# Comparison of Pregnancy Outcomes in Indian Women Complicated With Pregestational and Gestational Diabetes Mellitus

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***Research Article***

***Abstract:*** **Objectives:** To compare the pregnancy complications and fetal outcomes in pregnancies complicated with pregestational and gestational diabetes mellitus . **Materials and Methods:** a retrospective cohort study done in Krishna Institute of Medical Sciences, Karad. A study sample of 250 patients which included 43 pregestational and 207 gestational diabetic patients who delivered in 2011-2014. There were no, statistically significant differences in the two groups regarding the mean gravidity, parity, birth weight and placental weight ($p>0.05$).however statistically significant differences were foundwith respect to the mean maternal age, gestational at booking, fasting blood sugar and gestational at delivery. Although there was statistically significant difference between the groups regarding one of the pregnancy complication-polyhydramnios, none were found in other complications ($p>0.05$). the overall caserean section rate was 48%.The overall perinatal mortality was 5.7%. **Conclusion:** Women with diabetes have worse pregnancy outcomes compared to non-diabetic mothers with those with pre-gestational diabetes fare worse than those with gestational diabetes. The study emphasizes the fact that strict glycemic control is extremely important during pregnancy.

***Keywords:*** Diabetes Mellitus, Pregnancy.

## Introduction

Diabetes mellitus (DM) complicates 3–5% of all pregnancies and is a major cause of perinatal morbidity and mortality, as well as maternal morbidity (1). Gestational DM, a glucose tolerance disorder of variable severity which occurs or is diagnosed for the first time during pregnancy, constitutes a public health problem because of its frequency (1 to 6% of all pregnancies) and its short and long term consequences for the fetus and/or the mother (2). DM increases the risk of important adverse outcomes of pregnancy. The greatest perinatal risk in such cases is fetal macrosomia, which has been associated with a higher rate of Cesarean delivery. Major congenital anomalies are the leading cause of perinatal mortality in pregnancies complicated by DM, occurring in 6–12% of all infants (3). In women with type 1 DM who are poorly controlled at the time of conception and during the early weeks of gestation, the incidence of spontaneous abortion and major congenital malformations are increased.These Comparison of maternal and fetal/neonatal complication of DM,anomalies can be prevented by tight control of maternal glycemia before gestation and during the early weeks of pregnancy. The goal of our study was to evaluate the outcome of pregnancies complicated by DM and to compare maternal and fetal characteristics and outcome in gestational and pre-gestational DM.

## Material and Methods

**Design:** a retrospective cohort study

**Setting:** Krishna institute of medical sciences, karad

**Study period:** 2011- 2014

**Sample size:** There were a total number of 35,000 deliveries during this period out of which 250 were from diabetic mothers.

Data obtained from the case records include maternal age, gravidity , parity, number of abortions , booking status, type of diabetes , type of treatment during pregnancy, fasting blood sugar and post prandial blood sugar . Other data were complications during pregnancy, gestational age at delivery, mode of delivary, birth weight, placental weight, apgar score at 5 min and perinatal outcomes. The data were coded , tabulated and entered into an IMB compatible computer.

Statistical analysis were carried out using the statistical package for social sciences(SPSS) v10.simple ANOVA test was used to compare means of quantitative variables while the chi square test was used for qualitative data the level of significance was set at 0.05% They were 250 women in all made up of 27 (14.6%) patient with insulin dependent diabetes mellitus (IDDM), 16(10.2%) women with non insulin dependent diabetes-(NIDDM)(group1)and 207 (83%) gestational diabetes (GD) women (group2). Booked patients were managed by both the diabetologist and the obstetrician during the pregnancy. At the booking antenatal clinic, all patients with random blood sugar of>140mg/dl were subjected to a 75gms oral glucose tolerance test (OGTT). Gestational diabetes was considered if two or more values met or

exceeded the following cutoff Points: fasting, 105mg/dl; 1hour, 190mg/dl;2 hour , 165mg/dl; and 3 hour,145mg/dl. Those patients with abnormal OGTT were referred to the diabetologist who started the patient on diet alone or a combination of die and insulin. Patient who were already on insulin before pregnancy were automatically started on insulin while the non insulin diabetes would have either diet alone or a combination of diet and insulin. The patients were regularly followed up at both antenatal and diabetic clinic and were admitted either for pregnancy complication or poor control of diabetes. Poor glycemic control was based on blood sugar result which were done at the outpatient clinic and also patients compliance to treatment and attendance clinic. T policy was to allow pregnancy continue to term and have a delivery conducted by the expected date of confinement (EDC) if there were no complications. Caesarean section was done for obstetrical indication only.

