% level of significance.[11] To account for possible dropouts, the final sample was set at 75 women in each group.

Each participant was followed through a minimum of four antenatal evaluations until delivery. Maternal outcomes included pre-eclampsia, pregnancy-induced hypertension (PIH), gestational diabetes mellitus (GDM), cesarean section (C-section), wound infection, postpartum hemorrhage (PPH), assisted vaginal delivery (AVD), shoulder dystocia, and stillbirth. Neonatal outcomes assessed were Apgar score, early neonatal death, and neonatal intensive care unit (NICU) admission.

Data were analyzed using Statistical Package for Social Sciences version 27.0. Quantitative variables were expressed as mean ± standard deviation, while categorical variables were reported as frequencies and percentages. Comparisons of fetomaternal outcomes between groups were performed using the Chi-square test, with $p \leq 0.05$ considered statistically significant.

RESULTS

The mean age of 150 participants was 28.11 ± 2.96 years. By subgroup, mean age was 27.90 ± 2.97 years in women with normal weight, 28.36 ± 2.91 years in those who were overweight (BMI 25–29.9kg/m²), and 28.20 ± 3.12 years among obese women (BMI ≥30 kg/m²). Overall mean parity was 2.09 ± 0.99, distributed as 2.79 ± 0.76 in the normal-weight category, 1.58 ± 0.71 in the overweight group, and 1.00 ± 0.00 in the obese group. The mean BMI across the sample was 25.51 ± 4.45 kg/m², with subgroup values of 21.71 ± 1.81 kg/m² for normal weight, 27.61 ± 1.21 kg/m² for overweight, and 32.68 ± 1.41 kg/m² for obese women. The mean gestational age at birth was 37.48 ± 1.40 weeks, with respective averages of 37.48 ± 1.63 weeks, 37.44 ± 1.05 weeks, and 37.56 ± 1.29 weeks for the normal, overweight, and obese groups. Details of fetomaternal outcomes are presented in Table-I.

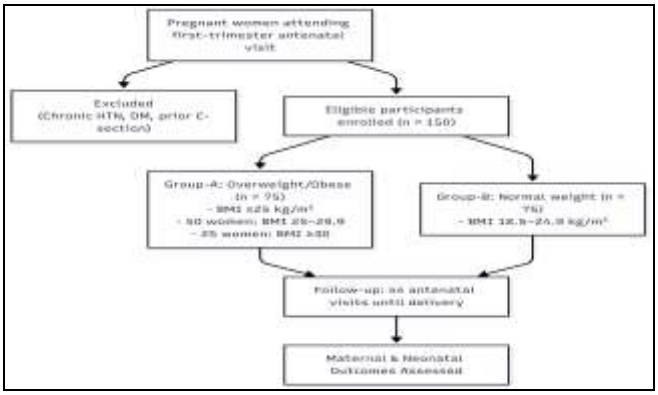

Figure: Patient flow diagram

DISCUSSION

The findings of our study show that maternal obesity is linked to higher risks of complications such as pre-eclampsia, shoulder dystocia, and lower Apgar scores Obesity has become a major global health challenge, with rising prevalence among women of reproductive age.[12] In the present study, the mean age in Group-A (overweight/obese) was 28.36 years for the overweight subgroup and 28.20 years for the obese subgroup, while in Group-B (normal weight) it was 27.90 years. Women in Group-A tended to be older than those in Group-B. Anwar *et al.*[9] reported mean ages of 30.7 ± 5.9 years for obese and 28.7 ± 5.2 years for normal-weight women, while Hanif *et al.* observed comparable values between the two groups (28.67 ± 3.30 vs. 28.84 ± 1.316 years).[11] Mean parity in this study was 2.09 ± 0.99 overall, with higher parity among normal-weight women (2.79 ± 0.76) compared to overweight (1.58 ± 0.71) and obese (1.00 ± 0.00) women. Anwar et al. described lower parity values (1.29 ± 1.14 in obese vs. 1.51 ± 1.44 in normal weight), while Hanif et al. reported significantly higher parity

Table-I: Fetomaternal Outcomes Among Groups (n=75)

