

Prevalence of gestational diabetes mellitus and its outcome in western Rajasthan

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) is a metabolic disorder defined as glucose intolerance with the onset or first recognition during pregnancy. Women with GDM are at increased risk for adverse obstetric and perinatal outcome. Hence, it is imperative that an early detection and management of the disease is done to ensure better maternal and fetal outcomes. **Aims:** This study was done to evaluate the prevalence of gestational diabetes using diabetes in pregnancy Study Group India (DIPSI) criteria and further assess its fetomaternal outcome in western Rajasthan. **Materials and Methods:** This study was carried out in 500 patients between 24 and 28 weeks of gestation, attending the antenatal outdoor. These patients were given 75 g oral glucose irrespective of the meals and their plasma glucose was estimated at 2 h. Patients with plasma glucose values ≥ 140 mg/dl were labeled as GDM and the rest as the control or the non-GDM group. All GDM patients were followed up and treated with diet and/or insulin therapy till delivery to know maternal and fetal outcomes. **Results:** The prevalence of GDM in this study was 6.6%. Maternal and fetal complications in the GDM group were much higher than in the non-GDM group. Hypertension, vaginal candidiasis, and abruptio placentae were the common maternal complications, while macrosomia and stillbirths occurred in the fetuses. **Conclusion:** GDM as a disease entity adversely affects maternal and fetal outcomes. This also builds a strong case for following DIPSI guidelines in diagnosis and management of GDM.

Key words: Diabetes in pregnancy study group india criteria, gestational diabetes mellitus, glucose intolerance, macrosomia

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with the onset or first recognition during pregnancy with or without remission after the end of pregnancy.^[1] GDM is important in that it poses a risk to the pregnant woman and her baby. GDM is associated with higher incidence of maternal mellitus later in life.^[2] The major morbidities associated with infants of diabetic mothers include respiratory distress, growth restriction, polycythemia, hypoglycemia, hypocalcemia, and hypomagnesemia, and congenital malformations.^[3] Perinatal outcomes associated with poor glycemic control in mothers are associated with as high as 42.9% mortality.^[4]

Appropriate diagnosis and management of GDM can improve maternal and perinatal outcome. Many studies have been done in various parts of India on gestational diabetes, like Seshiah *et al.* in Chennai, Wahi *et al.* in Jammu, and Gajjar in Baroda, Gujarat.^[5-7]

Very little data is available with regard to the prevalence of GDM from western Rajasthan which forms the Great Thar Desert. People here face living conditions different from their fellow countrymen, like arid climate, paucity of resources, and illiteracy. This is quite strange as a lot of research focus today is on the well-being of mother and the newborn child in general and the situation of GDM or diabetes in particular. The present study, therefore, has compiled data regarding the prevalence of GDM from western Rajasthan and its effect on pregnancy outcomes. In the present study, the Diabetes in Pregnancy Study Group India (DIPSI) guidelines have been followed for screening of subjects, so that a uniform protocol followed by similar groups in other parts of the country could enable a fair and judicious correlation with each other. Besides, DIPSI guidelines also facilitate both economical and

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feasible mode of evaluation. DIPSII diagnostic criterion of 2 h plasma glucose more than 140 mg/dl with 75 g oral glucose load is a modified version of WHO guidelines in that WHO procedure requires women to be in the fasting state, whereas DIPSII procedure is performed irrespective of the last meal timing.^[1]

MATERIALS AND METHODS

The present study was conducted at the antenatal clinic in the Department of Obstetrics and Gynaecology at a medical college hospital, which is the largest public sector hospital in the western Rajasthan. A total of 500 patients were screened for GDM. The inclusion criteria included pregnant women at 24th-28th week of gestation, while all patients with h/o of DM prior to onset of pregnancy, major chronic diseases like carcinoma, tuberculosis, congestive cardiac failure (CCF), renal failure, and advanced liver failure were excluded from the present study. A standardized questionnaire was used, and details pertaining to family history, medical and obstetric history were collected. Body mass index (BMI) and blood pressure (BP) were also recorded. Informed consent was taken from the patients. Pregnant women were given 75 g oral glucose load irrespective of their last meal timing and venous blood sample was drawn at 2 h. The plasma glucose was estimated in the central laboratory by the glucose oxidase-peroxidase (GOD-POD) method.^[18]

Diagnosis of GDM

The criterion used was if the 2 h venous plasma glucose measured after 75 g oral glucose load in non-fasting state was ≥ 140 mg/dl (DIPSII criteria) the patient was labeled as GDM.^[19] The rest were classified as the normal glucose tolerant or the non-GDM group. GDM women were advised medical nutrition therapy (MNT) for 2 weeks. Those who did not respond by maintaining fasting plasma glucose (FPG) ≤ 90 mg/dl and peak post-meal glucose ≤ 120 mg/dl were advised insulin. All of them were followed until delivery. The antenatal and the postnatal course of the women and the perinatal outcome were studied.

