International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Priya P et al. Int J Reprod Contracept Obstet Gynecol. 2026 Jun;15(6):xxx-xxx
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20261485

Original Research Article

Risk factors and fetomaternal outcome in gestational diabetes mellitus: a prospective observational study from a tertiary care hospital of Delhi

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Received: 02 May 2026
Accepted: 16 May 2026

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) is defined as glucose intolerance of varying severity with onset or first recognition during pregnancy. The objectives of the study are to evaluate the risk factors of GDM and their causative role.
Methods: A total of 121 antenatal women were enrolled after informed consent and screened for GDM between 24 and 28 weeks of gestation using Diabetes in Pregnancy Study Group of India (DIPSI) criteria. Participants were classified into the GDM group (≥140 mg/dl; n=25) and non-GDM group (<140 mg/dl; n=96). Maternal risk factors were assessed and participants were followed up for evaluation of maternal and fetal outcomes.
Results: GDM showed a significant association with age ≥30 years (52% vs 16%, p<0.001), BMI >25 kg/m² (44% vs 25%, p=0.033), weight gain >10 kg (44% vs 6.3%, p=0.001), positive family history of diabetes (24% vs 4.2%, p=0.001). Maternal complications were significantly more frequent in the GDM group including LSCS (60% vs 35.4%, p=0.045), pre-eclampsia (16% vs 4.2%, p=0.034), induction of labour (40% vs 18.8%, p=0.025), UTI (20% vs 6.3%, p=0.003), polyhydramnios (8% vs 3%, p=0.046), and PPH (20% vs 6.3%, p=0.033). Neonates of GDM mothers had birth weight ≥3.5 kg (12% vs 1%, p=0.008), macrosomia (4% vs 0%, p=0.049) and NICU admission (32% vs 11.5%, p=0.012).
Conclusions: Early screening is recommended in patients with advanced maternal age, obesity, excessive gestational weight gain, or positive family history of diabetes. Appropriate and timely diagnosis and management of GDM can significantly reduce adverse maternal and neonatal outcomes; hence, early detection is essential.

Keywords: Gestational diabetes mellitus, Maternal risk factors, DIPSI screening, Fetomaternal outcome

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as glucose intolerance of varying severity with onset or first recognition during pregnancy. It is one of the most common medical disorders complicating pregnancy, affecting approximately 16.9% of pregnancies worldwide.[1] GDM significantly increases the risk of adverse maternal and obstetric outcomes. If unrecognized or inadequately managed, it can lead to serious complications, contributing to increased perinatal morbidity and mortality, as well as long-term metabolic disease in the mother and, in severe cases, maternal mortality.[2] Women at risk for developing Gestational Diabetes Mellitus (GDM) include those with a family history of diabetes, a previous delivery of a large baby weighing 4 kg or more, or a history of stillbirth. Additional risk factors include history of unexplained perinatal losses, maternal obesity (body mass index (BMI) of more than 25 kg/m²), and advancing maternal age, particularly above 30 years.[3]

Bad obstetric history which may include previous unexplained perinatal loss, intrauterine fetal demise, or the birth of congenitally malformed babies, poor dietary habits and lack of physical activity are all well-established risk

factors that significantly increase the likelihood of developing gestational diabetes mellitus (GDM).[4,5] Furthermore, sedentary lifestyle, increased gravidity, lower socioeconomic status, and a family history of chronic diseases such as diabetes and hypertension havealso been identified as significant risk factors associated with the development of GDM.[6] GDM also increases the risk of maternal complications, such as polyhydramnios due to altered glucose regulation, a higher likelihood of operative interventions including caesarean delivery, as well as postpartum morbidities like haemorrhage that can adversely affect maternal recovery.[7] Neonates born to GDM mothers show higher rates of macrosomia, hypoglycaemia, respiratory distress, hyperbilirubinemia and increased need for NICU admission.[8]

Poor maternal glycemic control leads to disproportionate fetal growth, metabolic instability, and perinatal morbidity.[9] The aim of this research was to examine these risk factors and consequences. Our study attempted to identify important predictors such as maternal age, BMI, gravidity, accompanying complications, as well as neonatal parameters such as birth weight, Apgar scores, and NICU admission.

