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A Prospective Observational Study of Maternal and Foetal Outcome in Gestational Diabetes Mellitus

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ABSTRACT

Background: *Gestational diabetes mellitus (GDM) is one of the most common complications of pregnancy and associated with adverse fetomaternal outcome. Indian women have high prevalence of diabetes. As such GDM has implications beyond the index pregnancy, identifying two generations (mother and her offspring) at risk of future diabetes. GDM exposes foetus to hyperglycaemia leading to macrosomia, birth trauma, shoulder dystocia, neonatal hypoglycaemia, hyperbilirubinemia, hypocalcaemia, polycythaemia, and respiratory distress syndrome.*

Objectives: *The objective of this study is to analyse maternal and neonatal outcomes of pregnancy in women with GDM.*

Methods: *Patients attending the antenatal OPD less than 16 weeks POG were screened for gestational diabetes according to the DIPSI criteria. A detailed history of all patients was taken to obtain Maternal and fetal outcome.*

Results: *Out of 650 patients, 100 (15.38%) were found to have GDM. Pre-eclampsia complicating pregnancy was noted in 15% patients. Adverse maternal outcomes were polyhydramnios (8%), Candidiasis (8%), postpartum haemorrhage (2%), sepsis (1%), and urinary tract infection (3%). 34% patients delivered vaginally. In this study 66% patients underwent LSCS. Most common neonatal complication was prematurity (18%), hypoglycaemia (9%), hyperbilirubinemia (8%), RDS (4%), and macrosomia (5%). Maternal diabetes on follow up was seen in 8% patients.*

Conclusion: *The antenatal screening for GDM is key for early diagnosis and treatment during antenatal visit to improve maternal and fetal outcome. In conclusion, a short-term intensive care gives a long term pay off in the primary prevention of obesity, impaired glucose tolerance and diabetes in the offspring, as preventive medicine starts before birth.*

Keywords: *Gestational Diabetes Mellitus; Hypoglycaemia; Maternal Outcomes; Neonatal Complication; Polyhydramnios.*

INTRODUCTION

Gestational Diabetes Mellitus (GDM) is defined as the identification of carbohydrate intolerance that is either recognized first or begins during pregnancy [1]. Approximately 7% of all pregnancies are complicated by GDM, resulting in more than 200,000 cases annually. The prevalence may range from 1 to 14% of all pregnancies, depending on the diagnostic tests employed. It usually presents late in the second or third trimester. GDM has serious long-term consequences for both the baby and mother, with a predisposition to metabolic syndrome and cardiovascular disease later in life [2]. Risk factors for development of Gestational diabetes mellitus includes advanced maternal age, ethnicity, genetic factors overweight or obesity,

multiple pregnancy, previous history of gestational diabetes, family history of Type 2 diabetes mellitus, polycystic ovary syndrome, and multiple pregnancy [3]. Other emerging risk factors are environmental (pollution), psychosocial factors (depression), cigarette smoking, and physically inactive lifestyle before and during pregnancy [4]. GDM exposes fetus to maternal hyperglycaemia as per Pederson's hypothesis leading to macrosomia, shoulder dystocia, birth trauma, neonatal hypoglycaemia, hyperbilirubinemia, hypocalcaemia, polycythaemia, and respiratory distress syndrome. Long-term exposure to hyperglycaemia leads to intrauterine fetal death due to hypoxia [5-7].

The aim and objective of this study is to analyse maternal and neonatal outcomes of pregnancy in women with GDM.

MATERIALS AND METHODS

The present study was carried out at ESIC Medical college and Research institute (tertiary teaching institute) in the department of obstetrics and gynaecology, Kolkata, India. The data collection was performed over a period of 10 months from January 2024 to October 2024. It was a prospective study which included both outdoor (OPD) and admitted pregnant patients. All pregnant women who attended antenatal clinic were selected as per the inclusion and exclusion criteria.

