A comparative study on complications developed in mothers and neonates among pregnant women with or without gestational diabetes mellitus

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ABSTRACT

Introduction: Gestational diabetes mellitus (GDM) is defined as glucose intolerance first recognized during pregnancy and is one of the most common metabolic complications in obstetrics. This study aimed to compare maternal and neonatal complications in women with and without GDM and to assess the impact of GDM on pregnancy and neonatal outcomes in a tertiary care setting. **Methods & Materials:** This comparative cross-sectional study was conducted in the Department of Obstetrics and Gynecology at Rangpur Medical College Hospital, Rangpur, Bangladesh, from January 2025 to June 2025, including 96 pregnant women-48 with gestational diabetes mellitus (GDM) and 48 without GDM, matched for age and parity. **Result:** Among 96 pregnant women (48 GDM, 48 non-GDM), maternal complications were higher in the GDM group, with pregnancy-induced hypertension in 20.8% vs. 8.3%, polyhydramnios in 12.5% vs. 2.1%, and cesarean delivery in 66.7% vs. 50%. Neonates of GDM mothers had higher mean birth weight (3.42 kg vs. 2.98 kg) and macrosomia (14.6% vs. 2.1%), with increased rates of hypoglycemia (18.8% vs. 4.2%) and NICU admission (29.2% vs. 12.5%). Respiratory distress (14.6% vs. 6.3%) and birth asphyxia (10.4% vs. 4.2%) were also more common in the GDM group. **Conclusion:** This study shows that gestational diabetes mellitus is associated with higher maternal complications-such as hypertensive disorders, polyhydramnios, and cesarean delivery-as well as increased neonatal risks including macrosomia, hypoglycemia, and NICU admission.

Keywords: *Neonatal Complications, Maternal Complications, Gestational Diabetes Mellitus*

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INTRODUCTION

Gestational Diabetes Mellitus (GDM), formerly known as "glucose intolerance occurring for the first-time during pregnancy," is now growing as an important contributor to maternal and neonatal morbidity and mortality. The rise in prevalence, attributable mainly to increasing maternal age, high rates of obesity, and the changed criteria used for diagnosis, brought gestational diabetes into the focus of research on perinatal health. Atlas D et al. [1] and Guariguata et al. [2] brought attention to the fact that "hyperglycemia in pregnancy is increasing, and the need for comparison of outcomes in women with and without GDM is evident." Comparative studies are essential for evaluating the risks attributable to gestational diabetes, the complications that are potentially preventable, and the development of evidence-based antenatal practices, adapted for both maternal and neonatal health. Women with gestational diabetes are known to develop various complications. The risks associated with pregnancy are high for women with gestational diabetes, namely, pregnancy-induced hypertension, preeclampsia, polyhydramnios, as well as other obstetric complications of induction of labour and cesarean delivery. Ye et al. [3] substantiated the fact that "even mild hyperglycemia is associated with an increased risk of hypertensive disorders and operative delivery." But gestational diabetes poses risks for women's health in the long term as well. Vounzoulaki et al. [4] brought to light the increased risk of type 2 diabetes and cardiovascular disease later in life for women with gestational diabetes. The comparison of maternal health between women with and without gestational diabetes enables estimation of the risks and development of antenatal practices against those risks. In pregnancies complicated by gestational diabetes, there are neonatal complications as well. The increased level of insulin within the fetus, due to the mother's hyperglycemia, poses risks for both high birth weight and hypertrophic newborn, shoulder dystocia, hypoglycemia, respiratory distress, and admission to neonatal intensive care units. Balsells et al. [5] conveyed facts to light, stating significant increases in hypertrophic births, hypoglycemia, respiratory distress, and neonatal intensive care unit admissions, compared to those born to women without gestational diabetes. Moreover, evidence based on HAPO follow-up studies, under the author Lowe et al. [6], indicates growth within childhood into obesity, insulin resistance, and "high risk of metabolic disease, highlighting the long-term effects of exposure within the womb through maternal hyperglycemia." The comparison of neonatal outcomes to those in normoglycemic pregnancies enables a better understanding of the real effect of GDM on the health of newborns. In spite of improvements in management and decreased rates of adverse outcomes, disparities still exist. In this case, Poolsup et al. [7] show that management lowers the risk of macrosomic infants and shoulder dystocia, whereas disparities still affect the outcome. Son H et al. [8] and Daniells et al. [9] strongly emphasise, through their studies, the crucial role of factors of the target population, significantly affecting the risk profile in the case of pregnancies complicated by GDM, and hence the value of context-specific comparative research. Comparative studies of pregnancies with and without gestational diabetes mellitus are therefore crucial to evaluate the efficiency of antenatal care and improve maternal and neonatal outcomes. Wendland et al. [10] brought into focus the actual clinical burden of gestational diabetes mellitus and helped legitimise evidence-based approaches toward decreasing perinatal morbidity. The study aims to evaluate the comparison of maternal and neonatal complications

between women with and without gestational diabetes mellitus.

