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Original Research Article

From diagnosis to delivery: a retrospective analysis of diabetes in pregnancy at a tertiary care centre in South India

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ABSTRACT

Background: Diabetes in pregnancy is increasing globally, driven by rising obesity and lifestyle changes. In India, gestational diabetes mellitus (GDM) affects up to 15–20% of pregnancies and contributes substantially to obstetric and neonatal morbidities. Early identification and standardized management pathways are essential. Our objective is to review the clinical patterns, management strategies, and maternal–fetal outcomes of diabetic pregnancies, highlighting key trends useful for improving antenatal care pathways.
Methods: A retrospective descriptive study was conducted among 55 pregnant women diagnosed with diabetes and managed between January and December 2025 at a tertiary care institution in South India. Maternal demographic details, comorbidities, treatment modalities, obstetric complications, and pregnancy outcomes were obtained from medical records and analyzed descriptively.
Results: Most women were aged 20-30 years (50.9%) and were primiparous (74.5%). A family history of diabetes was present in 24 (43.6%). Diabetic pregnancies showed diverse comorbid profiles, with hypertensive disorders, thyroid dysfunction, and ART conception frequently co-existing. A significant proportion (81.8%) required pharmacologic therapy for diabetes. Growth abnormalities showed distinct maternal risk patterns LGA linked to endocrine immune factors, while FGR clustered around placental dysfunction (PE, PIH, ART, twins). A sizeable proportion (40%) delivered before term due to maternal or fetal indications, highlighting the need for anticipatory delivery planning. Delivery decisions were influenced predominantly by maternal complications and fetal status. Emergency LSCS was largely driven by pre-eclampsia and fetal distress, showing how rapidly clinical status can evolve in diabetic pregnancies.
Conclusion: Maternal and fetal outcomes in diabetic pregnancies are strongly influenced by associated comorbidities such as hypertensive disorders, hypothyroidism, and assisted conception. Early diagnosis, multidisciplinary antenatal surveillance, and individualized delivery planning are essential to improve pregnancy outcomes in diabetic women.

Keywords: Gestational diabetes mellitus, Diabetes in pregnancy, Fetal growth restriction, Pre-eclampsia, Maternal outcomes, Neonatal outcomes, Tertiary care centre

INTRODUCTION

Diabetes in pregnancy has emerged as a major public health challenge worldwide, with increasing prevalence attributed to rising maternal age, obesity, sedentary lifestyles, and changing dietary patterns. It includes both gestational diabetes mellitus (GDM), defined as glucose intolerance first recognized during pregnancy, and overt diabetes mellitus diagnosed prior to or during gestation. According to the International Diabetes Federation, nearly one in six live births globally is affected by hyperglycemia in pregnancy, with the majority occurring in low- and middle-income countries such as India.[1] India carries a particularly high burden of diabetes in pregnancy, with reported GDM prevalence ranging from 15% to 20%.[2] The increasing incidence poses substantial challenges for maternal and neonatal healthcare systems due to its association with adverse obstetric and perinatal outcomes.

Maternal hyperglycemia is associated with significant short- and long-term complications affecting both mother and fetus. Women with diabetes during pregnancy are at increased risk of hypertensive disorders, cesarean delivery, infections, and future development of type 2 diabetes mellitus.[3] Fetal and neonatal complications include macrosomia, fetal growth restriction (FGR), preterm birth, congenital anomalies, respiratory distress, neonatal hypoglycemia, and increased neonatal intensive care admissions.[4] Although fetal macrosomia is classically associated with diabetes in pregnancy, coexisting maternal conditions such as pregnancy-induced hypertension (PIH), hypothyroidism, placental insufficiency, assisted reproductive technology (ART) conception, and multiple gestation may alter fetal growth patterns and contribute to FGR and preterm delivery.[5] Therefore, diabetic pregnancies require individualized antenatal surveillance and multidisciplinary management. Early identification and standardized management pathways have significantly improved outcomes in diabetic pregnancies. However, the burden of associated maternal comorbidities continues to influence clinical decision-making regarding timing and mode of delivery. Data from tertiary care centres are particularly valuable in understanding the evolving clinical profile of diabetic pregnancies and identifying trends that may improve antenatal care strategies.

The present study was undertaken to retrospectively analyze the clinical characteristics, management approaches, and maternal–fetal outcomes among diabetic pregnancies managed at a tertiary care centre in South India.

METHODS

Study design and setting

This retrospective descriptive study was conducted at a tertiary care centre in South India.

