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Original Research Article

Pregnancy Outcome of Gestational Diabetes Mellitus Among Mothers Attending A Tertiary Care Hospital in Kolkata: An Observational Prospective Study

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Abstract:

Objectives: To study outcomes of mothers with GDM attending a tertiary care hospital in Kolkata.

Methods: This prospective observational study was done in a tertiary care hospital, Kolkata for one year. Single-step testing using 75 gm oral glucose and measuring blood sugar 2 hours after ingestion was done on the first visit irrespective of associated risk factors and gestational period. Mothers diagnosed with GDM were managed by Medical Nutrition Therapy with or without pharmacotherapy as required for glycemic control. Maternal and neonatal outcomes were documented and analyzed.

Results: Out of 981 screened with OGTT, 102(10.39%) mothers were diagnosed to have GDM. Ninety-two mothers were followed up till delivery. Most of the GDM mothers are between 25-30yrs. PPH and Hypertensive disorders of pregnancy were common antenatal complications. No maternal death or congenital anomalies occurred among mothers with GDM.

Conclusion: Detecting GDM at the earliest and proper management reduces maternal as well as neonatal adverse outcomes.

Keywords: GDM (Gestational Diabetes Mellitus), OGTT (Oral Glucose Tolerance Test), IGT (Impaired Glucose Tolerance), PPH (Postpartum Hemorrhage), IUFD (Intrauterine Fetal Death).

Introduction

Glucose intolerance occurred or diagnosed first time during pregnancy is known as gestational diabetes mellitus (GDM). Evidence showed that mothers with GDM can have adverse maternal and perinatal outcomes due to maternal hyperglycemia. Women with a history of GDM have a high risk of progression to type 2 diabetes mellitus [3].

Pregnancy induces progressive changes in maternal carbohydrate metabolism4. While the pregnancy advances insulin resistance and diabetogenic stress due to placental Hormones necessitates a compensatory increase in insulin secretion, and when this compensation is inadequate, GDM develops [4].

Further research on pregnancy outcomes, screening, and diagnosis of GDM, uses of new biomarkers, and intervention strategies to reduce long-term metabolic risk in mothers and offspring will be helpful. For example, Zawiejska et al. show that in high-risk women, early screening for GDM using the IADPSG criteria may be a useful predictor of congenital anomalies [14]. Early diagnosis and prompt treatment decrease the incidence of congenital malformations. [15]

The risk of adverse maternal outcomes like hypertensive disorder of pregnancy, emergency delivery by caesarian section, and adverse neonatal outcomes like macrosomia, stillbirth, birth trauma and shoulder dystocia increase in mothers with GDM if not appropriately managed.

Many studies report maternal and fetal complications with GDM but were flawed due to several confounding factors such as obesity, older maternal age, and various other comorbidities.[14] The ELENA study showed that multidisciplinary group education might help to manage the increasing workload better as positively evaluated by women with GDM. [16]

Indian women have a higher prevalence of diabetes, and their relative risk of developing GDM is 11.3 times compared to white women.1 HOC diabetes Reporting Group noted marked different rates of diabetes and IGT in different populations, from as low as <1% to >10%. [2]

In some of the population, more than half of the cases of diabetes were undiagnosed before the survey. IGT was mostly overlooked in routine clinical

practice. Thus, a substantial proportion of abnormal glucose tolerance in pregnancy goes undetected without screening.2 This study was done on the early antenatal screening with proper management of diagnosed Gestational diabetes mellitus and pregnancy outcome in a tertiary care hospital in Kolkata for evaluating the situation.

Materials and Methods

Study Area: Department of Obstetrics and Gynaecology, Calcutta National Medical College and Hospital, Kolkata.

Study Design: Prospective observational study.

Study Period: One year.

Study Population: The study includes all pregnant woman who presented with threshold blood sugar level > 140 mg after 2 hours OGTT, irrespective of gestational age.

Sample Size: All the patients fulfilled the inclusion and exclusion criteria in due course of time and were approximately 102 cases.

Inclusion Criteria: All women of any parity with singleton pregnancies attending CNMCH will be screened at the first visit and repeated between 24-28 weeks of gestation.

