

Comparison of Maternal and Neonatal Complications in Women with and without Gestational Diabetes Mellitus

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Introduction:

GDM is most frequently a metabolic pregnancy complication, with an incidence ranging from 1 to 14%, depending on the diagnostic criteria and features of the selected group.¹ Type 2 diabetes is significantly more common in those with GDM, and there is also a higher risk of prenatal morbidity. Uncontrolled glucose levels are linked to perinatal risk in GDM, and GDM treatment may reduce problems.²

In GDM, the independent correlation between birth weight and cesarean section rates is over

Abstract

Background:

Gestational Diabetes Mellitus (GDM) is a common pregnancy-related metabolic disorder associated with adverse maternal and neonatal outcomes. Gestational Diabetes Mellitus is characterized by glucose intolerance that develops during pregnancy. It affects approximately 7% of all pregnancies and has been linked to an increased risk of maternal and neonatal complications.

Objective:

The study was aimed to provide a comprehensive comparison of maternal and neonatal complications in women with and without GDM involving a thorough examination of medical records and clinical data to identify patterns and associations between GDM and various complications.

Methods:

A retrospective cohort study was conducted, including pregnant women with and without GDM who received prenatal care and underwent hospital delivery at the Department of Obstetrics and Gynecology, Enam Medical College and Hospital, Dhaka, Bangladesh from June 2022 to June 2023. Clinical data, including maternal age, gestational age at diagnosis, parity, and antenatal care were collected. Pregnancy outcomes, such as maternal complications, and live birth complications were also assessed.

Result:

A total of 60 pregnant women were included in the analysis, 30 were diagnosed with GDM and 30 without GDM. Analysis of pregnancy outcomes revealed a higher incidence of cesarean section deliveries in the GDM group ($p < .05$). Additionally, infants born to mothers with GDM had a higher risk of neonatal complications.

Conclusions:

Women diagnosed with GDM demonstrated distinct clinical characteristics and experienced a higher incidence of adverse pregnancy outcomes. These findings underscore the importance of effective management and close monitoring of pregnant women with GDM to optimize maternal and neonatal health.

Keywords: Gestational diabetes mellitus, Pregnancy outcome, Maternal, Neonatal complication

35%, whereas it is just 20% in the overall population. When GDM is diagnosed on its own, choosing to deliver a baby via cesarean section is simpler.^{3,4} Both induced and early spontaneous labour are more likely in people with GDM. According to research by Beigelman et al, the prevalence of spontaneous preterm labour varied from 7% in non-diabetics to 25% in pregestational diabetes and 10% in GDM.⁵ GDM women more often have a history of early fetal loss, and GDM can be the link between spontaneous abortions, PCOS, and insulin resistance.⁶ All forms of

diabetes in pregnancy are related to an increased risk for stillbirth; therefore, adequate prenatal care, a multidisciplinary approach, ultrasound monitoring, nonstress tests, and careful assessment of delivery time are needed.⁷

GDM diagnosis and screening are significant public health concerns.⁸ Numerous research studies have assessed the variables that could potentially raise the risk of gestational diabetes mellitus (GDM), including a history of GDM, pre-gestational body mass index (BMI) of at least 30 kg/m², macrosomia (birth weight greater than 4500 g or 90th percentile), a first-degree relative with type 2 diabetes, maternal age greater than 40 years, a history of prenatal loss or death, and a history of polycystic ovary syndrome. At 24–28 weeks of gestation, pregnant women who have any of these GDM risk factors are regularly evaluated for the disease.^{9,10,11} Nevertheless, it was also discovered that other variables, like a higher mother's age and pre-pregnancy body mass index (BMI), were linked to unfavorable pregnancy outcomes.^{11,12}

The findings of this study aim to contribute to a better understanding of the associations between GDM and maternal and neonatal complications. This knowledge can inform clinical practice and contribute to the development of targeted interventions aimed at reducing the risks associated with GDM.

Methods:

This study employed a retrospective cohort design involving pregnant women in their third trimester over a period at the Department of Obstetrics and Gynecology, Enam Medical College and Hospital, Dhaka, Bangladesh from June 2022 to June 2023. Data were collected from the hospital records. 500 pregnant mothers attained pre-natal checkup during this study period. Of them, patients who completed prenatal checkups and underwent hospital deliveries in the study place were included purposively for this study. Women with one or more other medical disorders, e.g., hypertension, cardiac disorders, anemia, asthma, thyroid dysfunction, and epilepsy that might affect pregnancy outcomes, were excluded from the study. Pregnant women with the history of previous DM were also excluded. The study included 60 pregnant women; among them, 30 were diagnosed with GDM, and another 30 were without GDM (Figure-1). The chi-square test was performed for categorical data and the independent t-test was performed in terms of continuous data. The odds ratio and 95% confidence interval were measured. For continuous variables, results were presented as mean. Moreover, nominal data were presented in frequency (n) and percentage (%). Two tail α level ≤ 0.05 is considered significant.

