

EVALUATION OF GESTATIONAL DIABETES MELLITUS FETAL AND MATERNAL OUTCOMES

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ABSTRACT

Objective: The main objective of this research is to evaluate maternal and fetal complications in gestational diabetes

Methods: A retrospective observational study was conducted among 110 patients diagnosed with gestational diabetes mellitus in Malla Reddy Narayana Multi-Speciality Hospital, the data collection was done by using upgraded patient profile form as per requirement of the research for a time period of 6 months.

Results: About 46% of GDM patients belongs to the age group of 25-30. The major proportion of maternal complication is pre-eclampsia with 33% and the fetal complications are both macrosomia with jaundice and jaundice alone with 24% each. Medical nutritional therapy is the most preferred treatment choice with 41%.

Conclusion: According to the research, medical nutritional therapy is preferred to reduce the maternal and fetal complications arise due to GDM.

Keywords: Gestational Diabetes Mellitus, Maternal outcomes, fetal outcomes, medical nutritional therapy, MNT, Pre-eclampsia

1. INTRODUCTION

Pregnancy's most frequent medical consequence is gestational diabetes mellitus (GDM). Diabetes during gestation has been known to have serious detrimental effects on fetal and neonatal wellbeing for more than a century. Women who years later acquired diabetes after becoming pregnant were found to have abnormally high rates of fetal and neonatal death. The phrase "gestational diabetes" is used to describe a condition that is believed to be temporary, negatively affecting fetal outcomes before improving after delivery. O'Sullivan discovered the level of blood sugar resistance experienced during gestation period is correlated with a higher risk of postpartum diabetes. He suggested essentially, statistical standards for the analysis of oral glucose tolerance tests (OGTTs) during gestation¹.

Insulin requirements during gestation, an earlier assessment of GDM in the course of gestation, a familial record of diabetes, another episode of GDM, raising a par value, a pregnant woman's age, pregnancy being overweight, gaining weight throughout gestation, and an earlier macrosomic infant are all considered to be important clinical factors that increase the probability of developing diabetes following delivery³. Metabolic signs of risk for diabetes following GDM have also been discovered. High levels of fasting glucose during pregnancy, decreased β -cell activity, and islet cell antibodies can lead to postpartum diabetes. Over the past twenty years, hyperhomocysteinemia has become an indicator of heart illnesses⁴. Ward et al. proved more than 20 years earlier that that females with previous GDM had glucose-secretion abnormalities and that only overweight people having GDM will have a smaller insulin-responsiveness index (SI) and a greater waist- to-hip ratio is equated to their obese peers when evaluated after delivery. From then on numerous investigations have identified individuals with past instances of GDM had greater insulin resistance and poorer reactions to insulin than females who never had GDM⁵.

EMERGING RISK FACTORS: In addition to food and lifestyle, growing studies suggest that environmental and psychosocial variables may contribute to the risk of acquiring GDM. Elevated concentrations of persistent organic contaminants and endocrine-disrupting substances have been linked to an increased likelihood of GDM. In addition, anxiety in both the first and second trimesters has been linked to an elevated danger of gestational diabetes¹. Data from epidemiological research shows that food and factors related to lifestyle, prior to and during pregnancy, are connected with GDM risk. Traditionally, encouraging pregnant women to engage in exercise has fraught with controversy, since the heat created during vigorous activity is thought to be a fetal teratogen².

The pathophysiology of GDM comprises both intolerance of tissue insulin and beta cell impairment, as GDM is typically due to beta cell malfunction because of persistent insulin resistance throughout gestation. These deficiencies usually exist before the prenatal period and may exacerbate with time, increasing the likelihood of developing T2DM following childbirth⁶.

Insulin storage and secretion constitute the key role of beta cells. Beta cell malfunction is the inability of beta cells to precisely measure glucose concentration in the blood or to generate sufficient insulin in reaction. Apparently persistent, and elevated insulin production causes beta cell malfunction⁷. The main reason that GDM is important is because it connects to unfavorable outcomes during pregnancy⁸.

The extensive repercussions of GDM for the health of mother and fetus highlight significance of understanding the condition and developing proper treatment or prevention strategies⁹. The chances of unfavorable consequences for mothers like toxemia of pregnancy (Pre- eclampsia) elevated blood pressure during gestation, frequent vulvo-vaginal infections, and a greater probability of surgical births, delayed labor, and the possibility of diabetes mellitus afterwards in life is higher if GDM is not effectively managed and fetal problems like premature labor, pulmonary difficulty, polycythemia, tetany, hypocalcaemia, hypomagnesaemia, macrosomia, polyhydramnios, painful delivery, difficulty breathing, inexplicable uterus fetal demise¹⁰.

The key advantage of keeping control over blood glucose throughout pregnancy has identified as the mitigation of specific neonatal problems, including shoulder dystocia and overweight infants¹¹. The most frequent significant consequences are macrosomia, shoulder dystocia, which carries the risk of brachial plexus injury and clavicle fracture, and newborn hypoglycaemia¹². There have been other reports of low calcium levels, respiratory distress, jaundice, and polycythaemia. Furthermore, certain statistics point to a rise in prenatal death rate and foetal deformity¹³.