Exclusion Criteria

1. Mothers who refused to participate in the study.
2. Mothers who do not want to get follow-up in Calcutta National Medical College and Hospital, Kolkata.
3. Diabetes mellitus diagnosed before pregnancy.

Ethical Clearance: The study was conducted after getting due ethical clearance.

Methodology

Method Performing OGTT: To perform the glucose tolerance test single step testing using 75 gm oral glucose and measuring blood sugar 2 hours after ingestion. Glucose was given orally after dissolving in approximately 300 ml water, irrespective of their last meal.

The solution was ingested within 5-10 minutes. In case of vomiting within 30 minutes of oral glucose intake, the test was canceled to be repeated later. If vomiting occurs after 30 minutes, the test continues. A plasma standardized glucometer was used to evaluate blood sugar 2 hours after the oral glucose load. The threshold blood sugar level > 140 mg/dl (more than or equal to 140) is taken as cut-off value for diagnosing of GDM. Those diagnosed as mothers with GDM were followed for maternal and fetal outcomes.

Statistical Methods: Categorical variables expressed as Number of patients and percentage of patients. Continuous variables are expressed as Minimum, Maximum, Mean, Median, and Standard Deviation and expressed through Tables, Figures, and Histograms. The statistical software SPSS version 22 has been used for the analysis. An alpha level of 5% has been taken, i.e., if any p-value is less than 0.05, it has been considered significant.

Results

Table 1: Distribution of screening test results

Total pregnant women	Pregnant women with GDM	Percentage of GDM
981	102	10.39

Out of 981 women screened, 102 found positive for GDM. Ten mothers with GDM did not come for follow-up, and only 92 women were followed up till delivery. In this study, the incidence of pregnancy with GDM was 10.39%.

Table 2: Distribution of results after Oral Glucose Tolerance Test

OGTT after 2 Hrs. (mg)	Frequency	Percent
140-180 mg	45	48.9
180-200 mg	12	13
>200 mg	35	38
Total	92	100(approx..)

In our study, among mothers with GDM, 45 (48.9%) mothers had 2hrs. PPBS value between 140-180 mg, 12 (13%) mothers had 2hrs. PPBS value between 180-200 mg, and 35 mothers (38%) had 2hrs. PPBS > 200 mg.

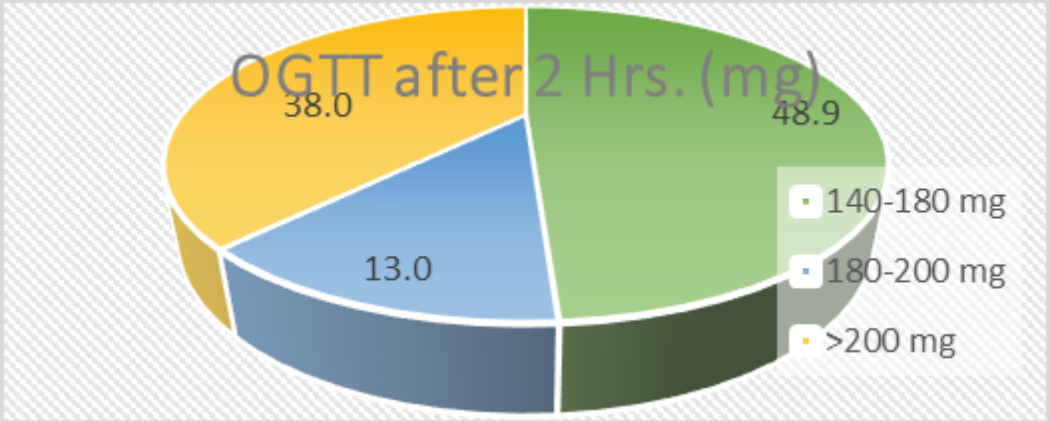

Figure 1: Distribution of results after Oral Glucose Tolerance Test

Table 3: Distribution of Age groups among GDM mothers

Age	Frequency	Percent
17-19 Years	14	15.2
20-24 Years	8	8.7
25-30 Years	50	54.3
30-35 Years	19	20.7
>35 Years	1	1.1
Total	92	100

In our study, 14(15.2%) mothers were in 17-19 years of age group, 8 (8.7%) mothers were in 20-24 years of age group, 50 (54.3%) mothers were in 25-30 years of age group, 19 (20.7%) mothers were in 30-35 years of age group and, 1 (1.1%) mothers was above 35 years of age.