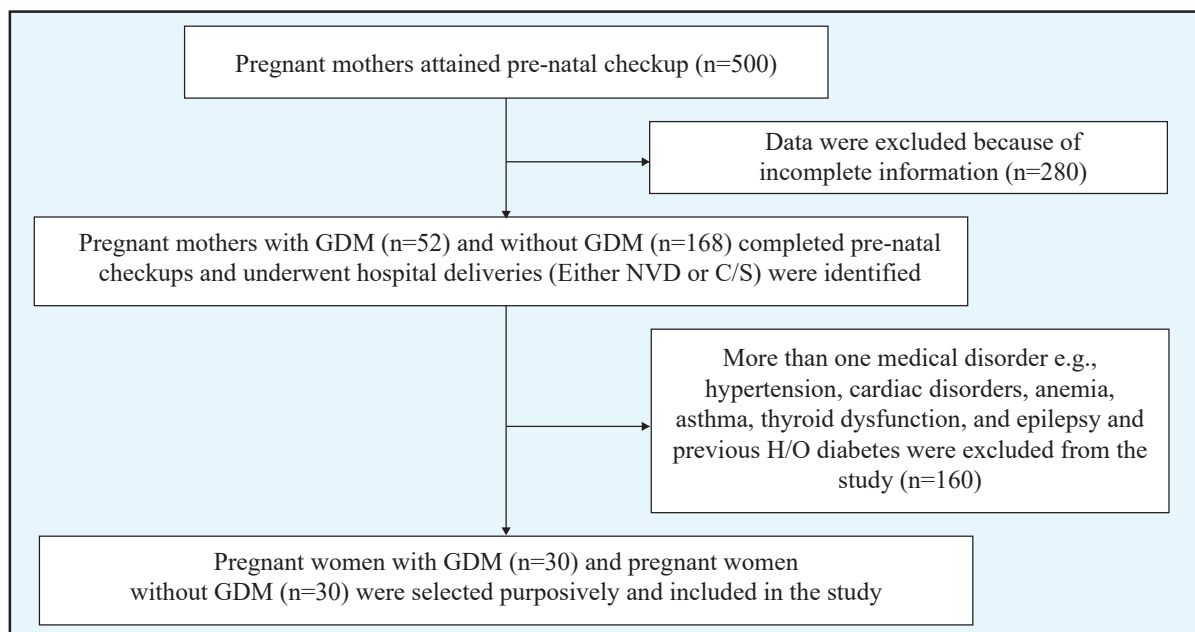


Figure-1: Flow Chart showing Selection of Study Population

Results:

Most participants in both groups were within the 20-30 age range, with a slightly higher number of participants with GDM in this age group. The group without GDM had more participants in the <20 age category. Participants with GDM had a slightly higher representation in the middle and higher socio-economic status categories compared to those without GDM. (Table-I)

Table-I: Age and socio-economic status of participants (n=60)

	Without GDM no.(%)	With GDM no.(%)	p-value
Age (Years)			
<20	4(13.33)	1(3.33)	0.3
20-30	19(63.33)	16(53.33)	
>30	6(20)	13(43.33)	
Socio-economic status			
Lower	6(20)	8(26.67)	0.41
Middle	19(63.33)	15(50)	
Higher	4(13.33)	7(23.33)	

The duration of gestation shows that for women who had gestational age >37 weeks, GDM was higher in this group, and it was statistically significant. In terms of parity, it is observed that participants with GDM tend to have higher parity (especially in the 1-2 category) compared to those without GDM. The group without GDM has a higher proportion of participants with parity 0. Participants without GDM got regular antenatal care than participants with GDM (63.33% vs 36.67%). (Table-II)

Table-III: Outcome of pregnancies among the study participants

Parameters	Without GDM no. (%)	With GDM no. (%)	p-value
Live birth	29(96.67)	27(90)	0.02
Survived	29(96.67)	24(80)	0.05
Death after birth	0	1(3.33)	0.70
Early neonatal death (END)	0	2(6.67)	0.32
Stillbirth (SB)	0	1(3.33)	0.43
Macerated	0	1(3.33)	0.51
Perinatal death (END+SB)	1	1(3.33)	0.11

Table-II: Duration of gestational age among participants (n=30)

	Without GDM no. (%)	With GDM no. (%)	p-value
Duration (Week)			
<28	2(6.67)	3 (10)	0.15
29-36	22(73.33)	16 (53.33)	0.02
>37	6 (20)	11(36.67)	0.004
Parity			
0	3(10)	10 (33.33)	0.11
1-2	24 (80)	16 (53.33)	
3	3 (10)	4 (13.33)	
Antenatal care			
None	10 (33.33)	3 (10)	0.22
Irregular	9 (30)	8 (26.67)	
Regular	11 (36.67)	19 (63.33)	

