



Mode of Delivery and Fetomaternal Outcomes in Gestational Diabetes Mellitus

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) is one of the most common complications of pregnancy, frequently linked to negative consequences for both the mother and the child. It may influence the course of labor and often prompts decisions regarding the safest mode of delivery. To determine the frequency of various modes of delivery and assess the associated fetomaternal outcomes in women diagnosed with GDM. **Methods:** This descriptive cross-sectional study was conducted over six months at a Hayatabad Medical Complex, Peshawar from March 15, 2024 to September 15, 2024. A total of 101 pregnant women with GDM were enrolled using a non-probability consecutive sampling technique. Baseline characteristics, mode of delivery, and outcomes such as pregnancy-induced hypertension, vulvovaginitis, neonatal hyperbilirubinemia, and macrosomia were documented. Data were analyzed using SPSS v26, with the Chi-square test applied to determine associations. **Results:** Cesarean section was the most common mode of delivery, observed in 60.4% of patients. Pregnancy-induced hypertension was recorded in 35.6% of participants, macrosomia in 13.9%, hyperbilirubinemia in 14.9%, and vulvovaginitis in 6.9%. No statistically significant association was found between mode of delivery and these outcomes ($p > 0.05$), although macrosomia and hyperbilirubinemia showed trends toward significance. **Conclusion:** Cesarean section remains a frequently chosen mode of delivery in women with GDM, often driven by precautionary clinical judgment. While complications such as PIH and macrosomia are common, individualized care and effective glycemic control are key to improving fetomaternal outcomes and reducing unnecessary operative deliveries.

INTRODUCTION

Gestational diabetes mellitus (GDM) is a common condition characterized by impaired glucose tolerance first recognized during pregnancy. The rate of impact ranges from 1% to 14% of pregnancies based on population demographics and methods of evaluation. Recent focus has been placed on the 'prevalence of gestational diabetes mellitus (GDM) and its enduring effects on mothers and children' owing to the sharp increase in GDM prevalence [1-3].

Gestational diabetes mellitus (GDM) increases the risk of several pregnancy and delivery concerns, such as the likelihood of a cesarean section, hypertensive disorders, infections, and complications during labor. For the fetus, the potential effects include macrosomia, shoulder dystocia, trauma during birthing, as well as hypoglycemia and respiratory distress postnatally. These consequences not only elevate the demand for considerable medical treatment but also instill lifelong complications, including obesity and type 2 diabetes during childhood [4-6].

Management of GDM generally consists of dietary changes and blood sugar monitoring, with insulin prescribed when

diet alone is inadequate. Despite best practices, certain obstetric care decisions related to the timing and method of delivery continue to be influenced by strategy. Clinicians tend to be more proactive and prefer cesarean delivery due to 'guilt' of not managing potential complications; however, in some well-controlled patients, safe vaginal delivery is still possible [7-9].

Understanding how GDM influences delivery mode and associated outcomes is vital for tailoring patient care and improving perinatal safety. The aim was to explore the frequency of different delivery methods and examine their relationship with common fetomaternal complications in GDM-affected pregnancies.

METHODOLOGY

This descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Hayatabad Medical Complex, Peshawar for a duration of six months (March 15, 2024 to September 15, 2024) after the research proposal was sanctioned by the Institutional Ethical Review Committee. The main goal of the study was to evaluate the prevalence of various delivery methods as

well as the fetomaternal outcomes in women with gestational diabetes mellitus (GDM).

The study included a total of 101 participants, with the sample size calculated using the WHO sample size software. A 95% confidence level, 5% margin of error, and an expected frequency of vulvovaginitis (7%) in women with GDM were used as reference points, as per previously published literature [10]. 'A non-probability consecutive sampling technique was employed to recruit participants who fulfilled the eligibility criteria'.

The study included women with a confirmed case of Gestational Diabetes Mellitus (GDM) and singleton pregnancies over 20 weeks' gestation who were within the age of 18 to 40 years. Women who had a previous history of cesarean section, known placenta previa, or sickle cell disease were excluded to reduce possible confounding factors that could independently alter the results regarding the mother and child's health.

Screening for gestational diabetes mellitus (GDM) follows the IADPSG guidelines which are recognized by World Health Organization. Every participant had a 75-gram oral glucose tolerance test (OGTT). 'GDM was diagnosed if any of the following criteria were met: fasting plasma glucose of 92 mg/dL or greater, a 1-hour post-load glucose > 180 mg/dL, or 2-hour post-load glucose > 153 mg/dL'. These laboratory tests were performed using standard hospital enzymatic techniques.