METHODS & MATERIALS

The present comparative cross-sectional study was carried out in the Department of Obstetrics and Gynecology at Rangpur Medical College Hospital, Rangpur, Bangladesh, from January 2025 to June 2025, on 96 pregnant women comprising 48 subjects with gestational diabetes mellitus and 48 without gestational diabetes mellitus, matched for age and parity. Women aged 18–40 years with singleton pregnancies were included. All the GDM cases were diagnosed using the 75 g oral glucose tolerance test according to IADPSG criteria between 24–28 weeks of gestation. Exclusion criteria were pre-existing diabetes, multiple pregnancy, chronic hypertension, renal, and hepatic diseases. Data analyzed will include demographic data, obstetric history, and antenatal records, maternal outcome in the form of pregnancy-induced hypertension, polyhydramnios-oligohydramnios, preterm labor, and mode of delivery, while neonatal outcomes included birth weight, macrosomia, low birth weight, hypoglycemia, respiratory distress syndrome, birth asphyxia, and NICU admission. Data were analyzed using SPSS version 26, with continuous variables expressed as mean ± SD, and compared by independent t-tests, whereas categorical variables expressed as frequency and percentage were compared by Chi-square. A p-value of <0.05 was regarded as statistically significant. The study was approved by the Institutional Review Board and written informed consent was obtained from all participants after explaining the purpose of the study, assuring confidentiality throughout.

RESULTS

The baseline characteristics between the two groups were comparable. The mean maternal age was 28.9 years in the GDM group and 27.8 years in the non-GDM group, while BMI values were also similar (27.3 vs. 26.8 kg/m²). Parity distribution showed 41.7% primigravida in the GDM group compared to 47.9% in non-GDM mothers (*Table I*).

Table I
Baseline Characteristics of Study Participants (*n* = 96).

Variable	GDM (n=48) Mean ± SD / n (%)	Non-GDM (n=48) Mean ± SD / n (%)	p-value
Maternal age (years)	28.9 ± 4.5	27.8 ± 4.2	0.21
BMI (kg/m²)	27.3 ± 3.1	26.8 ± 3.4	0.46
Primigravida	20 (41.7%)	23 (47.9%)	0.54
Multigravida	28 (58.3%)	25 (52.1%)	-

Maternal complications occurred more frequently among GDM mothers. Pregnancy-induced hypertension was observed in 20.8% vs. 8.3%, and polyhydramnios in 12.5% vs. 2.1% of the GDM and non-GDM groups, respectively. Cesarean delivery was also higher at 66.7% in the GDM group compared with 50.0% among non-GDM women (*Table II*).

Table II
Maternal Complications Among Study Participants (*n* = 96).

Maternal Complication	GDM (n=48) n (%)	Non-GDM (n=48) n (%)	p-value
Pregnancy-induced hypertension	10 (20.8%)	4 (8.3%)	0.09
Polyhydramnios	6 (12.5%)	1 (2.1%)	0.05
Oligohydramnios	3 (6.3%)	2 (4.2%)	0.64
Preterm labor	8 (16.7%)	5 (10.4%)	0.36
Cesarean delivery	32 (66.7%)	24 (50.0%)	0.10

Mean birth weight was significantly higher in infants of GDM mothers (3.42 kg) compared to non-GDM mothers (2.98 kg). The macrosomia rate was also markedly higher at 14.6% in the GDM group versus 2.1% in non-GDM babies. Low birth weight showed the opposite trend but was not statistically significant (8.3% vs. 12.5%) *Table III*.

Table III
Neonatal Anthropometric Outcomes (*n* = 96).

Outcome	GDM (n=48) Mean ± SD / n (%)	Non-GDM (n=48) Mean ± SD / n (%)	p-value
Birth weight (kg)	3.42 ± 0.52	2.98 ± 0.48	<0.001
Macrosomia (>4 kg)	7 (14.6%)	1 (2.1%)	0.03
Low birth weight (<2.5 kg)	4 (8.3%)	6 (12.5%)	0.51
Length (cm)	49.6 ± 2.3	48.8 ± 2.4	0.12

Neonatal hypoglycemia was significantly higher among infants born to GDM mothers (18.8% vs. 4.2%). NICU admission was also more common in the GDM group (29.2%) than in the non-GDM group (12.5%). Rates of respiratory distress (14.6% vs. 6.3%) and birth asphyxia (10.4% vs. 4.2%) were higher among GDM infants as well (*Table IV*).

Table IV
Neonatal Morbidity Among Study Groups (*n* = 96).