Inclusion Criteria: All antenatal women attending the OPD for routine antenatal checkup (less than 16 weeks POG) were enrolled for the study with prior consent.

Exclusion Criteria:

1) Pregnant women suffering from chronic renal, pancreatic, thyroid disorders or other endocrinal disease.
2) Known case of diabetes mellitus or patients on medications affecting glucose metabolism such as progesterone, corticosteroids, psychoactive agents, catecholamines.
3) Women with history of substance abuse (opioids, cocaine, marijuana and benzodiazepines).

All the selected women were given 75gm anhydrous glucose powder dissolved in 300ml of water, to be consumed over 5-10 minutes, irrespective to the time of last meal. A venous blood sample was collected at 2 hours for estimating plasma glucose by the glucose oxidase peroxidase (GOD-POD) method. **GDM** was diagnosed if the **2hr plasma glucose was >140 mg/dl.** If the glucose level was **>200 mg/dl**, it was labelled as **overt diabetes**. In women who were found to have normal glucose level, the test was repeated at 24 - 28 weeks POG. The women with positive test were treated as per our institutional protocol (medical nutritional therapy for 2 weeks) and if this failed to achieve the target glucose levels, Insulin was initiated. The patients were followed up till 6 weeks after delivery and the fetomaternal outcome was studied. A detailed clinical history was recorded and a thorough physical examination was performed at the time of presentation with specific emphasis on the risk factors of GDM. Symptoms of diabetes and its associated complications were noted. Investigations like complete blood count, liver function tests, kidney function tests, serum electrolytes, fundoscopy, Urine routine microscopy, HbA1c, a congenital anomaly scan at 18 weeks and third trimester ultrasound were done in all patients. In the third trimester weekly visits were advised. All GDM patients were admitted at 37 completed weeks for safe confinement or before if presenting in labour or if they developed complications. Intensive blood sugar monitoring of the patients was done. Elective LSCS was done at 38 completed weeks for patients with cephalopelvic disproportion, abnormal presentation, previous LSCS

and uteroplacental insufficiency. Other patients were induced at 38 weeks on Insulin, 39 weeks on OHA and at 40weeks well controlled on medical nutritional therapy with dinoprostone gel. The birth weight, APGAR score, admission to NICU and other complications including presence of congenital malformations if any were noted by the neonatologist. After discharge the patients were called after a period of 6 weeks for follow up and for testing Fasting and post prandial blood sugars to look for persistence of raised glucose levels and managed accordingly.

STATISTICS

Table 1 - Incidence of GDM in the Study Population

Total Population	GDM Diagnosed	Incidence
650	100	15.38%

In our study, out of 650 antenatal women, the incidence of GDM was 15.38%.

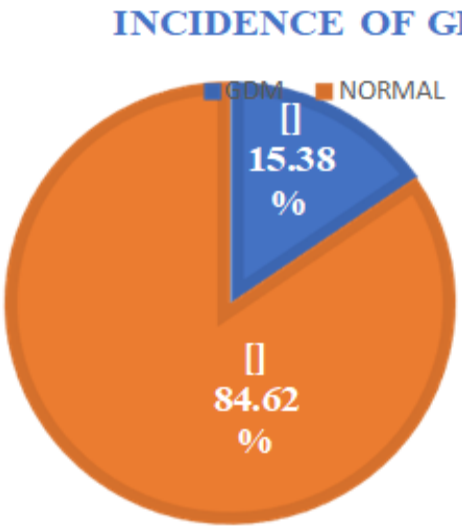


Table 2 – Distribution of GDM according to Maternal Age

Age Group (Years)	No of GDM cases	Percentage
18-25years	32	32%
26-30years	46	46%
31-35years	14	14%
More than 36 years	08	08%

In our study maximum number of patients were in the age group of 26-30years that is 46%.