Study population

All pregnant women diagnosed with diabetes and managed between January 2025 and December 2025 were included in the study. A total of 55 diabetic pregnancies were analysed.

Inclusion criteria

Pregnant women diagnosed with gestational diabetes mellitus or overt diabetes mellitus and women managed and delivered at the study institution during the study period were included.

Exclusion criteria

Patients with incomplete medical records and pregnancies managed elsewhere with unavailable outcome data were excluded.

Data collection

Data were collected from hospital medical records and labor ward registers. Variables analyzed included: maternal age, parity, type of pregnancy, type of diabetes, associated comorbidities, treatment modality, ultrasound findings, gestational age at delivery, mode of delivery, indications for emergency cesarean section.

Statistical analysis

Data were analyzed descriptively using frequencies and percentages. Results are presented using tables and graphical summaries.

RESULTS

Baseline characteristics

A total of 55 diabetic pregnancies managed between January and September 2025 were included in the study. The majority of women belonged to the 20–30 years age group (50.9%), followed by 31–35 years (34.5%). Most patients were primigravidae (74.5%). Singleton pregnancies constituted 83.6% of cases, while twin gestations accounted for 16.4%. Among the diabetic pregnancies, GDM was more common than overt diabetes mellitus (DM), accounting for 70.9% of cases, whereas overt DM constituted 29.1%. A positive family history of diabetes was present in 24 women (43.6%), indicating a strong familial predisposition among the study population (Table 1).

Table 1: Baseline characteristics and type of diabetes.

Characteristics	Category	Number (%)
Age (in years)	20–30	28 (50.9)
	31–35	19 (34.5)
	36–40	8 (14.5)
Parity	Primigravida	41 (74.5)
	Multigravida	14 (25.5)
Type of pregnancy	Singleton	46 (83.6)
	Twins	9 (16.4)
Type of diabetes	GDM	39 (70.9)
	Overt DM	16 (29.1)
Family history of DM	Present	24 (43.6)
Other comorbidities	PIH	18 (32.7)
	ART conceived	14 (25.4)
	Hypothyroid	15 (27.3)
	Autoimmune condition (APLA+ Sjögren's syn -drome, ITP)	3 (5.4)
	ICP	1 (1.8)

Associated medical and obstetric comorbidities were frequently observed. PIH was the most common

comorbidity, seen in 18 women (32.7%). Hypothyroidism was present in 15 women (27.3%), while 14 pregnancies (25.5%) were conceived through ART. Autoimmune disorders including antiphospholipid antibody positivity, Sjögren's syndrome, and immune thrombocytopenic purpura were identified in three patients. One patient had intrahepatic cholestasis of pregnancy (ICP). Regarding management, only 18.2% of women achieved adequate glycemic control with medical nutrition therapy (MNT) alone. The majority required pharmacological treatment, with 56.4% receiving oral hypoglycemic agents (OHA) and 25.5% requiring insulin therapy (Figure 1).

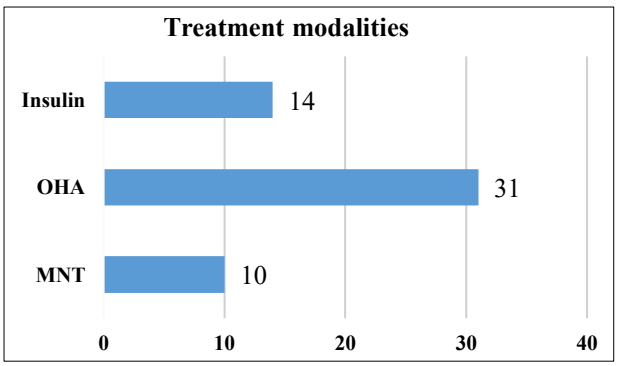

Figure 1: Treatment modalities.

Ultrasound abnormalities

Ultrasound abnormalities demonstrated varied fetal growth patterns among diabetic pregnancies. Large for gestational age (LGA) fetuses and FGR were each observed in six pregnancies (10.9%). SGA fetus was noted in one case. Polyhydramnios and oligohydramnios were identified in two and one pregnancies respectively. Further analysis of pregnancies complicated by LGA and FGR revealed differing maternal risk profiles. LGA babies were associated predominantly with endocrine and autoimmune factors including hypothyroidism and autoimmune disease. In contrast, FGR was commonly associated with placental dysfunction-related conditions such as severe pre-eclampsia, twin gestation, ART conception, PIH, and hypothyroidism (Table 2).

