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## A Retrospective Analysis of Pregnancy Outcomes in Women with Gestational Diabetes Mellitus: A Tertiary Care Hospital Experience

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### Abstract

Gestational diabetes mellitus (GDM) increases the risk of adverse maternal and neonatal outcomes. This retrospective study analyzes the pregnancy outcomes of women with GDM at a tertiary care hospital, focusing on delivery methods, birth weights and neonatal complications. Medical records of 250 women diagnosed with GDM who delivered at the hospital from 2017-2022 were retrospectively analyzed. Data included maternal demographics, glycemic control strategies and pregnancy outcomes. Statistical analyses were performed to compare outcomes between GDM patients and the general obstetric population. The cesarean delivery rate in the GDM group was 47%, higher than in the general obstetric population. Macrosomia occurred in 22% of the cases, while neonatal hypoglycemia was observed in 18% of the neonates and 20% were admitted to the NICU. Hypertensive disorders were noted in 14% of the women. The study highlights the increased risk of cesarean delivery and neonatal complications in women with GDM, underscoring the importance of stringent glycemic control and specialized prenatal care.

## INTRODUCTION

Gestational diabetes mellitus (GDM) is a condition characterized by glucose intolerance that is first diagnosed during pregnancy. This condition poses significant health risks to both the mother and the fetus. For the mother, GDM increases the risk of developing type 2 diabetes later in life, hypertensive disorders and complications during delivery<sup>[1,2]</sup>. For the fetus, risks include macrosomia, neonatal hypoglycemia, respiratory distress syndrome and an increased likelihood of developing obesity and glucose intolerance in later life<sup>[3]</sup>.

The prevalence of GDM has been rising worldwide, in part due to increasing rates of obesity and sedentary lifestyles, which are significant risk factors for the development of this condition. The management of GDM typically involves lifestyle modifications, such as dietary changes and physical activity and may require pharmacological interventions, including insulin therapy, to achieve optimal glycemic control<sup>[4]</sup>.

Despite advancements in the management of GDM, this condition remains a leading cause of adverse pregnancy outcomes. The complications associated with GDM can vary widely depending on factors such as the degree of hyperglycemia, the timeliness and effectiveness of intervention and underlying maternal health conditions. Given the significant impact of GDM on pregnancy outcomes, there is a need for comprehensive research to better understand these outcomes and improve management strategies<sup>[5]</sup>.

This retrospective study aims to analyze pregnancy outcomes in women diagnosed with GDM who were managed at a tertiary care hospital. The study focuses on comparing delivery methods, neonatal outcomes, and maternal complications between women with GDM and a control group from the general obstetric population. By providing a detailed assessment of these outcomes, this study seeks to inform clinical practice and enhance the management of GDM in pregnant women.

## MATERIALS AND METHODS

This study was conducted in accordance with the STROBE guidelines for observational studies and received ethical approval from the hospital's Institutional Review Board.

**Study Design and Setting:** The study employed a retrospective cohort design, analyzing medical records from a tertiary care hospital. The hospital is a major referral center, providing a comprehensive range of obstetric and neonatal care services.

### Participants

#### Inclusion Criteria:

- Women diagnosed with GDM based on the criteria

set by the American Diabetes Association, which includes a 75g oral glucose tolerance test.

- Singleton pregnancies.
- Delivery at the hospital between January 2017 and December 2022.

#### Exclusion Criteria:

- Pre-existing diabetes (Type 1 or Type 2).
- Multiple pregnancies.
- Incomplete medical records.

**Data Collection:** Data were extracted from electronic medical records, including:

- **Maternal Demographics:** Age, body mass index (BMI), parity, gestational age at GDM diagnosis, and history of GDM in previous pregnancies.
- **Glycemic Control:** Information on glycemic control measures, including diet management, insulin therapy and recorded blood glucose levels during pregnancy.
- **Pregnancy and Neonatal Outcomes:** Mode of delivery (vaginal or cesarean), birth weight, incidence of macrosomia (birth weight >4000g), Apgar scores, neonatal hypoglycemia, NICU admissions and maternal complications (hypertensive disorders, polyhydramnios, preterm delivery).

**Statistical Analysis:** Descriptive statistics were used to summarize the data. Chi-square tests were used to compare categorical variables and t-tests or ANOVA were used for continuous variables. A  $p < 0.05$  was considered statistically significant. Analyses were conducted using SPSS software.

## RESULTS AND DISCUSSIONS

This table provides an overview of the baseline characteristics of women with GDM compared to a control group without GDM.

This table summarizes the methods of glycemic control and corresponding mean glucose levels among women with GDM.

This table details the comparative outcomes between the GDM group and the control group, highlighting significant differences in cesarean delivery rates, neonatal outcomes and maternal complications.

This table compares neonatal outcomes based on the adequacy of maternal glycemic control during pregnancy.

This table shows the incidence of maternal complications in the GDM group compared to the control group.

This table compares the Apgar scores of neonates born to mothers with GDM and those born to mothers without GDM.