Aims and objectives

The objectives of the study are to evaluate the risk factors of gestational diabetes mellitus (GDM) and their causative role, to analyse demographic characteristics such as age, parity, body mass index (BMI), and family history in relation to GDM, to compare pregnancy outcomes in women with and without GDM in terms of mode of delivery as well as intrapartum and postpartum complications, and to assess fetal outcomes including birth weight, NICU admission, respiratory distress, hypoglycaemia, and hyperbilirubinemia.

METHODS

This hospital-based prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Kasturba Hospital, New Delhi, from 1st July 2024 to 31st July 2025.

Study population

A total of 121 antenatal women attending the clinic for routine check-up were enrolled after fulfilling inclusion and exclusion criteria. Inclusion criteria comprised pregnant women with singleton gestation providing informed consent, while multifetal pregnancies, overt diabetes, and comorbidities such as chronic hypertension or heart disease were excluded. Sample size was calculated based on a reported GDM prevalence of 7%, with adjustment for loss to follow-up, yielding 121 participants. Screening for GDM was carried out between 24–28 weeks of gestation using the DIPSI criteria. Each participant received 75 g of glucose dissolved in water, consumed within 5–10 minutes irrespective of fasting status, followed by a 2-hour venous plasma glucose estimation using the GOD-POD method. Women with plasma glucose ≥140 mg/dl were classified as GDM, while those with values <140 mg/dl were classified as non-GDM. The risk factors studied included: age ≥30 years, BMI >25 kg/m², pre-pregnancy weight ≥60 kg, weight gain >10 kg, family history of diabetes, and multiparity. All participants were followed until delivery, and maternal outcomes (e.g., pre-eclampsia, preterm delivery, mode of delivery, postpartum complications) and fetal outcomes (e.g., birth weight, NICU admission, neonatal complications such as respiratory distress, hyperbilirubinemia, neonatal hypoglycemia) were systematically recorded and analyzed. All women were counselled in their vernacular language regarding the procedure and benefits of participation. Written informed consent was obtained prior to enrolment.

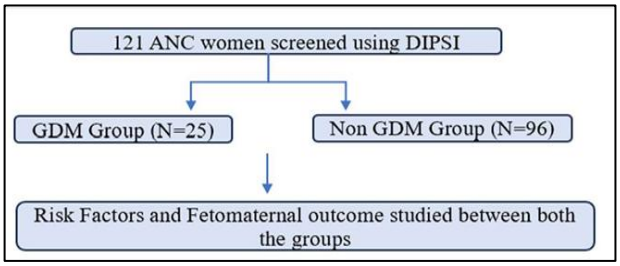

Figure 1: Study design.

A thorough antenatal history was taken, including trimester-wise complaints, past medical conditions, obstetric outcomes, and socioeconomic background. Clinical parameters such as pulse rate, blood pressure, temperature, random blood sugar, and maternal weight were charted, and first-trimester BMI was calculated.

Inclusion criteria

The study included patients who gave informed consent, pregnant women attending the antenatal clinic, those with singleton pregnancy, and those between 24 to 28 weeks of gestation.

Exclusion criteria

The study excluded patients with multifetal pregnancies, those with overt diabetes, and patients with comorbid conditions such as chronic hypertension, heart disease, or any other significant medical disorders.

Ethical consideration

The study was approved by the Institutional Ethics Committee of Kasturba Hospital. All participants provided informed consent prior to inclusion.

Statistical analysis

Statistical analysis was done using statistical packages for SPSS version 22.0 for Windows. Continuous and

categorical variables were expressed as mean ± SD and percentages, respectively. A chi-square test was done to compare categorical variables. An independent t-test was done to assess continuous variables. Logistic regression was done to see the associated risk factors. Two-sided p values were considered statistically significant at p<0.05.

RESULTS

A total of 121 pregnant women attending the antenatal OPD at 24-28 weeks of gestation were screened for GDM. The prevalence of GDM in the present study was found to be 20.7% (Table 1).