Table 4: Distribution of GDM patients with their Gravida

Gravida	Frequency	Percent
1	38	41.3
2	31	33.7
3	14	15.2
4	8	8.7
5	1	1.1
Total	92	100

In our study, among the diagnosed mothers with GDM, 38 (41.3%) mothers were primigravida, 31 (33.7%) were second gravida, 14 (15.2%) mothers were third gravida, 8 (8.7%) mothers were fourth gravid and, 1 (1.1%) mothers was fifth gravida.

Table 5: Distribution of GDM Mothers according to their Parity

Parity	Frequency	Percent
P_{0+0}	41	44.6
P_{0+1}	6	6.5
P_{1+0}	23	25
P_{1+1}	1	1.1
P_{1+2}	6	6.5
P_{1+3}	2	2.2
P_{2+0}	12	13
P_{2+2}	1	1.1
Total	92	100

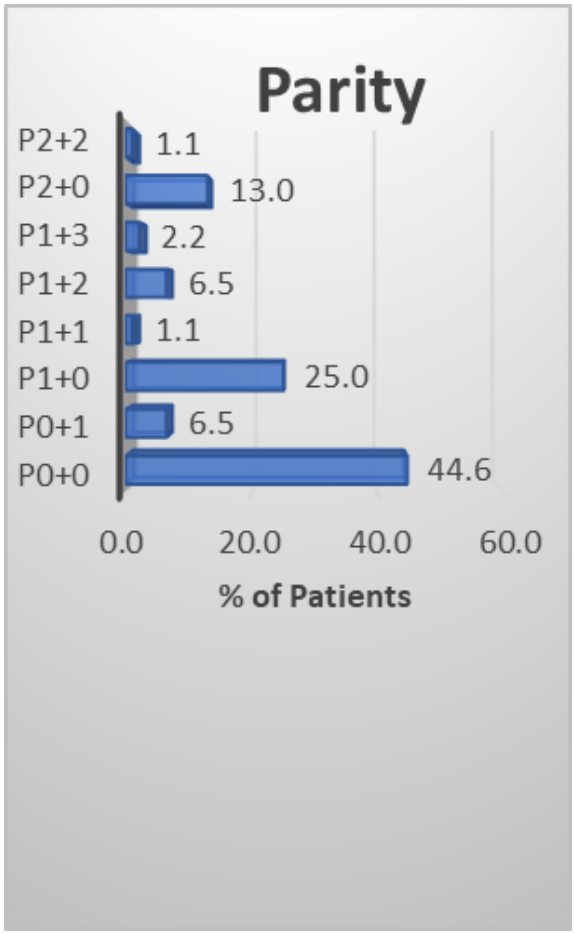

Figure 2: Distribution of GDM Mothers according to their Parity

In our study among GDM mothers, 41 (44.8%) were P_{0+0}, 6(6.5%) were P_{0+1},23 (25.0%) were P_{1+0}, 1 (1.1%) was P_{1+1}, 6(6.5%) wereP_{1+2},2(2.2%) wereP_{1+3},12(13.0%) were P_{2+0}, 1 (1.1%) wasP_{2+2}.

Table 6: Distribution Mode of Delivery of the GDM mothers

MOD	Frequency	Percent
Caesarian	53	57.6
VD	39	42.4
Total	92	100

In our study 53(57.8%) patients were delivered by caesarian section and 39(42.4%) patients were delivered by Vaginal Delivery.

Table 7: Distribution of Gestational Age (GA) at the time of diagnosis

GA (Weeks)	Frequency	Percent
<12 Weeks	2	2.2
12-20 Weeks	3	3.3
20-24 Weeks	10	10.9
24-28 Weeks	55	59.8
28-32 Weeks	16	17.4
>32 Weeks	6	6.5
Total	92	100approx.

In our study, among mothers with GDM, 2 (2.2%) were detected at GA < 12 weeks, 3 (3.3%) were detected at GA 12-20 weeks, 10 (10.9%) were detected at GA 20-24 weeks, 55 (59.8%) were detected at GA 24-28 weeks, 16 (17.4%) were detected at GA 28-32 weeks, 6 (6.5%) were detected at GA > 32 weeks.