Both groups have a high rate of live births, with no reported deaths after birth in the group without GDM. The group with GDM had one early neonatal death and one stillbirth, resulting in one perinatal death. (Table-III)

Complications among live births were more prevalent in the group with GDM. Neonatal convulsions, respiratory distress, and the combination of complications were reported more frequently in this group. (Table-IV)

Maternal complications were generally higher in the group with GDM. This group experienced more cases of macrosomia, gestational hypertension, and preterm delivery. Additionally, the rate of cesarean sections was higher among participants with GDM and statistically significant. (Table-V)

Table-IV: Complications among live birth (n=60)

Complications	Without GDM (n=8) no. (%)	With GDM (n=25) no. (%)	Odds ratio	95% CI	p-value
Jaundice	5 (17.24)	7 (23.33%)	2.1	0.7-8.1	0.01
Septicemia	1 (3.45)	4 (13.79)	1.4	0.4-7.1	0.3
Respiratory distress	2 (6.90)	6 (20.69)	2.1	0.6-9.1	0.002
Neonatal convulsion	0	1 (3.45)	1.1	0.3-4.2	0.8
Jaundice + Septicemia	0	1 (3.45)	2.4	1.1-7.0	0.4
Jaundice + Respiratory	0	3 (10.35)	1.5	0.1-5.0	0.02
Respiratory+ Convulsion	0	2 (6.9)	1.7	0.6-7.0	0.04
Jaundice + Convulsion	0	1 (3.45)	1.8	0.25-7.7	0.07

Table-V: Maternal complications (n=60)

Complications	Without GDM no. (%)	With GDM no. (%)	Odds ratio	95% CI	p-value
Macrosomia	3 (10)	4 (13.33)	2.3	0.9-8.0	0.04
Gestational hypertension	3 (10)	5 (16.67)	1.1	0.25-3.0	0.4
Prematurity	3 (10)	12 (40)	4.1	1.1-11.2	0.003
Cesarean section	23 (76.67)	26 (86.67)	2.7	0.8-7.1	0.006
Preterm delivery	5 (16.67)	9 (30)	3.3	1.1-9.4	0.01

Discussion:

The study comprised a total of 60 participants, with 30 individuals diagnosed with Gestational Diabetes Mellitus (GDM) and an equal number without GDM. Regarding age distribution, participants with GDM were notably more prevalent in the 20-30 age group compared to those without GDM (53.3% vs. 31.7%). In terms of socio-economic status, a higher proportion of individuals with GDM belonged to the middle and higher status categories, with 50% falling into the higher status group, compared to 13.3% in the non-GDM group. The outcomes of pregnancies illustrated that while most of both groups experienced live births, individuals with GDM had a slightly higher incidence of perinatal complications (6.7%). Among live births, individuals with GDM had a higher percentage of complications, including jaundice, septicemia, and respiratory distress and it was found statistically significant. We compared our investigations with existing studies and found many similarities in both maternal and neonatal outcomes. The rate of emergency cesarean section to previous studies reported an increase in the cesarean delivery rate among GDM women

compared with that in normal pregnant women.¹³ Recent studies identified a C-section rate among women with GDM as high as 35% and it was statistically significant.¹³ The study by Boriboonhirunsarn and Waiyanikorn (2016) found statistically significant association between emergency caesarean section and the incidence of GDM with a significant increase in emergency cesarean section in both treated and non-treated women.¹⁴ Other studies found that the treatment of gestational diabetes reduces the rate of emergency caesarean section.¹⁵ Another study found significant association between GDM and preterm delivery, although, in the current study, the frequency of preterm delivery tended to be higher in the groups of women with GDM and it was statistically significant.¹⁶ did not show an association between GDM and neonatal jaundice.¹⁷ A study found that women with GDM were at increased risk of developing pregnancy-induced hypertension than those with normal glucose tolerance.¹⁷ In our study, maternal complications, such as gestational hypertension and cesarean section, were more prevalent in the GDM group, underscoring the potential impact of GDM on both maternal and neonatal

outcomes. GDM is a commonly prevalent medical condition during pregnancy that results in negative outcomes for millions of pregnancies. Worldwide with the rise of the number of pregnant women with GDM, pregnancy complications are increasing perpetually. Health education and risk assessment are needed to dodge adverse pregnancy outcome.

Conclusion:

Participants with GDM tend to have a higher prevalence of certain complications, both in terms of neonatal outcomes and maternal complications, suggesting a potential association between GDM and adverse pregnancy and neonatal outcomes. This study highlights the importance of monitoring and managing pregnancies in women with GDM to improve outcomes for both mothers and infants.

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