Table 1: Results of ANC screening for gestational diabetes mellitus.

	No. of ANC screened	Percentage (%)
Total	121	100
GDM	25	20.7
Non-GDM	96	79.3

Risk factors

52% of GDM women were aged ≥30 years compared to only 16.7% in the non-GDM group (p<0.001), and 44% had a BMI ≥25 kg/m² versus 25% in non-GDM (p=0.033). Weight gain exceeding 10 kg during pregnancy was observed in 44% of GDM cases, markedly higher than the 6.3% in non-GDM (p=0.001). A family history of diabetes was present in 24% of GDM women compared to 4.2% in non-GDM (p=0.001). Multiparity was also more common among GDM cases (72%) than non-GDM (42.7%) (p=0.01) (Table 2).

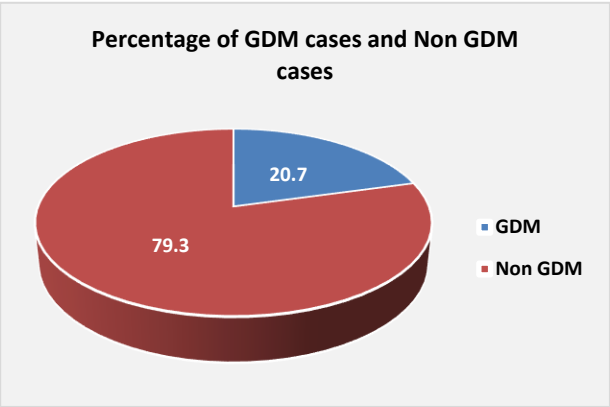

Figure 2: Percentage of GDM cases and non GDM cases.

Maternal outcomes

Maternal outcomes were significantly impacted by the presence of gestational diabetes mellitus. Women with GDM had higher rates of caesarean section (60%) compared to 35.4% in the non-GDM group (p=0.045). The incidence of pre-eclampsia was notably elevated in GDM cases (16%) versus 4.2% in non-GDM (p=0.034). Induction of labour was required in 40% of GDM pregnancies, significantly more than the 18.8% observed in non-GDM (p=0.025). Urinary tract infections were reported in 20% of GDM cases compared to 6.3% in non-GDM (p=0.003), and polyhydramnios occurred in 8% of GDM women versus 3% in non-GDM (p=0.046). Instrumental deliveries were more frequent in the GDM group (12%) than in non-GDM (3.1%) (p=0.02). Postpartum haemorrhage was also more common among GDM mothers (20%) compared to 6.3% in non-GDM (p=0.033) (Table 3).

Table 2: Comparative evaluation of risk factors.

Risk factor	GDM (%)	Non-GDM (%)	P value
Age ≥30 years	52	16.7	<0.001
BMI >25 kg/m²	44	25	0.033
Pre-pregnancy weight ≥60 kg	40	20	0.05
Weight gain >10 kg	44	6.3	0.001
Family history of diabetes	24	4.2	<0.001
Multiparity	72	42.7	0.01

Table 3: Comparative evaluation of maternal outcomes.

Outcome	GDM (%)	Non-GDM (%)	P value
LSCS	60	35.4	0.045
Pre-eclampsia	16	4.2	0.034
Induction of labour	40	18.8	0.025
UTI	20	6.3	0.003
Polyhydramnios	8	3.1	0.046
Instrumental delivery	12	3.1	0.02
Postpartum haemorrhage	20	6.3	0.033

Table 4: Comparative evaluation of fetal outcomes.