Table 8: Distribution as per indications of C/S

Indication of C/S	Frequency	Percent
Elderly Primigravida with uncontrol GDM	3	5.66
GDM with oligohydramnios	1	1.88
GDM with Term	10	18.87
Post C/S with ST	24	45.3
Primigravida with uncontrol GDM with oligohydramnios	5	9.43
PROM with GDM with Pre-eclampsia	2	3.77
Repeat C/S	8	15.09
Total	53	100

In our study, post C/S with scar tenderness was the commonest indication for caesarean section.

Table 9: Distribution of Adverse Maternal Outcomes

Maternal Outcomes	Frequency	Percent
Postpartum Hemorrhage	5	5.43
Puerperal complications following C/S	1	1.09
Hypertensive disorder of pregnancy	2	2.17
Postpartum Hypoglycemia	0	0
Polyhydramnios	0	0
Prolonged Labour	0	0
Maternal Death	0	0
Hyperglycemia	1	1.09

Among the 92 GDM mothers, 5 (5.43%) had post-partum hemorrhage, 1 (1.09%) had puerperal infection following C.S., 2 (2.17%) had Hypertensive disorder of pregnancy, and 1 (1.09%) had hyperglycemia.

Table *10*: Shows the distribution of birth weight

Birth Weight(kg)	Frequency	Percent
<2.5 KG	17	18.5
2.5-3 KG	50	54.3
3-4 KG	20	21.7
>4 KG	5	5.4
Total	92	100approx.

In our study among GDM mothers, 17 (18.5%) neonates had birth weight <2.5 kg, 50 (54.3%) had birth weight 2.5-3.0 kg, 20 (21.7%) had birth weight 3-4 kgs, 5 (5.4%) baby weight >4 kgs.

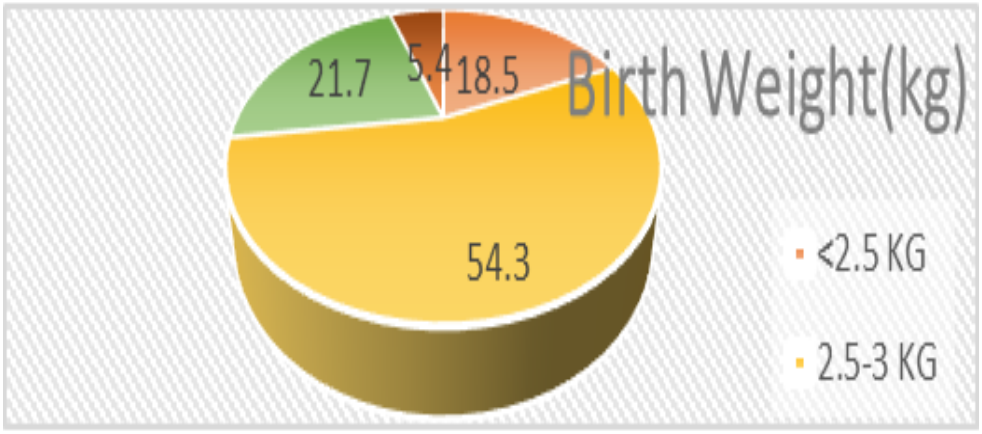

Figure 3: Shows the distribution of birth weight

Table 12: Distribution of neonatal outcome

Neonatal Complication	Frequency	Percent
Macrosomia	5	5.43
Shoulder Dystocia	4	4.35
Hypoglycemia	4	4.35
Hyperbilirubinemia	0	0
Polycythemia	0	0
Respiratory distress syndromes	7	7.61
Congenital anomaly	0	0
Central Septal hypertrophy	0	0
Hypocalcemia	0	0
IUFD	3	3.26
SNCU Admission	0	0
Preterm birth	9	9.78
Neonatal death	0	0

Among the babies of 92 GDM mothers, 9 (9.78%) babies had preterm delivery, 5 (5.43%) had macrosomia, 4 (4.35%) had complications of shoulder dystocia, 4 (4.35%) had hypoglycemia, 7 (7.61%) had respiratory distress syndrome and three fetus (3.26%) had IUFD.