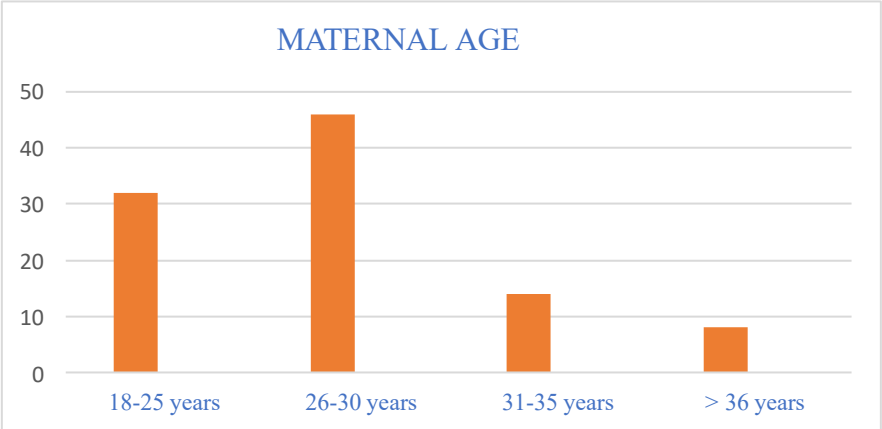


Table 3 – Incidence of GDM according to Gravida

Gravidity	No Of GDM Cases	Percentage
Primigravida	62	62%
Multigravida	38	38%

In our study primigravida were 62% and multigravida 38%.

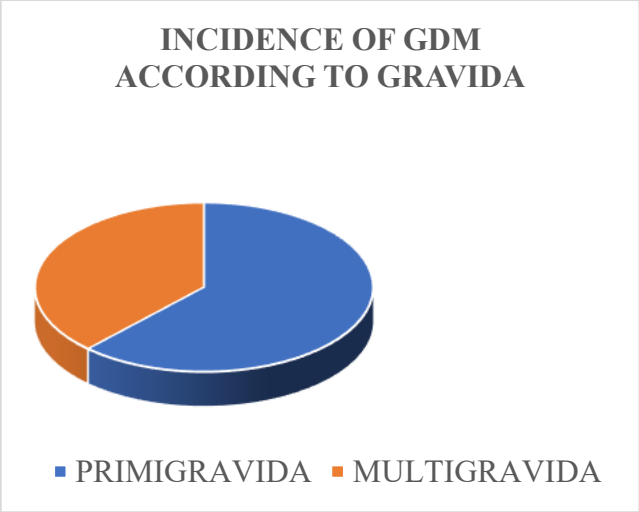


Table 4 - Significant Past History in Multigravida (38%)

Past History	No of Patients	Percentage
Anomalous baby	01	26.3%
Macrosomia	02	5.26%
GDM in previous pregnancy	07	18.4%
H/O IUFD	01	2.63%
H/O previous abortion	03	7.89%
Normal	24	63.1%
Total	38	100%

In our study out of 38 multigravida, 7 (18.4%) had a history of GDM in previous pregnancy.

Table 5 - Distribution based on Associated Maternal Co-Morbidities

Comorbidities	No. of Cases	Percentage
Hypothyroidism	37	37%
Deranged LFT	05	05%
Preeclampsia	15	15%
Anaemia	02	02%
Bronchial asthma	01	01%
Normal	40	40%

In our study, 37 patients (37%) were associated with hypothyroidism, 15% cases with preeclampsia.

Table 6 - Maternal Outcome

Outcome	No. of Cases	Percentage
Polyhydramnios	08	08%
Urinary tract infection	03	03%
Candidiasis	08	08%
Prolonged labour	04	04%

LSCS	66	66%
Vaginal delivery	34	34%
Post partum haemorrhage	01	01%
Puerperal Sepsis	01	01%
Persistent diabetes mellitus	03	03%

In our study around 66% underwent LSCS and 34% delivered vaginally, 8 patients had polyhydramnios, 8% had Candidiasis and 3% continued to be diabetic on follow up.