Outcome	GDM (%)	Non-GDM (%)	P value
Birth weight ≥3.5 kg	12	1	0.008
Macrosomia	4	0	0.049
NICU admission	32	11.5	0.012
Respiratory distress	4	1	0.301
Hyperbilirubinemia	8	2.1	0.141
Neonatal hypoglycaemia	8	1.05	0.203

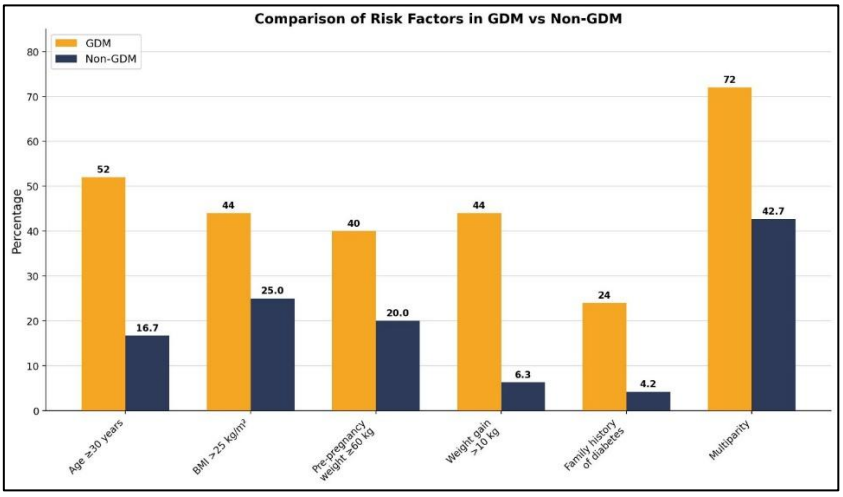

Figure 3: Comparative distribution of risk factors among GDM and non-GDM women. Advanced maternal age, higher BMI, excessive pregnancy weight gain, family history of diabetes, and multiparity were more common in GDM cases.

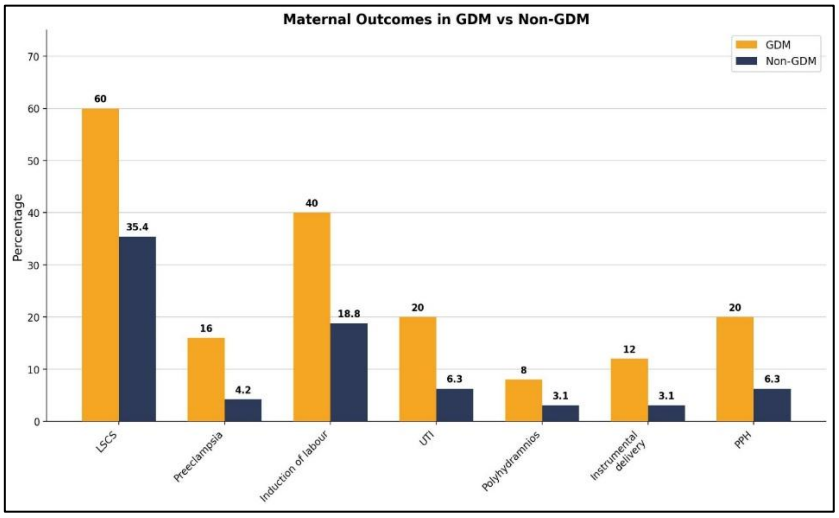

Figure 4: Maternal outcomes in GDM versus non-GDM pregnancies, showing increased obstetric and maternal complications among women with GDM.

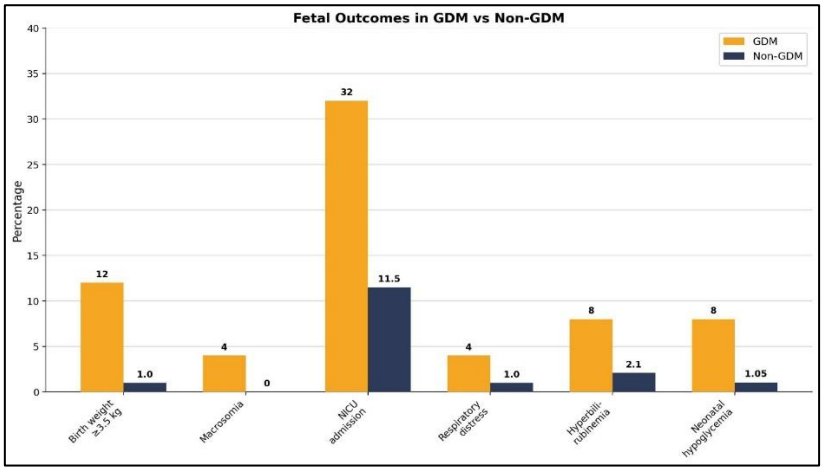

Figure 5: Fetal outcomes in GDM versus non-GDM pregnancies, demonstrating higher neonatal morbidity among infants born to GDM mothers.