2. METHODOLOGY

A total of 110 individuals with Gestational Diabetes Mellitus (GDM) data were obtained from Malla Reddy Narayana Multi-Speciality Hospital located in Suraram, Hyderabad. For this research project, which is a retrospective observational study, data was collected from obstetric units.

Study Period: August 2023-January 2024.

Study Population: Women over the gestational age of 20 weeks with Gestational Diabetes Mellitus

(GDM).

Study Setting: Medical inpatient obstetric wards were the source of subjects for this research.

Data Collection and Tools Used: Data was gathered from enlisted subjects in an abstract and brief manner using an upgraded patient profile form.

Inclusion criteria:

- Gestational age >20 weeks with GDM
- Hospitalized patients (Inpatients)

Exclusion criteria:

- Gestational age <20 weeks
- Pre-existing diabetes mellitus (before pregnancy)
- Non-hospitalized patients (Outpatients)

3. RESULTS AND DISCUSSION

BASED ON AGE:

TABLE 1: Age groups

AGE	NO. OF. PATIENTS	PERCENTAGE
20-25	40	36%
25-30	50	46%
30-35	20	18%

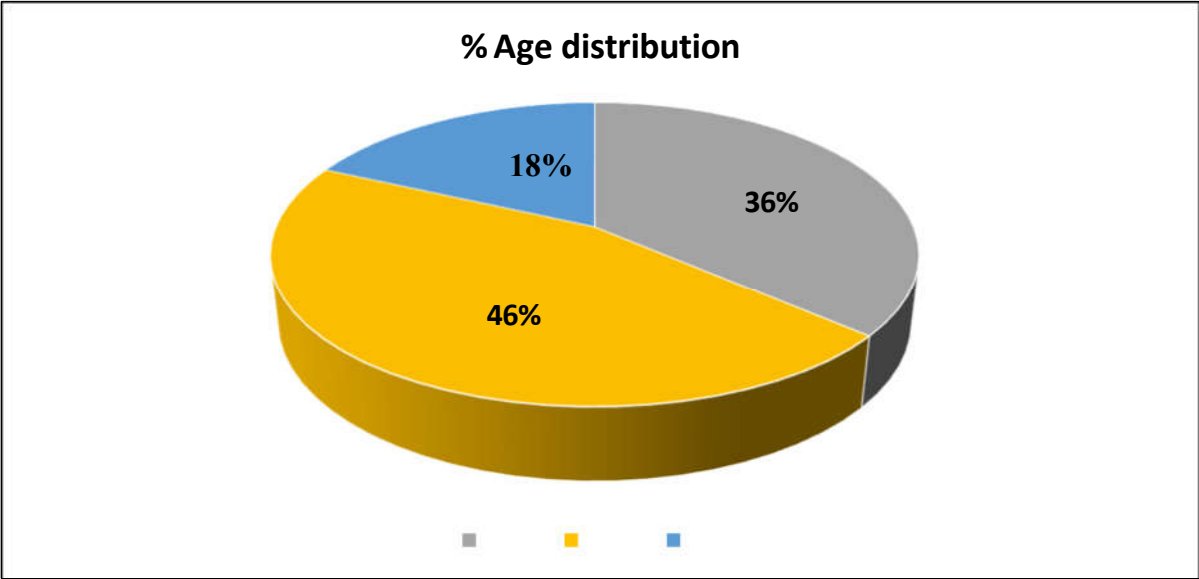


FIGURE 1: The pie chart representing age distribution among 110 gestational diabetes patients in proportions.

Gestational diabetes is prevalent across various age groups. The age group 25-30 has the highest number of cases, with fifty patients and a proportion of 46%. Age groups 20-25 and 30-35 have 40 and 20 patients (36% and 18%), respectively. This analysis provides insights into the distribution of gestational diabetes cases among different age brackets, allowing for a better understanding of its prevalence within specific age ranges.

BASED ON DELIVERY METHOD:

TABLE 2: Delivery methods in GDM Patients

DELIVERY METHOD	NO OF INDIVIDUALS	PERCENTAGE
Normal vaginal delivery	35	32%
Caesarean delivery	75	68%

The majority of gestational diabetes patients 68% of the total, underwent Caesarean delivery. Normal Vaginal Delivery was the mode of delivery for 32% of the gestational diabetes cases. This analysis provides insights into the distribution of gestational diabetes cases based on the mode of delivery, allowing for a better understanding of the delivery methods applied in the specified population.

