Original Article

Comparison of Clinical Status and Pregnancy Outcomes of Women with GDM and without GDM

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ABSTRACT

Introduction: *Gestational diabetes mellitus (GDM) is abnormal glucose tolerance first diagnosed during pregnancy. This study aims to evaluate and compare the clinical status and pregnancy outcomes between women diagnosed with gestational diabetes mellitus (GDM) and those without GDM.* ***Methods & materials:*** *A retrospective cohort study was conducted, including pregnant women with and without GDM who received prenatal care at Enam Medical College and Hospital, Dhaka, Bangladesh between July 2022 and June 2023. Clinical data, including maternal age, gestational age at diagnosis, parity, and mode of delivery were collected. Pregnancy outcomes, such as maternal complications, hypertension, neonatal birth weight, incidence of macrosomia, and other relevant parameters, were also assessed.* ***Result:*** *A total of 484 pregnant women were included in the analysis, 95 were diagnosed with GDM and 389 without GDM. Analysis of pregnancy outcomes revealed a higher incidence of cesarean section deliveries in the GDM group. Additionally, infants born to mothers with GDM had a higher risk of neonatal complications.* ***Conclusion:*** *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, Pregnancy outcome, Maternal complication, Neonatal complication*

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INTRODUCTION

The term "gestational diabetes mellitus" or GDM, refers to any level of glucose intolerance that initially appears during pregnancy. The rate of the prevalence of GDM varies between 1 and 14%[1]. The prevalence of risk factors for GDM varies by demographic, and it includes body mass index (BMI) >30 kg/m, a first-degree relative's family history of diabetes mellitus, a prior history of GDM, and Middle Eastern or Asian backgrounds[2]. According to estimates from the International Diabetes Federation, maternal dysglycemia affects one out of six pregnancies; GDM marks 84% of these pregnancies, while 16% have pregestational established diabetes[3]. Various significant observational studies have shown a link between GDM and adverse pregnancies[4, 5].

Large for gestational age (LGA), macrosomia, hypoglycemia, and the need for neonatal intensive care unit (NICU) treatment are among the conditions that affect the newborn. For the mother, these include a rise in hypertensive disorders and surgical deliveries. GDM affects the mother and child long after the baby is delivered. The impact on the long-term maternal glycaemic status and long-term glycaemic status conveys the obesity phenotype in the children, according to the most current cohort follow-up research[6,7]. Even with well-developed antenatal care services, several complications from GDM affect both the mother and the unborn child, reflecting the substantial burden that GDM places on patients, their families, and healthcare systems[8,9]. For high-risk women, early identification of gestational diabetes mellitus (GDM) offers the chance to intervene earlier and improve outcomes for the mother and the newborn[10].

Women with GDM diagnosed before 12 weeks of pregnancy had pregnancy outcomes similar to those of women with pre-existing diabetes and worse pregnancy outcomes as compared to women diagnosed between 24 and 28 weeks of pregnancy, according to an extensive retrospective research of an Australian cohort[11]. An analysis of a Middle Eastern population revealed that those with early GDM had greater rates of preterm labor and cesarean sections (CS) [12]. According to a study, women with a history of GDM in South Asia had a high incidence of DM, with notable regional variations. Despite their much lower age, Bangladeshi women exhibited significantly higher rates of DM, which may be explained by their substantially higher pregnancy rates, family history of diabetes, and overweight/obesity status[13]. Comparing the clinical conditions of maternal and newborn outcomes in pregnancies between the GDM and non-GDM groups was the purpose of this study.

METHODS & MATERIALS

This study employed a retrospective cohort design, involving pregnant women in their third trimester over a period from July 2022 to June 2023 at Enam Medical College and Hospital, Dhaka, Bangladesh. Data were collected from medical records, including maternal demographics, glycemic control measures, and maternal and neonatal outcomes. The study included 484 pregnant women, all diagnosed selected GDM cases were included in the group A=95, while selected cases without GDM were included in the group B=389.

Women with one or more other medical disorders e.g., anemia, asthma, epilepsy,

pre-pregnancy hypertension (PIH), thyroid dysfunction, and heart problems, that might affect pregnancy outcome, were excluded. The pregnant women known to have diabetes mellitus before pregnancy or who have oral glucose tolerance test (OGTT) positive in first trimester of pregnancy with unknown pre-pregnancy diabetes status were also excluded because diagnosed pregnant women with GDM in the first trimester are considered to have Type 2 DM.