Fetal outcomes

Fetal outcomes were notably affected in pregnancies complicated by gestational diabetes mellitus. Birth weight ≥3.5 kg was observed in 12% of neonates born to GDM mothers, compared to only 1% in the non-GDM group (p=0.008). Macrosomia was present in 4% of GDM cases and absent in non-GDM (p=0.049). NICU admissions were higher among GDM neonates (32%) versus 11.5% in non-GDM (p=0.012). Although respiratory distress (4% vs 1%), hyperbilirubinemia (8% vs 2.1%), and neonatal hypoglycaemia (8% vs 1.05%) were more frequent in the GDM group, these differences did not reach statistical significance (Table 4).

DISCUSSION

Gestational diabetes mellitus is the most prevalent medical complication of pregnancy and is associated with multiple risk factors. Women diagnosed with GDM are at an increased risk of various maternal complications, while their infants face a higher likelihood of morbidity and mortality. This study was a prospective observational study which aimed to study the risk factors of Gestational Diabetes Mellitus and to evaluate fetomaternal outcomes.

Risk factors

In our study, the prevalence of GDM increased significantly with advancing maternal age. Most cases were observed in women over 30 years, with a higher mean age in the GDM group compared to non-GDM (30.28±5.13 vs. 25.96±3.95 years; p<0.001).

A similar association of GDM and advanced age has been reported by Rajput et al and Dudhwadkar et al Obesity is an important risk factor in the development of GDM.[10,11] In our study GDM was found to be significantly higher in women with higher BMI. This finding aligns with Singh et al.[2] and Bhat et al who reported a significantly higher risk of GDM in women with BMI ≥25 kg/m².[12]

In our study, gestational weight gain >10 kg was significantly higher among women with GDM compared to non-GDM women (44.0% vs. 6.3%; p=0.001), identifying excessive weight gain as a key risk factor. Similar findings were reported by Jain et al who observed excess gestational weight gain in 17.85% of GDM cases, supporting its role in the development of glucose intolerance during pregnancy.[4] A positive family history of diabetes was significantly more common among women with GDM compared to non-GDM women (24.0% vs. 4.2%;p<0.001), indicating a strong familial predisposition. This finding is consistent with Kumari et al who reported a higher prevalence of family history among GDM cases (22.4% vs. 10.5%; p=0.002) in a comparable North Indian population.[13] In our study, multiparity was observed more frequently among women with GDM compared to non-GDM women (72.0% vs. 42.7%; p=0.01). Swaroop et al and Riaz et al also reported a higher prevalence of GDM among multigravidas.[14,15]

Maternal outcomes

Caesarean section rates were significantly higher among GDM women (60%) compared to non-GDM women (35.4%) (p=0.045), indicating a substantially increased likelihood of operative delivery in this cohort. This is consistent with Parekh et al, who reported a Caesarean rate of 70% among GDM women, with differences likely attributable to variations in study population characteristics and institutional obstetric practices.[16] Pre-eclampsia was significantly more prevalent in the GDM group (16% vs. 4.2%, p<0.05), corroborating findings by Kumari et al, who reported gestational hypertension in 13.5% versus 6.3% of GDM and non-GDM women respectively, possibly reflecting shared urban, tertiary-care demographic profiles.[13]

Urinary tract infections occurred significantly more frequently among GDM women (20.0% vs. 6.3%, p=0.003), a finding attributable to hyperglycaemia-induced glycosuria and impaired immune function, consistent with observations by Fareed et al and Makwana et al.[17,18] Induction of labour was significantly higher in the GDM group (40% vs. 18.8%, p=0.025), reflecting a cautious and protocolized approach to obstetric management in diabetic pregnancies.