Table 13: Distribution of Apgar Score

APGAR in 5 min	Frequency	Percent
<7	17	18.5
07-Oct	75	81.5
Total	92	100

In our study, 17 (18.5%) neonates had Apgar score <7, and 75 (81.5%) had Apgar score 7-10.

Discussion

In our study, the prevalence rate of pregnancy with GDM was 10.39%. Among 102 cases, 92 pregnant women with gestational diabetes mellitus were followed up till delivery. Most of the GDM mothers had 2hr.PPBS<180mg. Diagnosis of GDM can be made before the development of a severe form of glucose intolerance if screening is done on the first visit.

In our study of pregnant women with GDM, 50 (54.3%) mothers with GDM belonged to the age group of 25-30 years and 19 (20.7%) mothers with GDM belonged to the age group of 30-35 years. Similar findings was also reported by Dudhwadhar A.R. et al.[3] In their study maximum mothers with GDM (56%) were in the age group of 25-30 years, and 30% of mothers with GDM were over 30 years of age.

A study in the Jammu region also stated that compared with women of normal OGTT, women with GDM were older [4]. Thus, GDM affects older women more than younger ones, in concept with the pathophysiology of the disease. In our study, good numbers of patients had ages between 17-19 yrs. This fact can be explained by the possibility of more mothers of this age group participating during the screening process. In the present study, 33.7% of patients were second gravida, while 41.3% of patients were primigravida. Also, most of the mothers with GDM i.e. 41 (44.6%) are nulliparous. On the other hand, out of 92 cases, the majority of pregnant woman with GDM, 55 (59.8%) were diagnosed at the gestational age 24-28 weeks. In the present study, though most of the delivery, 53 (57.6%) were by LSCS and 39 (42.4%) were vaginal, but the commonest indication for LSCS was post-C.S. with scar tenderness. Dudhwadkar AR et al. found less(26.52%) incidence of LSCS among mothers with GDM.[3] The commonest maternal adverse outcome was Postpartum hemorrhage (PPH), occurred in 5(5.43%) mothers. Post-partum hemorrhage due to atonic uterus developed in two cases with macrosomia.

In the present study a majority of newborn, 50 (54.3%) had birth-weights between 2.5-3.0 Kg. Only 5 (5.4%) had macrosomia. The most used definition of macrosomia is a birth weight >4kg. In the present study, 5 (5.4%) babies had macrosomia at birth. The incidence is, however far lower than incidence (>30%) published in many other studies conducted on GDM.[6,7] Control of diabetes in most of the pregnancies, either by diet or pharmacotherapy might reduce the incidence of macrosomia in GDM. One recent investigation in India has explored that tight control of GDM causes large for gestational age of the baby instead of reducing the birth weight but causes a significant reduction in congenital anomalies and perinatal mortalities [8].

In the present study, we found live birth 89 (96.74%) and intrauterine death 3 (3.26%). Complications that developed in this study were Polyhydramnios (0%), pregnancy induced Hypertensive disorders of pregnancy 2 (2.17%), preterm birth 9 (9.78%), etc.

The study by Bhat et al. cites a 14.7% incidence of polyhydramnios versus 2.7% in control [9].

In a study by Maha Lakshmi MM et al. in South India, 77.5% of babies were term live births, while 19% were preterm live births [11]. Preterm births in the present study were attributed to premature preterm rupture membrane, preterm labor, and early induction in cases of severe preeclampsia. Macrosomia and perinatal mortality are considered adverse pregnancy outcomes in patients with GDM. Over 3.26% of babies had intrauterine deaths in the present study in contrast to 6% of intrauterine deaths reported in the study by Saxena et al.[10] No congenital anomaly was reported in the present study. The low rate of congenital anomalies in the present study could be because most of the women might have developed diabetes in the late second or third trimester. Intrapartum shoulder dystocia occurred in 4 (4.35%) mothers.

Conclusion

Early screening helps in the detection and management of GDM in less severe stages. The incidence of GDM was more in women greater than 25 years of age, irrespective of parity or gravida. GDM is most commonly detected between 24-28weeks of gestation. Maternal and Fetal outcome was satisfactory in well-controlled GDM. All pregnant women irrespective of risk factors should be screened for detection of GDM and managed at the earliest to reduce adverse outcomes.

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