Outcome	Group-A			Group-B	Total (n=150)	*p*-value
	Overweight (25–29.9 kg/m²) (n= 50)	Obese (≥30 kg/m²) (n=25)	Total (n=75)	Normal Weight (n =75)		
Pre-eclampsia						
Yes	11(22.0%)	8(32.0%)	19(25.3%)	7(9.3%)	26(17.3%)	0.02
No	39(78.0%)	17(68.0%)	56(74.7%)	68(90.7%)	124(82.7%)	
Pregnancy-Induced Hypertension						
Yes	7(14.0%)	5(20.0%)	12(16.0%)	9(12.0%)	21(14.0%)	1.00
No	43(86.0%)	20(80.0%)	63(84.0%)	66(88.0%)	129(86.0%)	
Gestational Diabetes						
Yes	8(16.0%)	1(4.0%)	9(12.0%)	12(16.0%)	21(14.0%)	0.315
No	42(84.0%)	24(96.0%)	66(88.0%)	63(84.0%)	129(86.0%)	
C-Section						
Yes	16(32.0%)	6(24.0%)	22(29.3%)	19(25.3%)	41(27.3%)	0.657
No	34(68.0%)	19(76.0%)	53(70.7%)	56(74.7%)	109(72.7%)	
Assisted vaginal delivery						
Yes	1(2.0%)	0(0.0%)	1(1.3%)	3(4.0%)	4(2.7%)	0.526
No	49(98.0%)	25(100.0%)	74(98.7%)	72(96.0%)	146(97.3%)	
Infected Wound						
Yes	1(2.0%)	3(12.0%)	4(5.3%)	3(4.0%)	7(4.7%)	0.143
No	49(98.0%)	22(88.0%)	71(94.7%)	72(96.0%)	143(95.3%)	
Postpartum Haemorrhage						
Yes	2(4.0%)	2(8.0%)	4(5.3%)	6(8.0%)	10(6.7%)	0.651
No	48(96.0%)	23(92.0%)	71(94.7%)	69(92.0%)	140(93.3%)	
Shoulder Dystocia						
Yes	0(0.0%)	2(8.0%)	2(2.7%)	0(0.0%)	2(1.3%)	0.006
No	50(100.0%)	23(92.0%)	73(97.3%)	75(100.0%)	148(98.7%)	
Still Birth						
Yes	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	–
No	50(100.0%)	25(100.0%)	75(100.0%)	75(100.0%)	150(100.0%)	
APGAR ≤7 at 1 min						
Yes	6(12.0%)	4(16.0%)	10(13.3%)	25(33.3%)	35(23.3%)	0.014
No	44(88.0%)	21(84.0%)	65(86.7%)	50(66.7%)	115(76.7%)	
APGAR ≤7 at 5 min						
Yes	3(6.0%)	2(8.0%)	5(6.7%)	15(20.0%)	20(13.3%)	0.054
No	47(94.0%)	23(92.0%)	70(93.3%)	60(80.0%)	130(86.7%)	
Early Neonatal Death						
Yes	1(2.0%)	2(8.0%)	3(4.0%)	3(4.0%)	6(4.0%)	0.458
No	49(98.0%)	23(92.0%)	72(96.0%)	72(96.0%)	144(96.0%)	
Nenoatal ICU Admissions						
Yes	21(42.0%)	13(52.0%)	34(45.3%)	18(24.0%)	52(34.7%)	0.016
No	29(58.0%)	12(48.0%)	41(54.7%)	57(76.0%)	98(65.3%)	

among obese compared with controls (2.80 ± 0.869 vs. 1.05 ± 0.951).[9,11] The mean gestational age at delivery in this study was 37.48 ± 1.40 weeks, consistent across BMI categories. Anwar et al. recorded a mean gestational age of 39 weeks, and Hanif et al. noted no significant difference between obese and normal-weight women (37.11 ± 1.641 vs. 36.87 ± 0.546 weeks).[9,11] Pre-eclampsia was more frequent in overweight and obese women, particularly those with BMI ≥30, where 32.0% were affected compared with 9.33% in the normal-weight group (p = 0.02). Similar findings have been reported by Rani et al. (p<0.001), Hanif et al. (30.9% vs. 14.5%), and Anwar *et al*. while Melchor et al. also described an increased risk among obese women.9, 10, 13 Rafat et al. further demonstrated that pre-pregnancy BMI, total gestational weight gain (TGWG), and trimester-specific gestational weight gain (TSGWG) were strongly associated with adverse maternal outcomes, with excess third-trimester gain predicting hypertension and gestational diabetes.[14] Pregnancy-induced hypertension did not differ between groups in the current study (p = 1). Rani et al. previously documented a significant association with obesity. Jabin et al. through a large multi-country cohort, confirmed that excessive gestational weight gain was linked to increased risk of PIH and emergency cesarean delivery, whereas inadequate gain was associated with small-for-gestational-age neonates, low birth weight, and adverse growth outcomes.[13,15]

Gestational diabetes mellitus (GDM) was not significantly different between groups in this study (p

