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Original Research Article

Maternal and neonatal outcomes of gestational diabetes mellitus: a retrospective study at a tertiary care centre

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) is a prevalent metabolic disorder during pregnancy associated with adverse maternal and neonatal outcomes. This study aimed to assess neonatal complications associated with GDM and compare outcomes between modes of delivery.
Methods: This retrospective study was conducted at Cama and Albless Hospital, Mumbai, over one year (June 2024 to May 2025). Sixty-eight pregnant women diagnosed with GDM were included. Demographic, maternal, and neonatal data were analyzed.
Results: Mean maternal age was 29.6±4.5 years; 61.8% were multigravida. Of 68 patients, 48 (70.5%) underwent lower segment caesarean section and 20 (29.5%) had normal vaginal delivery. Neonatal complications included hypoglycemia (26.5%), macrosomia (22%), and NICU admission (32.4%). Complications were more frequent in the cesarean group.
Conclusions: GDM remains a significant risk factor for neonatal morbidity. Early screening, consistent antenatal monitoring, and adherence to standardized management protocols can help mitigate these risks.

Keywords: Caesarean section, Gestational diabetes mellitus, Hypoglycemia, Macrosomia, Neonatal outcomes, NICU admission

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as glucose intolerance first recognized during pregnancy. It results from hormonal changes that increase insulin resistance coupled with inadequate compensatory response by pancreatic β-cells. GDM affects approximately 3-10% of pregnancies worldwide, with higher rates reported in South Asian populations including India.[1,4,5] The increasing prevalence of obesity, sedentary lifestyles, and advanced maternal age has contributed to the rising incidence.[9,10]

Women with GDM often have underlying risk factors such as a family history of diabetes, polycystic ovarian syndrome, previous macrosomic babies, or a history of stillbirth. The pathophysiology involves pancreatic β-cell dysfunction that cannot compensate for insulin resistance induced by placental hormones including human placental lactogen, growth hormone, prolactin, and cortisol. This resistance peaks at 24-28 weeks of gestation, forming the basis for recommended universal screening timing.[7]

Maternal complications include increased risk of hypertensive disorders of pregnancy, polyhydramnios, infections, and operative delivery.[12] Women with GDM also have a higher likelihood of cesarean delivery due to fetal macrosomia or failed induction and a significantly increased risk of developing type 2 diabetes mellitus later in life.[5]

Neonatal complications include macrosomia, birth trauma, shoulder dystocia, neonatal hypoglycemia, hyperbilirubinemia, respiratory distress syndrome, and

increased NICU admissions.[3] Long term, these neonates face higher risks of childhood obesity, metabolic syndrome, and impaired glucose tolerance.

Management includes dietary modifications, physical activity, pharmacotherapy, and regular fetal monitoring.[6] Evidence suggests that active treatment reduces adverse outcomes.[2,11] This study was conducted to evaluate maternal and neonatal outcomes associated with GDM in a tertiary care setup, with emphasis on comparing outcomes between different modes of delivery.

METHODS

This was a retrospective observational study conducted at Cama and Albless Hospital, a tertiary care referral center in Mumbai, India, over one year from June 2024 to May 2025. The study followed Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Inclusion criteria: pregnant women diagnosed with GDM according to DIPSI or WHO criteria, singleton pregnancies, delivery at the study hospital, and availability of complete records. Exclusion criteria: pre-existing type 1 or type 2 diabetes, extra-institutional delivery, incomplete documentation, major congenital anomalies, multiple gestation, and chronic diseases confounding fetomaternal outcomes.

Consecutive sampling was used. A total of 68 patients were included: 48 (70.5%) in the LSCS group and 20 (29.5%) in the NVD group.

Data were collected from antenatal records, admission/discharge summaries, laboratory reports, operative notes, and neonatal charts. Variables: maternal age, parity, gravida, BMI, complications (preeclampsia, polyhydramnios, hypothyroidism), treatment modality, birth weight, APGAR scores, macrosomia (>4 kg), neonatal hypoglycemia (<40 mg/dL), NICU admission, RDS, and hyperbilirubinemia.

Statistical analysis was performed using SPSS version 25. Categorical variables were expressed as frequencies/percentages, continuous variables as mean±SD. Chi-square or Fisher's exact test was used for categorical comparisons and t-tests for continuous variables. $p<0.05$ was considered significant.

RESULTS

A total of 68 pregnant women with GDM were included. Mean maternal age was 29.6±4.5 years. The largest age group was 26-30 years (41.2%), followed by 31-35 years (32.3%). Multigravida constituted 61.8% of the population. Most patients belonged to lower middle (38%) and upper lower (42%) socioeconomic classes (Table 1 and 2).

Table 1: Distribution of patients by mode of delivery.

Delivery mode	Patients (N)
LSCS	48
NVD	20

Table 2: Indications for LSCS.