With informed consent acquired, qualifying participants were registered alongside their corresponding demographic information such as age, gestational age at enrollment, and parity. Participants were tracked from the antenatal period up until parturition. Delivery mode was classified as either vaginal (spontaneous or induced) or cesarean section. Outcomes were evaluated post-delivery for certain fetomaternal complications including pregnancy-induced hypertension (PIH), vulvovaginitis, neonatal hyperbilirubinemia, and macrosomia.

'PIH was diagnosed if the patient recorded a blood pressure of 140/90 mmHg or higher on two separate occasions at least four hours apart'. Vulvovaginitis was identified through clinical examination revealing dusky red vaginal mucosa and curdy white discharge extending to the perineum and groin. Neonatal hyperbilirubinemia was diagnosed when the total serum bilirubin exceeded 5 mg/dL, measured using a standard photometric method. Macrosomia was defined as a neonatal birth weight greater than 4.5 kilograms, measured using a calibrated digital scale immediately after birth.

All clinical evaluations were conducted by trained obstetricians and pediatricians using standard protocols to ensure consistency. Laboratory procedures were carried out by certified technicians under institutional quality control measures to ensure accuracy. Reliability was maintained by using the same clinical staff for assessments and standardized instruments for measurements, while validity was ensured through the use of internationally recognized diagnostic criteria.

Data were compiled and analyzed using SPSS version 26. Continuous variables such as age, gestational age, and parity were summarized as means and standard deviations. Categorical variables, including the mode of delivery and fetomaternal outcomes, were presented as

frequencies and percentages. The chi-square test was applied to examine associations between mode of delivery and fetomaternal outcomes, and a p-value of ≤ 0.05 was considered statistically significant.

RESULTS

The mean age of participants was 29.05 ± 6.59 years, with the average gestational age at delivery being 34.32 ± 3.81 weeks. The mean parity recorded among the women was 2.03 ± 1.31 .

Table 1

Demographic Characteristics of Study Population (n = 101)

Variable	Mean \pm SD
Age (years)	29.05 \pm 6.59
Gestational Age (weeks)	34.32 \pm 3.81
Parity	2.03 \pm 1.31

Among the participants, 60.4% delivered via cesarean section, while 39.6% underwent vaginal delivery.

Table 2

Mode of Delivery Distribution

Mode of Delivery	Frequency	Percentage (%)
C-section	61	60.4%
Vaginal	40	39.6%

Pregnancy-induced hypertension (PIH) was observed in 35.6% of patients. Vulvovaginitis was present in 6.9% of cases. Neonatal hyperbilirubinemia occurred in 14.9% of newborns. Macrosomia (birth weight > 4.5 kg) was recorded in 13.9% of neonates.

Table 3

Frequency of Fetomaternal Outcomes

Outcome	Yes (n)	No (n)
Pregnancy Induced Hypertension	36	65
Vulvovaginitis	7	94
Hyperbilirubinemia	15	86
Macrosomia	14	87

Chi-square analysis was used to examine the relationship between mode of delivery and fetomaternal outcomes. No statistically significant associations were found, though hyperbilirubinemia ($p = 0.0884$) and macrosomia ($p = 0.0990$) approached significance.

Table 4

Association of Mode of Delivery with Fetomaternal Outcomes (Chi-square Test)

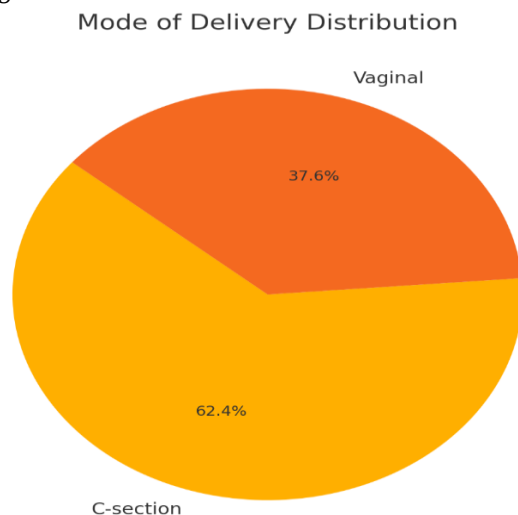
Outcome	P-value
Pregnancy Induced Hypertension	0.2622
Vulvovaginitis	0.7093
Hyperbilirubinemia	0.0884
Macrosomia	0.0990

No associations were statistically significant ($p > 0.05$) across the stratification variables. Parity and PIH showed a borderline p-value (0.0532), suggesting a trend worth investigating in larger studies.