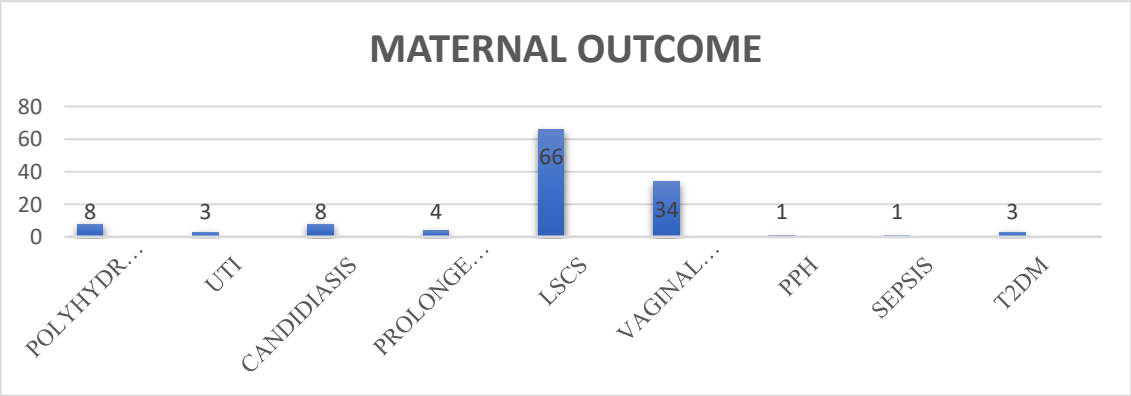
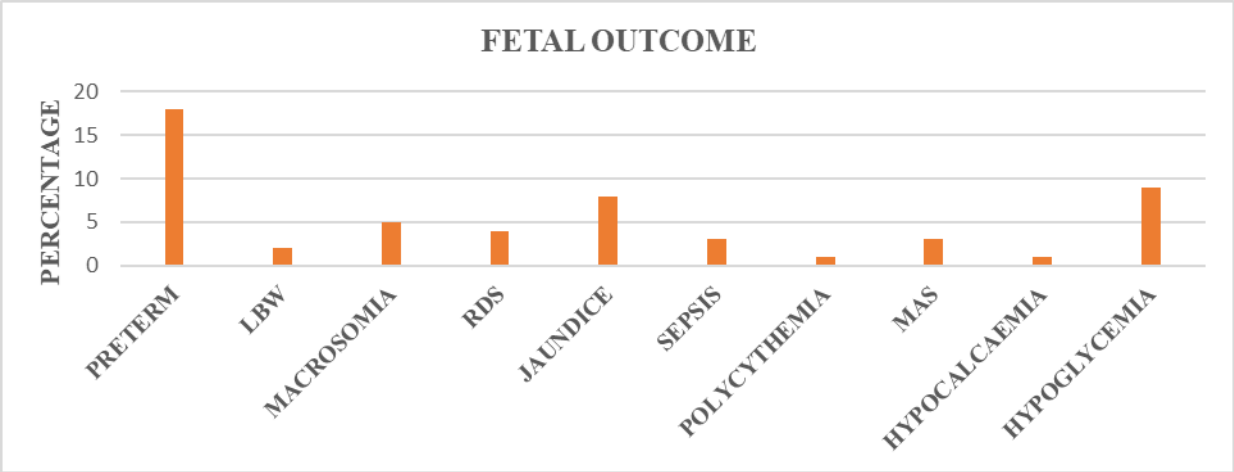


Table 7 - Fetal Outcome

Outcome	No of cases	Percentage
Preterm birth	18	18%
Low birth weight (<2.5kgs)	02	02%
Macrosomia (>3.5kgs)	05	05%
Respiratory distress syndrome	04	04%
Hyperbilirubinemia	08	08%
Hypoglycaemia	09	09%
Neonatal sepsis	03	03%
Polycythaemia	01	01%
Meconium aspiration syndrome	03	03%
hypocalcaemia	01	01%

In our study 18% were preterm births, 9% suffered hypoglycaemia, 8% neonates required phototherapy for hyperbilirubinemia.