**Table 1: Baseline Characteristics of Participants**

Characteristic	GDM Group (n=250)	Control Group (n=300)
Mean age (years)	32 ± 5	30 ± 4
Mean BMI (kg/m <sup>2</sup> )	29 ± 6	26 ± 4
Primiparous (%)	50	55
Gestational age at diagnosis (weeks)	25 ± 2	-
History of GDM (%)	30	-

**Table 2: Glycemic Control and Management**

Glycemic Control Method	Number of Patients (%)	Mean Fasting Glucose (mg/dL)	Mean Postprandial Glucose (mg/dL)
Diet alone	150 (60%)	92 ± 10	128 ± 15
Insulin therapy	100 (40%)	88 ± 9	122 ± 12

**Table 3: Pregnancy and Neonatal Outcomes**

Outcome	GDM Group (n=250)	Control Group (n=300)	p-value
Cesarean delivery (%)	47	25	<0.01
Vaginal delivery (%)	53	75	<0.01
Macrosomia (%)	22	10	<0.01
Neonatal hypoglycemia (%)	18	5	<0.01
NICU admission (%)	20	10	<0.01
Hypertensive disorders (%)	14	7	<0.05
Preterm delivery (%)	12	8	0.07

**Table 4: Neonatal Outcomes by Glycemic Control**

Glycemic Control	Macrosomia (%)	Neonatal Hypoglycemia (%)	NICU Admission (%)
Adequate Control	15	10	15
Inadequate Control	30	25	28
p-value	<0.01	<0.01	<0.01

**Table 5: Maternal Complications**

Complication	GDM Group (%)	Control Group (%)	p-value
Hypertensive disorders	14	7	<0.05
Polyhydramnios	10	5	<0.05
Preterm delivery	12	8	0.07
Postpartum hemorrhage	8	4	0.10

**Table 6: Apgar Scores at 1 and 5 Minutes**

Apgar Score	GDM Group (n=250)	Control Group (n=300)	p-value
< 7 at 1 minute	15	10	0.08
< 7 at 5 minutes	5	3	0.15
Mean score at 1 min	8.0 ± 1.2	8.5 ± 1.1	0.02
Mean score at 5 min	9.0 ± 0.5	9.2 ± 0.4	0.05

**Table 7: Length of Hospital Stay**

Length of Stay (days)	GDM Group (n=250)	Control Group (n=300)	p-value
1-2	40	55	0.03
3-4	150	180	0.10
> 4	60	65	0.12
Mean length of stay	3.5 ± 1.2	3.2 ± 1.1	0.04

This table shows the distribution of the length of hospital stay for mothers in the GDM group compared to the control group, highlighting a slightly longer stay for the GDM group.

The findings from this retrospective analysis indicate that women with GDM face a higher risk of adverse pregnancy outcomes compared to the general obstetric population. The elevated rate of cesarean deliveries in the GDM group is consistent with previous studies, likely due to concerns over fetal macrosomia and other complications associated with GDM. This study found that nearly half of the women with GDM underwent cesarean delivery, significantly higher than the rate observed in the control group<sup>[6-8]</sup>.

**Maternal and Neonatal Complications:** The study also highlights the increased prevalence of hypertensive disorders among women with GDM, further complicating pregnancy management. These disorders,

along with other conditions such as polyhydramnios, contribute to the decision to opt for cesarean delivery to mitigate risks. The incidence of macrosomia, neonatal hypoglycemia and NICU admissions was notably higher in the GDM group. These complications underscore the critical need for strict glycemic control during pregnancy to minimize risks to both mother and child<sup>[6,9]</sup>.

**Impact of Glycemic Control:** The analysis demonstrated that adequate glycemic control significantly reduces the incidence of adverse neonatal outcomes. Women who maintained better glycemic control had lower rates of macrosomia, neonatal hypoglycemia and NICU admissions. This finding reinforces the importance of managing blood glucose levels effectively during pregnancy, which can be achieved through a combination of dietary management, regular monitoring and insulin therapy when necessary<sup>[10-13]</sup>.

**Hospital Stay and Healthcare Utilization:** The length of hospital stay was marginally longer for women in the GDM group, reflecting the need for extended monitoring and management of complications associated with the condition. This not only impacts healthcare costs but also underscores the importance of optimizing prenatal care to potentially reduce the need for prolonged hospital stays<sup>[2,13]</sup>.

**Strengths and Limitations:** The strengths of this study include a large sample size and comprehensive data collection, allowing for a detailed analysis of pregnancy outcomes associated with GDM. However, the study's retrospective nature may limit the ability to establish causality. Additionally, as the study was conducted in a single tertiary care hospital, the findings may not be generalizable to all settings, particularly those with different patient demographics or healthcare resources.

**Future Directions:** Future research should focus on prospective studies to confirm these findings and explore the mechanisms underlying the observed differences in pregnancy outcomes. There is also a need to develop standardized protocols for the management of GDM, particularly in resource-limited settings. Interventions aimed at improving glycemic control and minimizing the risk of complications should be a priority in prenatal care programs.

## CONCLUSION

This study highlights the significant impact of GDM on pregnancy outcomes, including increased rates of cesarean delivery, macrosomia and neonatal complications. Effective management of GDM, including stringent glycemic control and comprehensive prenatal care, is crucial for minimizing these risks. Healthcare providers should be aware of the elevated risks associated with GDM and take proactive measures to optimize care for affected women. Further research and improved clinical guidelines are needed to enhance the management and outcomes of pregnancies complicated by GDM.

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