Table 5
Stratified Chi-Square Test Results for Fetomaternal Outcomes

Outcome	Stratified By	P-Value
Pregnancy Induced Hypertension (PIH)	Age Group	0.5800
Pregnancy Induced Hypertension (PIH)	Gestational Age Group	0.2786
Pregnancy Induced Hypertension (PIH)	Parity Group	0.0532
Vulvovaginitis	Age Group	1.0000
Vulvovaginitis	Gestational Age Group	0.1810
Vulvovaginitis	Parity Group	0.6201
Hyperbilirubinemia	Age Group	0.3562
Hyperbilirubinemia	Gestational Age Group	0.5365
Hyperbilirubinemia	Parity Group	0.3571
Macrosomia	Age Group	0.2423
Macrosomia	Gestational Age Group	0.1465
Macrosomia	Parity Group	0.1153

Figure 1
Pie Chart Showing the Distribution of Mode of Delivery among 'Patients with Gestational Diabetes Mellitus'.



DISCUSSION

Our findings indicate that cesarean section was the predominant mode of delivery, accounting for 60.4% of cases, while 39.6% underwent vaginal delivery. This distribution aligns closely with the studies reported a 60% cesarean rate in GDM patients, highlighting a consistent trend of increased operative deliveries in this population [11-13].

The elevated rate of cesarean section in GDM may be attributed to a combination of factors, including the higher likelihood of fetal macrosomia, pregnancy-induced hypertension, and prolonged labor due to fetal size. In our study, macrosomia was observed in 13.9% of neonates, which is consistent with reported frequencies in previous studies, reported similar associations between GDM and increased birth weight. Although the relationship between mode of delivery and macrosomia in our sample did not

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reach statistical significance ($p = 0.099$), the near-significant trend suggests a potential clinical impact worth monitoring [14-16].

Pregnancy-induced hypertension (PIH) was noted in 35.6% of participants. This rate is higher than some regional studies but still within the expected range for GDM pregnancies. PIH in GDM may result from endothelial dysfunction caused by insulin resistance and hyperglycemia, which may contribute to placental vascular abnormalities. Our findings echo those of studies emphasized a strong link between GDM and hypertensive disorders of pregnancy [17-19].

Hyperbilirubinemia was observed in 14.9% of neonates. Although not statistically associated with delivery mode in this study ($p = 0.088$), this finding supports existing literature noting an increased risk of neonatal metabolic complications in pregnancies complicated by GDM. This may be due to immature hepatic enzyme systems in neonates exposed to hyperglycemia in utero [20].

Vulvovaginitis was identified in 6.9% of participants, closely matching the 7% reported by GDM-associated hyperglycemia can alter the vaginal microbiota, predisposing patients to infections such as candidiasis. However, no significant association was found between this outcome and the type of delivery [21].

Interestingly, none of the outcomes assessed PIH, macrosomia, hyperbilirubinemia, or vulvovaginitis showed statistically significant associations with the mode of delivery. This may suggest that while cesarean sections are more frequently performed in GDM cases, they are more likely driven by clinician preference or precautionary practice rather than specific outcomes. However, the trends observed in macrosomia and hyperbilirubinemia warrant attention in future studies with larger samples.

These findings emphasize the importance of individualized obstetric care and strict glycemic control in reducing adverse maternal and neonatal events. Though cesarean delivery remains common in GDM cases, optimal prenatal care and early detection of complications may allow for safer vaginal deliveries in selected patients.

CONCLUSION

In this study of 101 women with gestational diabetes mellitus, cesarean section was the most frequent mode of delivery. Fetomaternal complications such as pregnancy-induced hypertension, macrosomia, hyperbilirubinemia, and vulvovaginitis were commonly observed, although none were significantly associated with the mode of delivery. These findings highlight the need for careful risk assessment and clinical judgment when determining delivery plans in GDM pregnancies. Improved screening, early diagnosis, and glycemic management may help reduce unnecessary cesarean deliveries and improve maternal and neonatal health outcomes.

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