Polyhydramnios was also significantly more common among GDM women (8.0% vs. 3.1%, p=0.046), consistent with Kanakannavar et al, who reported polyhydramnios in 20% of GDM pregnancies.[19] Postpartum haemorrhage was significantly more frequent in GDM women (20.0% vs. 6.3%, p=0.033), likely mediated by associated complications such as macrosomia and polyhydramnios, corroborating Dudhwadkar et al, and emphasizing the importance of vigilant intrapartum and postpartum surveillance in this high-risk population.[11]

Fetal outcomes

Studies have shown that compared to normal pregnancies, pregnancies involving diabetes mellitus are associated with an increased risk of neonatal morbidity and mortality. In our study, mean birth weight was significantly higher in GDM babies than non-GDM babies (3.03±0.47 kg vs 2.84±0.36 kg; p=0.008). These findings aligned with Vyas et al, highlighting poor glycaemic control in GDM as a key contributor to abnormal fetal growth.[20]

Macrosomia occurred in 4.0% of GDM neonates and in none of the non-GDM group, with a statistically significant difference (p=0.049). This finding is consistent with Vyas et al who reported macrosomia as a major neonatal complication associated with poor glycaemic control in GDM.[20] NICU admission was more common among GDM neonates (32.0%) compared to non-GDM neonates (11.5%), showing a significant difference

(p=0.012). This finding is supported by Singh et al and Kumari et al, who also reported increased NICU admissions among infants of GDM mothers.[2,13]

Respiratory distress was observed in 4.0% of GDM neonates versus 1.0% in the non-GDM group, with the difference being statistically insignificant (p=0.301). This suggests that well-controlled GDM does not significantly increase neonatal respiratory risk, likely reflecting effective glycaemic control and timely delivery practices. Similar findings were reported by Kumari et al and Swaroop et al both of whom noted non-significant rates of respiratory morbidity in GDM neonates, attributing this to optimized perinatal care.[13,14]

Hyperbilirubinemia was observed in 8.0% of GDM neonates versus 2.1% in the non-GDM group, though the difference was statistically insignificant (p=0.141). Kumari et al similarly noted a higher trend in GDM neonates, consistent with our finding, possibly explained by shared North Indian demographic characteristics.[13] This study has limitations such as a small sample size and single-centre design. The study did not assess long-term maternal and fetal outcomes. These limitations necessitate the need for large multicentric studies with long-term follow-up.

CONCLUSION

The present study demonstrated that multiple risk factors have causative association with Gestational Diabetes Mellitus. These risk factors are advanced maternal age, higher body mass index, multigravidity, excessive gestational weight gain, and positive family history of diabetes. Identification of these high-risk factors during antenatal care can help in early screening and timely intervention.

The study also establishes that GDM is not only a disorder of pregnancy but also a significant predictor of adverse maternal and neonatal health. Its impact extends beyond delivery, with long-term implications for both mother and child. Multidisciplinary management and strict glycaemic control are essential to reduce maternal and neonatal complications. Public health programs must integrate GDM awareness and screening into comprehensive maternal care services to reduce long-term health consequences.

