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# Maternal and perinatal outcome in gestational diabetes among low socioeconomic status

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**Abstract**
**Background:** Prevalence rate of gestational diabetes varies from 2% to 22% of all pregnancies because of the use of different criteria for diagnosis. It constitutes 90%–95% of all cases of diabetes seen in pregnant women. Many controversies exists related with the screening, diagnostic tools, and glucose level threshold use due to the use of different criteria followed by the different organisation. Many studies report maternal and fetal outcomes related with complications in GDM but were flawed due to a number of confounding factors like older maternal age, obesity, and various other comorbidities.
**Materials and methods:** The present study was a retrospective cohort study of 150 GDM patients who belongs from a low socioeconomic status over a period of 1 years. Another 100 women with normal profile patients without GDM who delivered during the same time were taken as controls. Demographic characteristic of women including age, body mass index (BMI), socioeconomic status, and religion was recorded and the diagnosis of GDM was made by GTT using 75 g glucose, if any one value is more than criteria (fasting blood sugar [BS] ≥92 mg/dl, 1 h BS ≥180 mg/dl, and 2 h BS ≥153 mg/dl), patients were labelled as GDM.
**Results:** A total of 125 (83.33%) were controlled on diet, whereas 16 (10.66%) required insulin and 9 (6%) were treated with oral hypoglycemic agent. Baseline characteristic of diabetic women and control is shown in Table 2. There was no significant difference in age, BMI, and religion in both groups. However, there was a significant difference in socioeconomic status with a significantly higher number of women in middle socioeconomic class in GDM (36.66) as compared to control (35%) ($P$ = 0.001). Family history of diabetes was observed in a significantly higher number of GDM patients (25.33%) as compared to control group (20%) ($P$ = 0.002).
**Conclusion:** There is a higher prevalence rate of GDM in India which varies from area to area and socioeconomic status. Adequate treatment of GDM with diet, oral hypoglycemic agents with or without insulin to achieve euglycemia can achieve near-normal maternal and neonatal outcome. Although birth weight and neonatal hypoglycemia remain higher in GDM patients.

**Keywords:** proximal tibia fracture, MIPPO, knee stiffness, wound dehiscence

## Introduction
According to the World Health Organization gestational diabetes mellitus (GDM) is a degree of glucose intolerance with onset or first recognized during pregnancy. [1] It's prevalence rate varies from 2% to 22% of all pregnancies because of the use of different criteria for diagnosis.[2] It constitutes 90%–95% of all cases of diabetes seen in pregnant women.[3] Many controversies exists related with the screening, diagnostic tools, and glucose level threshold use due to the use of different criteria followed by the different organisation.[2] Many studies report maternal and fetal outcomes related with complications in GDM but were flawed due to a number of confounding factors like older maternal age, obesity, and various other comorbidities.[4] The most convincing evidence of adverse pregnancy outcome in gestational diabetes was provided by hyperglycemia. [5] In a study The tolerance test (GTT) was performed with fasting ≥92 mg, 1 h ≥180 mg/dl, and 2 h ≥153 mg/dl plasma glucose values are taken as GDM.[6] In India, study by Seshiah *et al*., a community-based study on the prevalence of GDM in South India was performed and they came up with Indian guidelines for GDM which are commonly used in Indian condition. [7] The aim of the present paper was to evaluate the maternal and perinatal outcomes in gestational diabetes in low socioeconomic groups.

## Materials and method
The present study was a retrospective cohort study of 150 GDM patients who belongs from a

Low socioeconomic status over a period of 1 years. Another 100 women with normal profile patients without GDM who delivered during the same time were taken as controls. Demographic characteristic of women including age, body mass index (BMI), socioeconomic status, and religion was recorded and the diagnosis of GDM was made by GTT using 75 g glucose, if any one value is more than criteria that is fasting blood sugar [BS] ≥92 mg/dl, 1 h BS ≥180 mg/dl, and 2 h BS ≥153 mg/dl, patients were labelled as GDM. Initially, patients were started with balanced diet with some physical exercises. If blood glucose levels were not controlled on diabetic diet, then women were either started on oral hypoglycemic drugs or insulin. All antenatal investigations were performed and women were screen for Down's syndrome using Level I ultrasound and dual screen followed by triple screen. Level II ultrasound was performed at 18–20 weeks in all patients for anomaly screening and antenatal complications were listed and treated, particularly urinary tract infection (UTI), candidiasis, preeclampsia etc. As per the guidelines, all the subjects with GDM on insulin were induced at 38 weeks, and those controlled on diet were induced at 40-week period of gestation. All the data analyses were carried out using statistical product services solution IBM SPSS version 20.0.For normally distributed continuous variables, descriptive statistics such as mean, standard deviation, and the range values were calculated. Comparison of two group means was tested using Student's *t*-independent test., median values and interquartile range were computed and were compared using Mann–Whitney U-test. Data were presented as frequency and percent values. Frequency data across categories were compared using Chi-square test and $P < 0.05$ was considered statistically significant for all statistical tests.