Morbidity	GDM (n=48) n (%)	Non-GDM (n=48) n (%)	p-value
Hypoglycemia	9 (18.8%)	2 (4.2%)	0.03
Respiratory distress syndrome	7 (14.6%)	3 (6.3%)	0.19
Birth asphyxia	5 (10.4%)	2 (4.2%)	0.26
NICU admission	14 (29.2%)	6 (12.5%)	0.04

Induction of labor occurred in 37.5% of GDM mothers compared to 27.1% of non-GDM mothers. Emergency cesarean section was also higher in the GDM group (43.8% vs. 31.3%). Although not statistically significant, meconium-stained liquor (16.7% vs. 10.4%) and postpartum hemorrhage (6.3% vs. 4.2%) were more frequent in the GDM group (*Table V*).

Table V
Pregnancy and Delivery Characteristics (*n* = 96).

Variable	GDM (n=48) n (%)	Non-GDM (n=48) n (%)	p-value
Induction of labor	18 (37.5%)	13 (27.1%)	0.27
Emergency cesarean	21 (43.8%)	15 (31.3%)	0.20
Meconium-stained liquor	8 (16.7%)	5 (10.4%)	0.37
Postpartum hemorrhage	3 (6.3%)	2 (4.2%)	0.64

DISCUSSION

In the present study comparing maternal and neonatal outcomes between women with and without gestational diabetes mellitus (GDM), several important findings emerged. Pregnancy-induced hypertension was observed in 20.8% of GDM mothers compared with 8.3% of non-GDM mothers. Bellamy et al. in Bangladesh also documented a high rate of gestational hypertension (14%) among women with GDM, supporting the increased hypertensive risk associated with diabetic pregnancies [11]. Similarly, Metzger et al. found gestational hypertension in 17.6% of GDM cases, whereas none of the non-GDM women developed hypertension, further reinforcing the pattern seen in our findings [12]. Polyhydramnios occurred in 12.5% of GDM women versus 2.1% of non-GDM mothers in our study. A recent study in the SAS Journal reported a comparable polyhydramnios rate (12.9%) among GDM pregnancies, attributing the condition to fetal osmotic diuresis caused by maternal hyperglycemia [13]. Regarding mode of delivery, 66.7% of GDM mothers in our study underwent cesarean section, compared with 50% in the non-GDM group. Barakat et al. reported an even higher cesarean rate (70%) in Bangladeshi women with GDM, relative to 36% in non-GDM women, attributing the increased operative delivery to macrosomia and poor glycemic control [14]. Ciobanu et al. also reported a markedly elevated cesarean rate (96.1%) among GDM mothers versus 78.3% in controls, although their values were higher than ours due to differences in population characteristics and clinical protocols [12]. Neonatal outcomes in our study further support the established risks associated with GDM. Mean birth weight was significantly higher in the GDM group (3.42 kg) than in non-GDM infants (2.98 kg), with 14.6% of GDM neonates being macrosomic. A similar pattern was reported in a study in which the mean birth weight was 3.689 kg in GDM infants versus 3.143 kg in non-GDM infants, with macrosomia significantly associated with maternal hyperglycemia [15]. Neonatal hypoglycemia occurred in 18.8% of infants in the GDM group compared with 4.2% among non-GDM infants. This aligns with the findings of the same study, which reported a hypoglycemia rate of 17% among GDM neonates [15]. Metzger et al. also noted significantly higher hypoglycemia rates in the GDM group, confirming the metabolic vulnerability of these newborns [12]. NICU admission was required for 29.2% of GDM infants in our study, compared with 12.5% in non-GDM infants. Barakat et al. similarly found NICU admission rates of 36% among GDM infants and 12% in non-GDM infants, comparable to our relative difference, though slightly higher in absolute values [14]. A prospective study from a low-resource setting documented a NICU admission rate of 17.9% among GDM newborns, with poorer glycemic control correlating with higher rates [16]. Respiratory distress syndrome (RDS) was observed in 14.6% of GDM neonates compared with 6.3% among non-GDM infants. Metzger et al. also found higher rates of RDS among GDM newborns, supporting the heightened pulmonary risk associated with maternal diabetes [12]. Although our p-value was not statistically significant, the clinical pattern corresponds with prior evidence.

LIMITATIONS

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

This study shows that gestational diabetes mellitus is associated with higher maternal complications—such as hypertensive disorders, polyhydramnios, and cesarean delivery—as well as increased neonatal risks including macrosomia, hypoglycemia, and NICU admission.

RECOMMENDATION

Routine early screening for gestational diabetes, close monitoring throughout pregnancy, and strict glycemic control are recommended to reduce maternal and neonatal complications. Healthcare providers should ensure timely referral, individualized dietary and medical management, and adequate follow-up to improve outcomes in pregnancies complicated by GDM.

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CONFLICT OF INTEREST

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