Indication	Number of patients
Previous C/S	20
Preeclampsia	15
Macrosomia/CPD	8
Non-reassuring FHR	5

Mode of delivery

Of 68 patients, 48 (70.5%) underwent LSCS and 20 (29.5%) had NVD. Indications for LSCS: previous caesarean section (n=20, 41.6%), preeclampsia (n=15, 31.2%), macrosomia/cephalopelvic disproportion (n=8), and non-reassuring fetal heart rate (n=5) (Table 3).

Table 3: Maternal clinical parameters by mode of delivery.

Parameter	LSCS (n=48), N (%)	NVD (n=20), N (%)	P value
Mean age (years), Mean±SD	30.2±4.3	28.1±4.9	0.089
Previous LSCS	20 (41.7)	0	<0.001*
Preeclampsia	15 (31.3)	2 (10)	0.024*
Hypothyroidism	10 (20.8)	4 (20)	0.306
Polyhydramnios	7 (14.6)	1 (5)	0.238
Insulin use	28 (58.3)	10 (50)	0.485

*Statistically significant ($p<0.05$)

Preeclampsia and previous LSCS were significantly more common in the caesarean group. No significant differences were found in insulin use or hypothyroidism between groups.

Neonatal outcomes

Neonatal complications included hypoglycemia (n=18, 26.5%), macrosomia (n=15, 22%), and NICU admission (n=22, 32.4%). All three were more frequent in the LSCS group (Table 4 and 5).

Table 4: Neonatal outcomes by mode of delivery.

Complication	LSCS (n=48)	NVD (n=20)
Hypoglycemia	14	4
Macrosomia	11	4
NICU admission	16	6

Neonatal hypoglycemia was more frequent in the LSCS group. Macrosomia contributed to increased caesarean rates. NICU admissions were mainly for hypoglycemia, macrosomia, or transient tachypnea.

Table 5: Neonatal outcomes by mode of delivery.

Complication	Total, N (%)	LSCS (n=48), N (%)	NVD (n=20), N (%)
Hypoglycemia	18 (26.5)	14 (29.2)	4 (20)
Macrosomia	15 (22)	11 (22.9)	4 (20)
NICU admission	22 (32.4)	16 (33.3)	6 (30)

DISCUSSION

This study evaluated maternal and neonatal outcomes in pregnancies complicated by GDM at a tertiary referral center in Mumbai. The findings corroborate prior research highlighting GDM as a significant risk factor for perinatal morbidity.[2,11]

The majority of women were multigravida aged 26-35 years, consistent with known epidemiological patterns. Advanced maternal age, higher BMI, and multiparity are established risk factors for insulin resistance and poor glycemic control during pregnancy.[8] Most patients were from socioeconomically disadvantaged backgrounds, potentially affecting compliance with monitoring and treatment.

Caesarean delivery was significantly more common (70.5%), primarily for previous caesarean, preeclampsia, and macrosomia.[12] Preeclampsia was significantly associated with the LSCS group, reflecting its established link with insulin resistance, endothelial dysfunction, and metabolic syndrome common in GDM.[10]

Neonatal complications hypoglycemia (26.5%), macrosomia (22%), and NICU admission (32.4%) were consistent with prior studies. Langer et al reported macrosomia in approximately 22% of GDM cases, matching our findings.[3] Our NICU admission rate was slightly higher than the 20-25% reported by Seshiah et al, likely due to proactive NICU observation for all GDM babies.[4] Neonatal hypoglycemia is a well-recognized complication of GDM and was more prevalent in the LSCS group.[3]

The findings align with the HAPO Study, establishing a linear relationship between maternal glucose levels and adverse perinatal outcomes.[7] The MFMU Network trial by Landon et al demonstrated that active treatment of mild GDM significantly reduced fetal overgrowth, shoulder dystocia, and preeclampsia.[11] The ACHOIS trial similarly emphasized benefits of active intervention for GDM.[2] Together, these trials support aggressive screening and treatment protocols.

Clinical implications

Our institutional protocol emphasizes (i) universal screening with 75 g OGTT per DIPSI criteria, (ii) multidisciplinary management, and (iii) mandatory postpartum glucose assessment at 6-8 weeks to mitigate the 30-50% lifetime risk of progression to type 2 diabetes mellitus.[5]

Despite standardized care, persistent neonatal risks underscore the need for early diagnosis, patient education, close glycemic monitoring, and timely delivery planning.

This study has few strengths. This includes tertiary care setting with structured services, complete medical records, comprehensive comparison by delivery mode.

This study has few limitations. This includes retrospective design, single-center setting, absence of a non-GDM control group, and lack of long-term outcome assessment.

CONCLUSION

This study confirms that GDM is associated with significant neonatal morbidity even with standardized care. High rates of neonatal hypoglycemia, macrosomia, and NICU admission were observed, with greater frequency in the LSCS group. Early screening and consistent antenatal monitoring remain essential.

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