## Results

Of the 250 people under study 207 were diagnosed with gestational diabetes mellitus (G.D.M)and 43 were diagnosed with PGDM. In this study the mean age of women was 28yrs (from, 23-42yrs) women with GDM being slightly higher 32yrs vs 28yrs. Multiple risk factors were taken into consideration including Hba1c, preLGA , prev abortions and BMI. Though family history is important risk factor for both the prevalence was seen more in GDM (37.5 vs 21%) Compared to those with PGDM, the GDM experiences higher rate of gestational hypertension (21.1vs 7.8%). We found that there was a relation between pre-pregnancy BMI and women undergoing caserean section which states that with increasing BMI the chances of patient of patient undergoing LSCS increases. In women with BMI >30 it was found that prevalence of BMI was seen more in GDM than PGDM (24.4VS 21.2)and risk of caserean delivery among women with GDM compared to PGDM was more (48vs30). Of the 207 females with GDM 17.5% had preterm delivery compared 10 only 9.8% of those with PGDM. Abortion and IUFD was particularly common with similar frequency in GDM and PGDM respectively (22.9 vs 21.2)(15.8vs7.2). Neonatal complications included congenital malformations, macrosomia, RDS, Hypoglycaemia, shoulder dystocia and NICU admission. The rate of neonatal RDS was significantly higher among offspring of women with GDM compared to PGDM (11.6VS 5.1).Hypoglycemic episodes were higher in GDM than PGDM(21.8 VS 16.5).Offspring with macrosomis were more prevalent in PGDM than GDM (22.9 VS 7.9).However NICU admission was found more prevalent in PGDM than GDM (78%VS 42%).

**Table 1:** Maternal characteristics of the study groups

| Characteristics | GDM n=207 | PGDM n =43 |
|---|---|---|
| Maternal age | 32.4yrs+/-2.5yrs | 28.5yrs+/-2.2yrs |
| Family history of diabetes mellitus | 78(37.5%) | 9(21%) |
| BMI>27kg/$m^2$ | 50(24.4%) | 9(21.2%) |
| Pre-eclampsia /eclampsia | 43 (21%)* | 3 (7.8%)* |
| Fasting plasma glucose | 118.2+/-15.6mg/dl | 101.5+/-17.7mg/dl |
| Intrauterine fetal death | 32(15.8%)* | 3(7.2%)* |
| Abortion | 47(22.9%)* | 9(21.2%)* |
| Prior gestational diabetes mellitus | 171(83%) | ------- |
| Prior preterm delivery | 36(17.5%) | 4(9.2%) |
| Large gestational age | 32(15.5%) | 2(6.2%) |
| Prior congenital malformation | 11(5.7%) | 1(2.9%) |
| Prior LSCS | 77(37.2%) | 10(23.8%) |
| Gestational age at delivery | 37.3wks+/-2wks* | 37.6wks+/-2wks* |
| Prior stillbirth | 36(17.5%)* | 7(15.2%)* |
| Hba1c | 6.8 | 7.5 |
| Oligohydroamnios | 16(45%) | 5(13.5%) |
| Polyhydroamnios | 14(7.6%) | 2(5.2%) |

*p<0.05 statistically significant data

**Table 2:** Neonatal Outcomes

| Characteristics | GDM n =207 | PGDM n =43 |
|---|---|---|
| Preterm | 30(14.8%)* | 38(9.1%)* |
| RDS | 24(11.6%) | 21(5.1%) |
| Hypoglycemia | 45(21.8%) | 7(16.5%) |
| Shoulder dystocia | 8(4.1%) | 1(3%) |
| Macrosomia | 47(22.9%) | 3(7.9%) |
| NICU addmission | 88(42.6%) | 33(78%) |

**Table 3:** Delivery Outcomes

| Outcomes | GDM | PGDM |
|---|---|---|
| Casearean section | 99(48%) | 13(30%) |
| Induction of labour | 84(41.5%) | 12(28.6%) |