ACKNOWLEDGEMENTS

The authors would like to thank the Department of Obstetrics and Gynaecology at Kasturba Hospital for their support in conducting this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Unnikrishnan B, Rathi P, Bhat S, Nayak P, Ravishankar N, Singh A, et al. Risk factors of gestational diabetes mellitus: A hospital-based pair-matched case-control study in coastal South India. South Afr J Obstet Gynaecol. 2020;26(1):13.
2. Singh A, Kujur A. Single-Step First Trimester Screening "Sooner the Better." J Obstet Gynecol India. 2016;66(S1):77-81.
3. Patel TL, Jadav KD. A study of feto-maternal outcome in cases of gestational diabetes mellitus. Int J Reprod Contracept Obstet Gynecol. 2023;12(2):377-81.
4. Jain U, Singhal K, Jain S, Jain D. Risk factor for gestational diabetes mellitus and impact of gestational diabetes mellitus on maternal and fetal health during the antenatal period. Int J Reprod Contracept Obstet Gynecol. 2021;10(9):3455.
5. Panigrahi A, Mallicka, Panda J. Gestational diabetes mellitus, its associated factors, and the pregnancy outcomes among pregnant women attending tertiary care hospitals of Bhubaneswar, India. Int J Diabetes Dev Ctries. 2020;40(3):371-8.
6. Veerappan PR, Lenin D, Sahaya Sona Thresa. Prevalence of Gestational Diabetes and its Related Risk Factors among Rural Pregnant Women. Indones J Obstet Gynecol. 2024;79-84.
7. Akhter S, Karim MR. Maternal and Fetal Outcome in Gestational Diabetes Mellitus. J Armed Forces Med Coll Bangladesh. 2021;16(2):18-21.
8. Bhavana K, SRS, SN, Patil D. Fetomaternal outcome in gestational diabetes mellitus: a retrospective study. Int J Reprod Contracept Obstet Gynecol. 2025;14(5):1573-81.
9. Dahiya K, Sahu J, Dahiya A. Maternal and Fetal Outcome in Gestational Diabetes Mellitus—A Study at Tertiary Health Centre in Northern India. OALib. 2014;1(3):1-5.
10. Rajput R, Yadav Y, Nanda S, Rajput M. Prevalence of gestational diabetes mellitus and associated risk factors at a tertiary care hospital in Haryana. Indian J Med Res. 2013;137(4):728-33.
11. Dudhwadkar A, Fonseca M. Maternal and fetal outcome in gestational diabetes mellitus. Int J Reprod Contracept Obstet Gynecol. 2016;5(10):3317-21.
12. Bhat M, Ramesha KN, Sarma SP, Menon S, Ganesh Kumar S. Outcome of Gestational Diabetes Mellitus from a Tertiary Referral Center in South India: A Case–Control Study. J Obstet Gynecol India. 2012;62(6):644-9.
13. Kumari R, Dalal V, Kachhawa G, Sahoo I, Khadgawat R, Mahey R, et al. Maternal and perinatal outcome in gestational diabetes mellitus in a Tertiary Care Hospital in Delhi. Indian J Endocrinol Metab. 2018;22(1):116.
14. Swaroop N, Rawat R, Lal P, Pal N, Kumari K, Sharma P. Gestational diabetes mellitus: study of prevalence using criteria of diabetes in pregnancy study group in India and its impact on maternal and

fetal outcome in a rural tertiary institute. Int J Reprod Contracept Obstet Gynecol. 2015;4(6):1950-3.
15. Riaz M, Nawaz A, Masood SN, Fawwad A, Basit A, Shera AS. Frequency of gestational diabetes mellitus using DIPSI criteria, a study from Pakistan. Clin Epidemiol Glob Health. 2019;7(2):218-21.
16. Parekh UR, Jadeja HK, Airao BB, Sarvaiya H. Data analysis on risk factors and fetomaternal outcome in gestational diabetes mellitus. Int J Reprod Contracept Obstet Gynecol. 2023;12(3):712-8.
17. Fareed P, Siraj F, Lone K. Fetomaternal outcome in women with gestational diabetes mellitus. Int J Res Med Sci. 2017;5(9):4151-5.
18. Makwana M, Bhimwal RK, Ram C, Mathur SL, Lal K, Mourya H. Gestational diabetes mellitus with its maternal and foetal outcome: a clinical study. Int J Adv Med. 2017;4(4):919-23.
19. Kanakannavar S, Umashankar KM, Gopalakrishnan S. Maternal and fetal outcome of gestational diabetes mellitus at tertiary care hospital. Int J Clin Obstet Gynaecol. 2019;3(5):368-71.
20. Vyas AH, Shah SR, Deliwala KJ, Parikh PM. Fetomaternal outcome in pregnancy with diabetes mellitus. Int J Reprod Contracept Obstet Gynecol. 2024;13(11):3280-3.

Cite this article as: Priya P, Ajmani SN, Sarbhai V, Singh B. Risk factors and fetomaternal outcome in gestational diabetes mellitus: a prospective observational study from a tertiary care hospital of Delhi. Int J Reprod Contracept Obstet Gynecol 2026;15:xxx-xx.