= 0.315). Bokhari *et al*. and Fallatah *et al*. have shown variable associations between obesity and GDM. Rafat *et al*. also mentioned third-trimester excessive weight gain as a predictor of GDM, while Jabin *et al.* found that inadequate weight gain increased the odds of GDM (OR: 1.9, 95% CI: 1.3–2.7).7, 14-16 Chen *et al*. further demonstrated that in women with GDM, overweight and obesity (OR = 4.04, 95% CI: 2.12–7.70) and rapid gestational weight gain trajectories increased the risk of cesarean delivery.[17] In the present study, cesarean section rates did not differ significantly between BMI categories (p = 0.657). Chen *et al*. provided additional evidence that excessive gestational weight gain patterns increase cesarean risk, particularly in women with GDM. The frequency of assisted vaginal delivery was low across groups without significant variation (p = 0.526). Wound infection was slightly more common among overweight and obese women, particularly with BMI ≥30, though the association was not statistically significant (p = 0.143). Postpartum hemorrhage also showed no significant difference (p = 0.657).[17] Shoulder dystocia was more frequent among obese women (BMI ≥30), reaching statistical significance (p = 0.006). This finding corresponds with observations by Rani *et al*. who also linked maternal obesity with increased risk. No stillbirths were recorded in this study, whereas Jain et al. and Melchor *et al*. have reported variable rates across BMI categories.[10,13,18] Apgar scores ≤7 at one and five minutes were more common among neonates of overweight and obese women, with statistical significance at one minute (p = 0.014) and borderline significance at five minutes (p = 0.054). Hanif et al. similarly reported higher rates of low Apgar scores in obese pregnancies. Early neonatal death did not differ between groups (p = 0.458), though Short *et al.* and Stubert *et al.* have reported variable mortality outcomes across BMI categories.[11,19,20] Neonatal intensive care unit admissions were significantly higher among infants born to overweight and obese mothers, particularly those with BMI ≥30 (p = 0.016). Hanif *et al.* and Rani *et al.* reported comparable results, with higher NICU admission rates in neonates of obese mothers. Jabin et al. also reinforced that gestational weight gain outside optimal ranges was linked with adverse perinatal outcomes requiring increased neonatal care.[11,13,15]

LIMITATION OF STUDY

A limitation of this study is the use of a non-probability consecutive sampling technique, which may introduce selection bias. Matching was performed only for gestational age at enrollment, and residual confounding from other factors, such as socioeconomic status, dietary patterns, or physical activity, could not be fully controlled. In addition, outcomes were assessed only during the index pregnancy, without long-term follow-up of maternal or neonatal health.

CONCLUSION

Maternal obesity was linked to higher risks of complications such as pre-eclampsia, shoulder dystocia, and lower Apgar scores. While patterns for gestational diabetes and cesarean delivery varied, neonatal intensive care admissions remained consistently elevated among infants of obese mothers. These results highlight the complex influence of maternal obesity on pregnancy outcomes and the need for further investigation and preventive measures.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

RJ & FK: Data acquisition, data analysis, critical review, approval of the final version to be published.

GB & FR: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

HS & SQ: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Islam AS, Sultana H, Refat MNH, Farhana Z, Kamil AA, Rahman MM. The global burden of overweight-obesity and its association with economic status, benefiting from steps survey of WHO member states: A meta-analysis. Prev Med Rep 2024; 46: 102882. https://doi.org/10.1016/j.pmedr.2024.102882
2. Gul R, Iqbal S, Anwar Z, Ahdi SG, Ali SH, Pirzada S. Pre-pregnancy maternal BMI as predictor of neonatal birth weight. PLoS One 2020; 15(10): e0240748. https://doi.org/10.1371/journal.pone.0240748
3. Soharwardi MA, Sarwar J, Hussain E. Prevalence of underweight and obesity among women and impact on fertility: A case of Pakistan. Pak J Soc Res 2022; 4(1): 702-713. https://doi.org/10.52567/pjsr.v4i1.936
4. Ashraf T, Sultana R, Nadeem A, Lashari MN. Obesity from clinical evaluation to management local perspective. Pak Heart J 2023; 56(4): 248-249. https://doi.org/10.47144/phj.v56i4.2704
5. Langley-Evans SC, Pearce J, Ellis S. Overweight, obesity and excessive weight gain in pregnancy as risk factors for adverse pregnancy outcomes: A narrative review. J Hum Nutr Diet 2022; 35(2): 250-264. https://doi.org/10.1111/jhn.12999