## Result

Table 1 summarizes the method of diagnosing GDM and treatment received by the patient A total of 125 (83.33%) were controlled on diet, whereas 16 (10.66%) required insulin and 9 (6%) were treated with oral hypoglycemic agent. Baseline characteristic of diabetic women and control is shown in Table 2. There was no significant difference in age, BMI, and religion in both groups. However, there was a significant difference in socioeconomic status with a significantly higher number of women in lower socioeconomic class in GDM (36.66) as compared to control (35%) ($P = 0.001$). Family history of diabetes was observed in a significantly higher number of GDM patients (25.33%) as compared to control group (20%) ($P = 0.002$). Various maternal complications of two groups are shown in Table 3. Gestational hypertension and preeclampsia (pregnancy-induced hypertension) were seen in a significantly higher number of cases in GDM patients as compared to controls whereas polyhydramnios was also seen in higher number in GDM. Prevalence of other antenatal complications such as UTI and candidiasis was similar in two groups. Obstetric outcome in two groups is shown in Table 4. Preterm delivery rate was higher in GDM patients as compared to control group. There was no significant difference in the mode of delivery between the two groups. Postpartum haemorrhage and postpartum complication were also similar in two group. Perinatal outcome and neonatal complication in the two groups are shown in Table 5. Mean birth weight was significantly higher in GDM group as compared to control. There was no significant difference in Apgar score at 1 and 5 min in two groups. There was a significantly higher number of large-for-date babies in GDM group as compared to control group.

**Table 1:** Method of diagnosis and the modes of treatment for gestational diabetes mellitus

| **Method of diagnosis** | |
|---|---|
| | **GDM(n=150)%** |
| F<br>Fasting blood sugar<br>1h<br>2h | 109(72.66%)<br><br>61(40.66%)<br>56(37.33%) |
| Modes of treatment for gestational diabetes mellitus | |
| Diet | 125(83.33%) |
| Insulin | 16(10.66%) |
| Oral hypoglycemic agents | 9(6%) |

**Table 2:** Baseline characteristics of patients and control

| | **GDM (150)** | **NON GDM (100)** | **P** |
|---|---|---|---|
| **Age** | 27.77±4.32 | 27.75±4.52 | 0.94 |
| BMI(kg/m$^2$±SD) | 24.6±4 | 24.8±4.9 | 0.721 |
| Religion (%) | | | |
| Hindu | 130(86.66%) | 90(90%) | 0.10 |
| Muslim | 18(12%) | 8(8%) | |
| Christian | 1(0.66%) | 0(0%) | |
| Sikh | 1(0.66%) | 2(2%) | |
| Socioeconomic status | | | |
| Lower | 90(60%) | 60(60%) | 0.001 |
| Middle | 55(36.66%) | 35(35%) | |
| Upper | 5(3.33%) | 5(5%) | |
| History of diabetes in family | 38(25.33%) | 20(20%) | 0.002 |

**Table 3:** Maternal Complications in GDM and Non GDM Patients

| **COMPLICATION** | **GDM(150)** | **NON GDM(100)** | **P** |
|---|---|---|---|
| UTI | 20 | 15 | 0.44 |
| Gestational hypertension/preeclampsia | 30 | 10 | 0.017 |
| Polyhydramnios | 1 | 0 | 0.221 |
| Vaginal candidiasis | 5 | 3 | 0.241 |

**Table 4:** Outcomes in Both Groups

| | **GDM(n=150)%** | **NONGDM (N=100) %** | **P (T-TEST)** |
|---|---|---|---|
| Preterm delivery | 10(6.66%) | 5(5%) | 0.006 |
| Mode of delivery | | | |
| Vaginal | 85(56.66%) | 40(40%) | 0.28 |
| Caesarean | 65(43.33%) | 60(60%) | |
| Instrumental | 5(3.33%) | 5(5%) | 0.25 |
| Primary postpartum haemorrhage | 2(1.33%) | 1(1%) | 0.60 |
| Postpartum sepsis | 3(2%) | 1(1%) | 0.56 |