Data encompassed maternal age, glucose monitoring records, blood pressure measurements, gestational age, mode of delivery, neonatal birth weight, Apgar scores, and neonatal intensive care unit (NICU) admission rates.

RESULTS

The study involved a total of 968 participants, all of whom were married. Among them, (group A=190) were diagnosed with GDM, while the majority, (group B=778) did not have GDM. Maximum patients were found under the age range of 20-30.

Table I: Distribution of the participants' age

Age	Group A	Group B
<20	16	40
20-30	110	634
>30-32	64	104
All participants were married		

In terms of parity, for those with three or more pregnancies found higher chance of GDM. However, for those with 1-2 previous pregnancies had higher rate of non GDM history. The participants were also analyzed based on gestation week, our study groups dominated the range of 29-36 gestation weeks for both GDM and non GDM. Only, three patients required irregular antenatal care (**Table I**).

Table II: Distribution of parity and gestational week of the participants

Parity	Group A	Group B
0	30	210
1-2	64	488
≥3	96	80
Gestation week	**Group A**	**Group B**
<28	14	58
29-36	112	472
>37	64	170
3 patients required irregular antenatal care		

Regarding the mode of delivery, the majority of participants underwent Lower Segment Cesarean Section (LSCS), with 870 cases. Normal Vaginal Delivery (NVD) occurred in 86 cases, and 12 participants underwent other procedures such as peripartum hysterectomy (**Table II**).

Table III: Delivery mode of the patients

Mode of Delivery	Frequency	Percentage
LSCS	870	89.88
NVD	86	8.88
Others (peripartum hysterectomy)	12	1.24

The maternal complications examined in this study include Preeclampsia (prominent), Placental Abruption, Placental Previa, Intrauterine Growth Restriction, Oligohydramnios, and

Anemia. The following table underscores the differences in the prevalence of these complications between the two groups, shedding light on potential associations between GDM and specific maternal health challenges during pregnancy (**Table III**).

Table IV: Pregnancy related complication among the patients

Maternal Complicatios	**Group A**	**Percentage**	**Group B**	**Percentage**
Preeclampsia	40	45.45	92	47.42
Placental abruption	04	4.54	24	12.37
Placental Previa	16	18.18	10	5.15
Intrauterine growth restriction	14	15.9	22	11.34
Oligohydramnios	06	6.81	34	17.53
Anemia	08	9.09	12	6.19
	n=88		*n=194*	

The **Table V** presents the outcomes of pregnancies among two distinct groups, Group A and Group B. In Group A, 170 out of 190 resulted in live births, whereas, Group B indicates 762 live birth out of 778 participants.

Table V: Outcome of pregnancies among the study participants

Maternal Outcome	**Group A**	**Percentage**	**Group B**	**Percentage**
Live birth	170	89.47	762	97.94
Early neonatal death (END)	04	2.10	04	0.51
Still birth (SB)	06	3.16	02	0.26
Macerated	08	4.21	06	0.77
Perinatal death (END+SB)	02	1.05	04	0.51
	n=190		*n=778*	

The data presented in Table 6 provides insights into the distribution of hypertension types, duration of hypertension, and familial hypertension status among the study groups. This data demonstrates family history has impact on GDM. Hypertension and GDM often coexist during pregnancy. Women with GDM have an increased risk of developing

hypertension, and vice versa, leading to potential complications that require careful monitoring and management for maternal and fetal well-being.

Table VI: Hypertension status among the study groups

Hypertension type	Frequency	Percentage
Primary	98	10.12
Secondary	48	4.96
Duration of Hypertension		
<1 year	106	10.95
1-3	22	2.27
4-7	14	1.45
>7	4	0.41
Familial hypertension		
Yes	110	11.36
No	36	3.72

In Table VII, the occurrences of various complications are detailed for two groups, Group A and Group B. Maximum neonates were out of complication however, jaundice and respiratory distress were recorded for both the group which is significant.

Table VII: Complications among live birth neonates

Neonatal Complications	Group A	Percentage	Group B	Percentage
Jaundice	20	10.52	36	4.62
Septicemia	04	2.10	02	0.26
Respiratory distress	30	15.79	26	3.34
Neonatal convulsion	06	3.16	06	0.77
No complication	130	68.42	708	91.00
	n=190		*n=778*	

Table VIII outlines the distribution of neonatal birth weights, maximum neonates, 892 in between the 2501-4000g. Additionally, 32 neonates required admission to the Neonatal Intensive Care Unit (NICU), and 4 were diagnosed with congenital anomalies.