Pregnancy outcomes and delivery characteristics

Most pregnancies (60%) delivered beyond 37 weeks gestation. However, 40% of women required preterm delivery due to maternal or fetal indications. Deliveries between 34 and 37 weeks accounted for 27.3% of cases. Cesarean delivery was the predominant mode of delivery. Elective lower segment cesarean section (LSCS) was performed in 47.3% of women, while emergency LSCS was required in 29.1%. Normal vaginal delivery occurred in 16.4% and assisted vaginal delivery in 7.3%. The most common indications for emergency LSCS were pre-eclampsia and fetal distress, followed by meconium-stained liquor and preterm labour (Table 3 and Figure 2).

Table 2: Ultrasound findings and associated risk factors.

Ultrasound finding	Number (%)	Associated risk factors
LGA baby	6 (10.9)	Autoimmune disorders (1), hypothyroidism (2)
SGA baby	1 (1.8)	-
FGR	6 (10.9)	Severe pre-eclampsia (1), twins (2), ART conception (3), PIH (1), hypothyroidism (1)
Polyhydramnios	2 (3.6)	-
Oligohydramnios	1 (1.8)	-

Table 3: Pregnancy outcomes and delivery characteristics.

Pregnancy outcomes	Category	Number (%)
Gestational age at delivery (weeks)	26–28	2 (3.6)
	28–34	5 (9.1)
	34–37	15 (27.3)
	>37	33 (60.0)
Mode of delivery	NVD	9 (16.4)
	Assisted vaginal delivery	4 (7.3)
	Elective LSCS	26 (47.3)
	Emergency LSCS	16 (29.1)

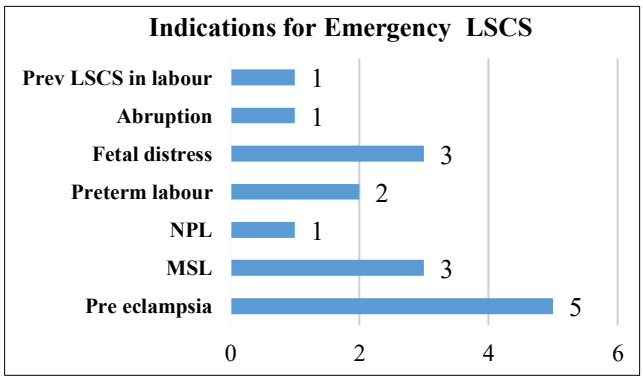

Figure 2: Indications for emergency LSCS.

Neonatal outcomes

Neonatal birth weight analysis showed that the majority of babies (58.2%) weighed between 2.5 and 3.5 kg. Low birth weight babies (<2.5 kg) accounted for a substantial proportion, likely reflecting the high incidence of preterm birth and fetal growth restriction in the study population. Five babies (9.1%) weighed more than 3.5 kg (Figure 3). 10 babies required NICU care, with latent NICU stay of 8.5 days. All babies recovered and had good outcomes because of the prompt treatment.

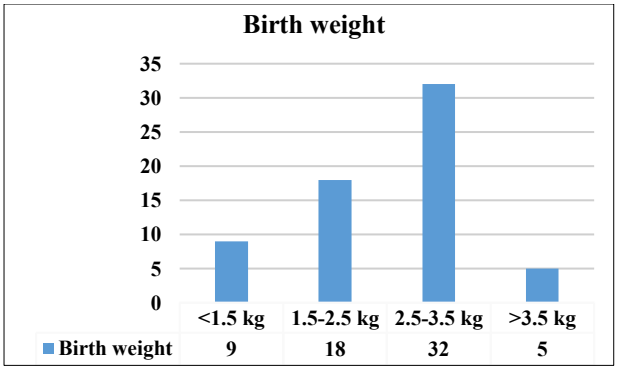

Figure 3: Birth weight distribution.