**Table 5:** Perinatal Outcomes in Both Groups

| | **GDM (100)** | **NON GDM(100)** | **P** |
|---|---|---|---|
| Baby weight | 2842.73±538.35 | 2706.54±643.47 | 0.04 |
| Apgar 1 min | 8.07±1.31 | 8.04±0.84 | 0.94 |
| Apgar 5 min | 8.62±1.42 | 8.72±0.81 | 0.36 |
| Distribution of baby weight with reference to standard weight (%) | | | |
| AFD | 103(68.66) | 75(75%) | 0.002 |
| LFD | 42(28%) | 20(20%) | |
| SFD | 5(3.33) | 5(5%) | |
| Hypoglycemia (%) | 30(20%) | 9(9%) | 0.001 |
| Hyperbilirubinemia (%) | 6(4%) | 4(4%) | 0.762 |
| Respiratory distress syndrome (%) | 7(4.66) | 3(%) | 0.082 |
| Congenital anomaly (%) | 7(4.66) | 3(%) | 0.082 |

AFD- Appropriate for date, LFD- large for date, SFD- small for date

## Discussion

Gestational diabetes mellitus (GDM) is commonly seen in pregnancy [1, 2] and have adverse antenatal and neonatal outcome. However, controversies regarding adverse effects of GDM exists may be due to the use of different criteria used in the different studies [4]. HAPO (hypoglycemia and adverse pregnancy outcome) study confirmed adverse maternal and fetal outcome with rising blood glucose levels in the form of large for date, cesarean delivery rate, and neonatal hypoglycemia as a primary outcome and preeclampsia, birth injury, preterm delivery, shoulder dystocia, hyperbilirubinemia, and intensive neonatal care as secondary outcome. Outcome were affected with maternal hyperglycemia and the prevalence rate of outcomes was directly proportional to rising blood glucose levels [5]. Most of the guidelines have been developed by considering the results of HAPO study including Indian guidelines by Seshiah *et al.* [7, 8] The incidence of GDM in the present study was found to be 7.12% which was lower than that of 13% by Nair *et al.* [9] from Kolkata, Bengaluru, and Pune and was similar to 7.17% by Rajput *et al.* [10] and higher than that of 3.8% by Zargar *et al.* [11] However, Seshiah *et al*. [8] in a study found the prevalence rate of GDM to be very high being 17.8% in urban, 13.8% in semiurban, and 9.9% in rural area of south. In the present study, GDM was found to be higher in lower and middle socioeconomic class, which is in accordance with Rajput *et al*. who observed the similar results. [10] History of diabetes in family was significantly higher in GDM cases in the present study as compared to controls with the similar results obtained by Nair *et al.* [9] In the present study, maternal complications such as gestational hypertension and preeclampsia were significantly higher as compared to controls that is in accordance with the results found by Nair *et al.* [9] and HAPO study [5]. No significant difference in mode of delivery (cesarean delivery and instrumental delivery) in GDM as compared to controls was observed in the present study, an observation also reported by HAPO study [6] and Nair *et al.* [9] showed the similar results. In perinatal outcome, mean birth weight was significantly higher in GDM cases as compared to controls. Similarly, large-for-date babies were significantly higher in GDM patients than control. There was significantly higher incidence of neonatal hypoglycemia in GDM patients than control. There was no significant difference in congenital malformation, Apgar scoring, and neonatal hyperbilirubinemia in both the groups. The results were similar to Nair *et al.* [9] and Djomhou *et al.* [2] who observed increased incidences of macrosomia in their study. Other studies and a systematic review of WHO and International association of diabetes and pregnancy study group of India diagnostic criteria observed adverse maternal and perinatal outcome, especially macrosomia and neonatal hypoglycemia in GDM patients as compared to controls [12, 13, 14]. Study by Sacks *et al.* [15] found prevalence of GDM to be 17.8% (9.3%–25.5%) and adverse perinatal outcome in these patients. In another study, Most *et al.* [16] observed adverse perinatal outcome in women diagnosed to have GDM in the early pregnancy, with adverse pregnancy outcome despite early identification and management of GDM may be due to greater severity of disease [9, 16].

In a study conducted in south India, by using Diabetes in Pregnancy Study Group of Indian criteria, [17] observed an incidence of 13.4% of GDM in pregnancy and need of insulin to be in 9.7% which was similar to need of insulin in the present study. Nair *et al.* [9] observed most complication could be reduced significantly by adequate glycemic control in the antenatal period. We also observed slight increase in parameters but most other parameters were similar in the two groups due to adequate control of blood glucose by diet control, insulin, and oral hypoglycemic agents. Similar results were observed by Kwik *et al.* [18] Similarly, in the present study respiratory distress syndrome and hyperbilirubinemia were similar to control levels due to proper control of GDM. Mitanchez *et al.* [19] found a relationship between maternal blood glucose levels and increased birth weight and the treatment of GDM can reduces the risk of macrosomia and adverse neonatal outcome.

## Conclusion

There is a higher prevalence rate of GDM in India which varies from area to area and socioeconomic status. Adequate treatment of GDM with diet, oral hypoglycemic agents with or without insulin to achieve euglycemia can achieve near-normal maternal and neonatal outcome. Although birth weight and neonatal hypoglycemia remain higher in GDM patients.

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