Table VIII: Birth weight variations among the neonates

Neonatal birth weight (gm)	Frequency	Percentage
≥ 4001	24	2.48
2501- 4000	892	92.15
1501- 2500	42	4.33
1000- 1500	08	0.83
≤ 1000	02	0.20
NICU required = 32 Congenital Anomalies = 4		

DISCUSSION

There were 968 married participants in the study. Out of them, 778 did not have GDM, and 190 had the diagnosis. Sixteen GDM and forty non-GDM participants were under the age of 20, 110 GDM and 634 non-GDM participants were between the ages of 20 - 30, and 64 GDM and 104 non-GDM participants were ≥30- 32 range. Regarding parity, 210 participants were not diagnosed with GDM, and 30 GDM participants had never given birth before. However, 64 people with GDM and 488 people without GDM had one or two prior pregnancies. Again, 96 people with three or more pregnancies had GDM, as well as 80 had non-GDM. In addition, the participants' gestation weeks were examined. Of these, 14 GDM and 58 non-GDM participants had gestations shorter than 28 weeks, 112 GDM and 472 non-GDM participants fell between 29 and 36 weeks, and 64 GDM and 170 non-GDM participants had gestations longer than 37 weeks.

The mode of delivery in our study population showed that the majority undergoing Lower Segment Caesarean Section (LSCS) accounted for 89.88%. Normal Vaginal Delivery (NVD) is less frequent, constituting 8.88% of the cases. A small percentage, 1.24%, represents other modes, primarily involving peripartum hysterectomy. This distribution underscores the prevalence of cesarean sections, possibly influenced by GDM[8,10]. It emphasizes the diverse methods employed in childbirth, with LSCS emerging as the dominant mode[11]. It warrants further exploration into factors influencing delivery choices and potential implications for maternal and neonatal health[12].

Maternal complications associated with GDM and non-GDM are illustrated in our study with evidence of the contribution to an increased risk of various adverse outcomes during pregnancy. Preeclampsia appears notably elevated in both groups, with 45.45% in group A and 47.42% in group B. Placental abruption, Placental Previa, and Intrauterine growth restriction also exhibit higher percentages among GDM patients. Oligohydramnios shows a significant increase from 6.81% to 17.53%. Anemia, although present, demonstrates a relatively lower percentage shift.

The study data compared maternal outcomes between women with GDM and non-GDM. Among women with GDM, 89.47% experienced live births, while 2.10% had early neonatal deaths, 3.16% experienced stillbirths, and 4.21% had macerated births. The overall perinatal death rate (combining early neonatal deaths and stillbirths) was 1.05%. In contrast, non-GDM women had higher percentages of live births (97.94%), with lower rates of early neonatal deaths (0.51%), stillbirths (0.26%), and

macerated births (0.77%). The overall perinatal death rate for non-GDM women was 0.51%. These findings highlight potential differences in maternal outcomes associated with GDM[14].

Among the participants, 10.12% exhibited primary hypertension, while 4.96% had secondary hypertension. In terms of duration, 10.95% reported having hypertension for less than a year, with decreasing percentages for longer durations. Familial hypertension was prevalent in 11.36% of cases. The data provides a snapshot of hypertension characteristics within the studied group. However, additional information on the relationship between hypertension and gestational diabetes mellitus (GDM) is mentioned but not detailed, leaving room for further exploration of the interplay between these health conditions[14].

Among 190 GDM cases, jaundice was reported in 10.52%, septicemia in 2.10%, respiratory distress in 15.79%, and neonatal convulsions in 3.16%. In contrast, the non-GDM group (n=778) showed lower percentages for these complications—jaundice (4.62%), septicemia (0.26%), respiratory distress (3.34%), and neonatal convulsions (0.77%). Notably, 68.42% of GDM births had no complications, which was higher at 91.00% in the non-GDM group. Additionally, the distribution of neonatal birth weight revealed that the majority of cases fell within the 2501-4000 gm range (92.15%). The need for Neonatal Intensive Care Unit (NICU) care was indicated in 32 cases, and congenital anomalies were reported in 4 cases. These findings underscore the impact of GDM on neonatal outcomes, emphasizing the need for careful monitoring and management during pregnancy to mitigate associated complications.

Conclusion:

The outcome of pregnancy in the women with GDM in this study showed significantly raised incidences of pregnancy-induced hypertension, cesarean section, maternal complication (e.g., high preeclampsia rate), neonatal complication (more jaundice cases), and NICU requirement, compared with the non-GDM. These findings support the paradigm of increased rates of maternal and neonatal complications in pregnant women with GDM.

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