6. Poniedzialek-Czajkowska E, Mierzynski R, Leszczynska-Gorzelak B. Preeclampsia and obesity-the preventive role of exercise. Int J Environ Res Public Health 2023; 20(2): 1267. https://doi.org/10.3390/ijerph20021267
7. Bokhari N, Hayat Z, Akhtar N, Asmat S. Frequency of adverse obstetric and fetal outcome among overweight and obese women. J Postgrad Med Inst 2019; 33(2): 140-145. https://jpmi.org.pk/index.php/jpmi/article/view/2420
8. Dasgupta S, Roy P, Ghosh C, Biswas J, Das P, Ghosh U, et al. A prospective cohort study of adverse fetomaternal outcomes among overweight, obese, and normal weight pregnant women with term singleton pregnancy in a tertiary care hospital. Asian J Med Sci 2022; 13(4): 106-111. https://doi.org/10.3126/ajms.v13i4.42351
9. Anwar R, Razzaq K, Parveen N. Maternal obesity and obstetric outcome in pregnant women attending PNS Shifa Karachi. Pak Armed Forces Med J 2021; 71(Suppl-1): S245-S249. https://doi.org/10.51253/pafmj.v71iSuppl-1.2837
10. Melchor I, Burgos J, Del Campo A, Aiartzaguena A, Gutierrez J, Melchor JC. Effect of maternal obesity on pregnancy outcomes in women delivering singleton babies: A historical cohort study. J Perinat Med 2019; 47(6): 625-630. https://doi.org/10.1515/jpm-2019-0103
11. Hanif S, Zubair M, Shabir N, Zia MS. A comparative study of maternal and fetal outcome in obese and non-obese pregnant women. J Soc Obstet Gynaecol Pak 2020; 10(2): 96-101. https://jsogp.net/index.php/jsogp/article/view/287
12. Thapa S, Ahmed KY, Bizuayehu HM, Huda MM, Chalise B, Bore MG, et al. Trends and social determinants of the obesity epidemic among reproductive-age women in ten asian countries. Sci Rep 2024; 14(1): 22545. https://doi.org/10.1038/s41598-024-73522-5
13. Rani S, Anjum F, Siddique AA, Khan S, Kazi K, Almas S. Maternal obesity & feto-maternal outcomes: Maternal obesity & feto-maternal outcomes. Paz BioMed J 2022; 5(6): 186-190. https://doi.org/10.54393/pbmj.v5i6.588
14. Rafat D, Nawab T, Khan T. Gestational weight gain and body mass index in asian indian women: Impact of timing and amount on fetomaternal outcomes. J Family Med Prim Care 2024; 13(10): 4399-4405. https://doi.org/10.4103/jfmpc.jfmpc_340_24
15. Jabin N, Malla L, Otieno G, Ismail LC, Barros FC, Berkley J, et al. Association between gestational age-specific weight gain in pregnancy and risk of adverse perinatal outcomes: A secondary analysis of the interbio-21st fetal study. Am J Clin Nutr 2025; 121(6): 1304-1314. https://doi.org/10.1016/j.ajcnut.2025.04.012
16. Fallatah AM, Babatin HM, Nassibi KM, Banweer MK, Fayoumi MN, Oraif AM. Maternal and neonatal outcomes among obese pregnant women in King Abdulaziz University Hospital: A retrospective single-center medical record review. Med Arch 2019; 73(6): 425-432. https://doi.org/10.5455/medarh.2019.73.425-432
17. Chen T-L, Cheng S-F, Kuo C-L, Huang C-Y, Wu C-H. Gestational weight gain patterns as predictors of cesarean deliveries in women diagnosed with gestational diabetes mellitus. BMC Pregnancy Childbirth 2025; 25(1): 79. https://doi.org/10.1186/s12884-025-07222-x
18. Jain RS, Shirodkar SD. Associated comorbidities with obesity in pregnancy and its feto-maternal outcome. Int J Reprod Contracept Obstet Gynecol 2019; 8(7): 2785-2792. https://doi.org/10.18203/2320-1770.ijrcog20193043
19. Short VL, Geller SE, Moore JL, McClure EM, Goudar SS, Dhaded SM, et al. The relationship between body mass index in pregnancy and adverse maternal, perinatal, and neonatal outcomes in rural India and Pakistan. Am J Perinatol 2018; 35(9): 844-851. https://doi.org/10.1055/s-0037-1621733
20. Stubert J, Reister F, Hartmann S, Janni W. The risks associated with obesity in pregnancy. Dtsch Arztebl Int 2018; 115(16): 276-283. https://doi.org/10.3238/arztebl.2018.0276