DISCUSSION

The present study was undertaken to identify cases of GDM, to study obstetric and fetal outcomes.

In the present study, GDM comprises of 15.38% of the total patients screened as compared to the global prevalence of 1.4-14% [8]. In 2019, the International Diabetes Federation (IDF) estimated that 166 in 1000 live births worldwide were complicated by GDM [9]. In a study done at a tertiary care hospital in Mumbai, Maharashtra the prevalence was found to be 4.2% which is lower compared to our study [10]. More than 90% of cases of hyperglycemia in pregnancy occur in low and middle-income countries.

32% of patients fell in the age group of 18-25 years and the majority (46%) were over 26-30 years of age, which was similar to a study done by Dudhwadkar AR et al. [10] (56%). A study in Jammu stated that women of normal OGTT were younger as compared to those with GDM [11]. It is also noteworthy that other cardiovascular risk factors may be present in older women and hence primary prevention in these patients would be extremely important to prevent future cardiovascular disease.

In the present study, 38% patients were multigravida, A study by Rajput et al,[12] showed that higher parity would have a higher rate of GDM which was in contrast to our study. The study by Dudhwadkar AR et al. [10] showed similar results as Rajput et al, (72%).

Polyhydramnios was found in 8% of our patients. This was markedly low as compared to the study by Bhat et al (14.7% v/s 2.7% in controls) [13]. Polyhydramnios in GDM is due to fetal polyuria which increases perinatal morbidity and mortality [14].

Pre-eclampsia can complicate the course of pregnancy and has an adverse effect on the feto-maternal outcome. In our study, 15% of GDM patients had associated pre-eclampsia. In the study by Saxena et al, and Jani et al, the incidence was higher at 40% [14] and 46.1% [18]. According to Xiong et al, mothers with GDM were at a higher risk of presenting with pre-eclampsia [15]. Thus, there is an association between pre-eclampsia.

Hypothyroidism was noted in 37 patients in our study, of these 15 (40.5%) had preexisting hypothyroidism. In a study by Dudhwadkar AR et al, [10] in Mumbai, only 6% were associated with hypothyroidism. According to Toulis KA et al, a modestly increased risk of GDM might be present in pregnant women with subclinical Hypothyroidism [19].

34% patients in this study delivered vaginally. Half of them were induced at 38weeks of gestation while other half went into spontaneous labour. 66 patients (66%) delivered by LSCS (out of 100). According to Kale et al, the incidence of LSCS in patients with GDM was 60% [17], This is due to the higher incidence of macrosomia and polyhydramnios in GDM mothers.

Diabetes causes delayed wound healing. Incidentally, none of the patients in our study had wound related complications. In a study by Dudhwadkar AR et al, [11] the incidence of surgical site infection was 7%.

In the present study, 18% of babies were pre-term. In a study by Mahalakshmi MM et al, in South India, 19% were preterm [16]. Preterm births in present study were attributed to PPROM, preterm labor and early induction in cases of severe preeclampsia.

Fetal macrosomia, impaired fetal growth secondary to vasculopathy, metabolic and electrolyte abnormalities, CNS anomalies, Cardiovascular anomalies and perinatal mortality are considered as adverse pregnancy outcomes in patients with GDM [11]. We encountered 1 IUD in the present study as compared to 6% reported in the study by Saxena et al [17].

In present study, 5% babies were macrosomic at birth which is low when compared to other Indian studies where the incidence was 28%. In the present study 9% of the babies had hypoglycemia whereas 1% had hypocalcemia. None had congenital anomalies. According to Shefali et al, [8] 1.4% babies had congenital anomalies, while according to Saxena et al, 10% babies had congenital anomalies [14].

CONCLUSION

Gestational Diabetes Mellitus is associated with adversed maternal and fetal outcome, with proper pre-conceptional counselling and multidisciplinary approach can have better outcome

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