DISCUSSION

The present study highlights the evolving clinical profile of diabetes in pregnancy in a tertiary care setting and demonstrates that maternal and fetal outcomes are influenced not only by glycemic status, but also by the cumulative burden of associated comorbidities. GDM constituted the majority of cases in our cohort (70.9%), which is consistent with the rising prevalence of hyperglycemia in pregnancy reported globally and particularly in South Asian populations. Recent epidemiological studies estimate that nearly one in six pregnancies worldwide is affected by hyperglycemia, with South-East Asia carrying a disproportionately high burden.[6,7] Most women in the present study were between 20 and 30 years of age and were primigravidae. Similar demographic trends have been observed in recent Indian studies, likely reflecting increasing screening practices among young pregnant women and the growing prevalence of metabolic risk factors at earlier ages. A positive family history of diabetes was observed in 43.6% of women, reinforcing the strong genetic and familial predisposition associated with GDM. Current evidence suggests that women with a family history of diabetes are at significantly increased risk of impaired glucose tolerance during pregnancy due to underlying insulin resistance and β-cell dysfunction.[8] An important finding in our study was the high prevalence of associated comorbidities, particularly pregnancy-induced hypertension, hypothyroidism, and ART conception. The coexistence of hypertensive disorders and diabetes substantially increases maternal and fetal morbidity because both conditions contribute to endothelial dysfunction and placental insufficiency. Recent guidelines emphasize that pregnancies complicated by diabetes and hypertensive disorders require close fetal surveillance due to the increased risk of placental dysfunction, fetal compromise, and medically indicated preterm delivery.[9,10] The majority of women in our study required pharmacological treatment, with 56.4% receiving oral hypoglycemic agents and 25.5% requiring insulin therapy. Only a minority achieved glycemic control with medical nutrition therapy alone. This observation is comparable to recent evidence demonstrating that lifestyle modification alone may be inadequate in women with significant insulin resistance or multiple metabolic risk factors. ADA Standards of Care recommend initiation of pharmacologic therapy when fasting and postprandial glucose targets are not achieved with dietary modification.[11,12]

Fetal growth abnormalities were notable in our cohort, with both LGA babies and FGR occurring at similar frequencies. Traditionally, diabetes in pregnancy has been associated with fetal macrosomia due to maternal hyperglycemia and fetal hyperinsulinemia. However, recent literature increasingly recognizes that placental vascular dysfunction, hypertensive disorders, ART conception, and multiple gestation may shift fetal growth patterns toward FGR rather than macrosomia.[9,13]

In our study, LGA fetuses were more frequently associated with endocrine and autoimmune conditions, whereas FGR clustered with severe pre-eclampsia, twin pregnancies, PIH, and ART conception, supporting the multifactorial nature of fetal growth disturbances in diabetic pregnancies. Preterm delivery occurred in 40% of pregnancies in our study, predominantly due to maternal or fetal indications. Similar findings have been reported in recent studies, where diabetes complicated by hypertensive disorders significantly increased the risk of medically indicated preterm birth. The high rate of preterm delivery reflects the need for individualized delivery planning and vigilant antenatal monitoring in high-risk diabetic pregnancies.[14]

Cesarean section rates were high in the present study, with more than three-fourths of women undergoing operative delivery. Emergency cesarean sections were commonly performed for pre-eclampsia and fetal distress, illustrating the rapidly changing clinical course that may occur in diabetic pregnancies. The neonatal birth weight distribution in our cohort reflected the coexistence of both prematurity and fetal growth abnormalities. Although the majority of babies weighed between 2.5 and 3.5 kg, a significant proportion had low birth weight, likely secondary to FGR and preterm birth.

This finding further supports the concept that diabetic pregnancies are heterogeneous and that outcomes are heavily modified by associated maternal conditions rather than hyperglycemia alone. Early screening, standardized glycemic monitoring, nutritional counseling, serial fetal growth assessment, and anticipatory delivery planning are critical components of care.

The present study adds to the growing evidence from India regarding the complex interaction between diabetes and coexisting obstetric disorders. Our findings highlight that adverse outcomes are often driven by cumulative maternal risk factors such as hypertensive disorders, hypothyroidism, ART conception, and placental dysfunction, rather than isolated hyperglycemia alone. Strengthening antenatal surveillance pathways and optimizing multidisciplinary care may therefore improve pregnancy outcomes in diabetic women.

Limitations

This study was limited by its retrospective design and relatively small sample size. Long-term neonatal outcomes and postpartum maternal follow-up could not be assessed. Future prospective studies with larger populations are needed to evaluate predictors of adverse outcomes in diabetic pregnancies.

CONCLUSION

Diabetes in pregnancy remains a major contributor to maternal and neonatal morbidity. The cumulative burden of associated comorbidities such as hypertensive disorders, hypothyroidism, and ART conception significantly influences fetal growth patterns, preterm delivery, and mode of delivery. Early diagnosis, standardized glycemic management, individualized fetal surveillance, and anticipatory delivery planning are essential to improve outcomes in diabetic pregnancies.

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