## Discussion

It has been shown that the risk of developing type 2 diabetes in women with gestational diabetes in women with gestational diabetes is considersable.[12] Women who remains glucose tolerant after pregnancy have been found to have a subtle but significant difference from controls in fasting lipids and blood pressure which are predictor of coronary heart disease.[13-14] DM is one of the most common medical complications of pregnancy. A review of the literature over the last two decades indicates that the incidence of gestational DM varies from 0.15 to 12.3%. Between 0.2 and 0.3% of pregnancies occur in women with insulin dependent DM. When not diagnosed or treated properly, DM in pregnancy is associated with adverse maternal and fetal outcomes such as high perinatal wastage, congenital anomalies, macrosomia and

neonatal, childhood and adult complications.[5] In our study, the two groups of patients were similar with respect to parity,maternal weight at booking, birth weight and placental weight but there were difference regarding maternal age , gestational age at delivery and mean fasting blood sugars. Among the diabetic mothers, proportion of abortions and assisted deliveries were significantly higher compared to non-diabetic controls and this is in agreement with earlier studies.[16]The frequency of low birth weight babies in non-diabetic controls was 14.3% which was slightly higher than that observed in the diabetic mothers. We studied the pregnancy outcomes of 27 women with gestational and 73 women with pre-gestational DM. After controlling for multiple risk factors, including previous LGA infants, fetal death, congenital malformations, abortion, preterm labor, familial history of DM and gestational DM, we observed that women with pre-gestational DM were at increased risk for operative delivery (four times higher than gestational DM). In other studies, similar to the results of our study, frequency of Cesarean delivery has been found to be higher in pregestational
DM compared to the gestational DM[7-8]. The incidence of pre-eclampsia in our study was high (11%), similar to findings of Lavin *et al.* who found that pre-eclampsia is significantly increased[8]. The different thresholds of glucose in diabetic
pregnant women are associated with fetal complications such as stillbirth, spontaneous abortion, congenital anomalies, fetal macrosomia, and metabolic and respiratory complications[9]. In our study, the overall incidence of abortion was high
(22%), higher in type 2 diabetic women compared to type 1 and gestational DM (31.5% vs. 11.4% and 22.2%). The incidence of congenital anomalies in offsprings of diabetic mothers has been reported as 6-9% (10). In our study, it were higher (11%) and four times more frequent in pre-gestational compared to gestational DM (12.5% vs. 3.6%), while none
occurred in those with pre-conceptional counselling. The cause of the higher incidence of congenital anomalies in our study could be poor glucose control in diabetic women, or few pre-conceptional counselling.
The GDM women had a slightly higher frequency of large babies compared to PGDM mothers. This is consistent with earlier studies.[18] The reason could probably due to insulin resistance as shown by decreased insulin binding and associated metabolic abnormalities ,which is more pronounced in GDM than in PGDM.[6] An earlier study had shown that even women with impaired glucose tolerance had higher rates of large babies compared to normals.[14] Congenital anomalies were more common in the PGDM group that the GDM group although this was not statistically significant. This is comparable to earlier studies.[5, 18] Macrosomia continues to be a problem, with a rate of occurrence of 25% compared with non-diabetic mothers. The rate is inverselyproportional to glycemic control [11]. The rate ofLGA in our study was 14.3% in gestational DM and6.9% in pre-gestational DM, compared to 16% and37% in Ray *et al.* study. The probable cause of lowincidence of LGA in pre-gestational DM in our studyis poor control of DM in the pre-conceptional periodand presence of vascular disease. In our study wefound RDS in pre-gestational DM with a rate 13.9%,four times higher than gestational DM (3.6%) andmore common in type 2 DM (21.9%) compared to type 1 DM (7.9%). Clinical studies investigating theeffect of maternal diabetes on fetal lung maturationhave produced conflicting data. With the introductionof protocols that have emphasized glucose control and antepartum surveillance until lung maturity hasbeen established, RDS has become a less common finding in the IDM[12]. In our study, the rate ofpreterm birth was 11.1% in pre-gestational and17.9% in gestational DM. Despite small sample size and retrospective nature, this study has shown that gestational diabetes is a major contributor to perinatal deaths (5.7%)

## Conclusion

women with PGDM are at greater risk of unfavourable pregnancy outcomes than GDM. Pregnancy outcomes also depend on glycemic control and hence tight control of diabetes must be attempted right through the pregnancy, probably starting even before the time of conception through combined pre-pregnancy, diabetes clinics, jointly run by diabetologists and obstetricians.

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