BASED ON MATERNAL OUTCOMES**TABLE 3: Maternal outcomes in GDM diagnosed patients.**

MATERNAL OUTCOMES	NO.OF. PATIENTS	PERCENTAGE
Gestational hypertension	22	20%
Preeclampsia	36	33%
Polyhydramnios	7	6%
Preterm labour	4	4%
Gestational hypertension with polyhydramnios	6	5%
Gestational hypertension with preterm labour	1	1%
Preeclampsia with polyhydramnios	3	3%
Preeclampsia with preterm labour	3	3%
Polyhydramnios with preterm labour	0	0%
No outcomes	28	25%

Out of the 110 cases of gestational diabetes patients, preeclampsia is the most common maternal outcome with the proportion of 33%. There are no outcomes for individuals with proportion range of 25%. A thorough understanding of the health issues related to pregnancy-related diabetes in the targeted group is provided by this analysis, which sheds light on the distribution of maternal outcomes among patients with the disease.

TABLE 4: Fetal Outcomes in gestational diabetic patients.

FETAL OUTCOMES	NO. OF PATIENTS	PERCENTAGE
Macrosomia	8	7%
Jaundice	26	24%
Respiratory distress	7	6%
Patients having all three outcomes	5	5%
No fetal outcomes	18	16%
Macrosomia and jaundice	26	24%
Jaundice and respiratory distress	9	8%
Macrosomia and respiratory distress	11	8%

Table. 4 shows that jaundice alone and macrosomia along with jaundice are the most common fetal outcome with 24% each. There are also occasional observations of macrosomia and respiratory distress. 5% of the individuals exhibited all three events. None of the 18 individuals (16%) had any particular fetal outcomes documented.

TABLE 5: Treatment options in GDM

TREATMENT OPTION	NO. OF PATIENTS	PERCENTAGE
OHA with MNT	41	37%
Insulin with MNT	24	22%
MNT	45	41%

In 45 instances i.e., at a proportion of 41%, multi nutrition therapy (MNT) alone is the most often preferred therapeutic approach. In 41 instances (37%), MNT is used in conjunction with oral hypoglycaemic agents (OHA). 24 individuals (22%) got insulin and MNT combination. This study highlights the range of methods utilized for managing gestational diabetes in the targeted group by offering perspectives on the distribution of treatment modalities across patients.

TABLE 5.6. Risk factors affecting GDM

RISK FACTORS	NO.OF. PATIENTS	PERCENTAGE
Obesity	33	30%
Family history	15	14%
Previous history	2	2%
All yes	11	10%
All no	26	23%
Obesity+ family history	13	12%
Obesity+ past history	7	6%
Family history +past history	3	3%

Obesity is the most prevalent risk factor among gestational diabetes patients, with 30% . A notable proportion of 23% of patients has none of the specified risk factors. Combinations of risk factors, such as obesity + family history and obesity + past history, are also observed. The least common risk factor is previous history of GDM with a proportion of just 2%.

DISCUSSION

The intent of this investigation is to analyses the fetal and maternal outcomes of individuals with GDM.’ To be more precise, the present investigation was a six months retrospective observational research. i.e., September 2023 - February 2024, conducted in Malla Reddy Narayana Multi-Speciality Hospital, Suraram, Hyderabad. For this study, we have selected patients based on both inclusion and exclusion criteria. We have upgraded the patient profile form to collect the necessary data for our study. Then we collected the data from selected subjects and furthermore the information obtained through instance documents has evaluated. Lastly, the conclusions drawn from the evidence that was assessed.

According to our research, woman diagnosed with GDM is mostly within the range of ages 25–30 years. The delivery methods include caesarean and normal vaginal delivery, in which caesarean is the most observed mode of delivery. The maternal outcomes seen are Pre- eclampsia, Gestational hypertension, Polyhydramnios, and Preterm labor from which the most common maternal outcome is ‘pre-eclampsia.’ Here are the fetal outcomes seen in our research are Macrosomia, Respiratory distress, and Jaundice. Among them ‘macrosomia along with jaundice’ and ‘jaundice alone’ are in most proportion within them. Moving to another parameter i.e., Treatment options which are ‘Medical Nutrition Therapy (MNT), Oral Hypoglycemic agents (OHA’s), and ‘Insulin Therapy.’ Medical nutrition therapy is the most used treatment choice for GDM patients according to the data. The spotted risk factors in research are overweight, familial background of GDM, and prior diagnosis of GDM. Overweight is the majorly noticed risk variable among them.

CONCLUSION

- Gestational Diabetes Mellitus (GDM) is the hyperglycaemic phase of pregnant women. Managing GDM is crucial to mitigate the maternal and foetal complications.
- This research emphasized that the women with age group of 25 – 30 years are in higher proportion. The common mode of delivery in this study is found to be Caesarean delivery (C – Section).
- The frequent complication of mothers is Pre-eclampsia, and the Macrosomia is most occurring fetal outcome.
- Medical Nutrition Therapy (MNT) is the prioritized treatment choice based on the information. Obesity is the major risk factor found in our research.
- Close monitoring, Lifestyle modifications and medical interventions can reduce the

vulnerability of unfavourable outcomes, assuring wellbeing for mother and baby during the course of gestation.

- Regular prenatal care and collaboration between healthcare providers and expectant mothers are essential in addressing potential complications and promoting optimal outcomes.

Conflict of interest

The authors declare that they have no conflict of interest.

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