Statistical analysis

Results were expressed as number and percentages. Chi-square test for proportions was used for comparing GDM and control. $P < 0.05$ were considered to be significant.

RESULTS

A total of 500 subjects at 24-28 weeks of gestation were evaluated for GDM using the DIPSII criteria. Out of 500 subjects, 33 (6.6%) were diagnosed as GDM. The remaining formed the non-GDM group. The mean age

of the patients was 25.33 ± 3.17 years. Table 1 shows the comparison of prevalence of risk factors between GDM and non-GDM population. Family history of diabetes mellitus, age ≥ 25 years, past history of GDM, and BMI ≥ 25 kg/m² were significantly associated with GDM group ($P < 0.001$).

Table 2 shows the distribution of associated complications such as pregnancy-induced hypertension (PIH), vaginal candidiasis, and abruptio placentae. The prevalence of all these complications was higher in the GDM group than in the non-GDM group, with statistical significance ($P < 0.01$).

Table 3 shows statistical correlation between delivery outcomes in women with and without GDM. Prevalence of Cesarean delivery and assisted vaginal delivery was statistically higher in non-GDM group than in GDM group ($P < 0.001$). Although the percent prevalence of shoulder dystocia and postpartum hemorrhage (PPH) was higher in GDM than in non-GDM group, it did not reach statistical significance.

Table 1: Comparison of prevalence of risk factors in GDM and non-GDM population

Risk factors	Non-GDM (n=467) No. (%)	GDM (n=33) No. (%)	P value
Age ≥ 25 years	260 (55.67)	28 (84.84)	<0.001
Family history of diabetes mellitus	25 (5.35)	11 (33.33)	<0.001
History of perinatal losses	38 (8.13)	5 (15.15)	<0.001
History of big baby	2 (0.43)	2 (6.06)	<0.001
Past history of GDM	-	4 (12.12)	<0.001
BMI ≥ 25 kg/m ²	116 (26.4)	22 (67)	<0.001

GDM: Gestational diabetes mellitus, BMI: Body mass index

Table 2: Distribution of associated complications between non-GDM and GDM population

Complications	Non-GDM (n=467) No. (%)	GDM (n=33) No. (%)	P value
Gestational hypertension	72 (15)	9 (27)	<0.01
Vaginal candidiasis	30 (6.4)	8 (24.2)	<0.001
Abruptio placentae	14 (3)	4 (12)	<0.001
Premature rupture of membranes	21 (4.8)	6 (18.1)	<0.01

GDM: Gestational diabetes mellitus

Table 3: Delivery outcomes in non-GDM and GDM population

Outcome	Non-GDM (n=467) No. (%)	GDM (n=33) No. (%)	P value
Cesarean delivery	143 (30)	26 (79)	<0.001
Spontaneous vaginal delivery	320 (67)	6 (18)	<0.001
Assisted vaginal delivery	4 (0.81)	1 (3)	<0.001
Shoulder dystocia	3 (0.64)	1 (3)	>0.05
Postpartum hemorrhage	64 (13.8)	7 (21)	>0.05

GDM: Gestational diabetes mellitus

Table 4 shows the fetal outcomes in the study group. The prevalence of stillbirths, macrosomia, and neonatal intensive care unit (NICU) admissions was higher in the GDM group than in the non-GDM group, with statistical significance ($P < 0.05$). The prevalence of hypoglycemia and hyperbilirubinemia was higher in GDM than in non-GDM group, but it did not reach statistical significance.

In the present study, out of 33 GDM patients, 14 (42.4%) patients were managed on both diet and insulin, while 19 (57.57%) were managed on diet alone. Premix insulin (30/70) was given starting with an initial dose of 4U subcutaneously and was increased according to the fasting and 2hr pp plasma glucose levels.

DISCUSSION

The present prospective hospital-based study, which is the first of its kind to be undertaken in this part of the country, showed the prevalence of GDM as 6.6%. GDM prevalence has been reported variably from 1.4 to 14% worldwide and differently among racial and ethnic groups. Prevalence is higher in Blacks, Latino, Native Americans, and Asian women than in White women. Compared to European women, the prevalence of gestational diabetes has increased 11-fold in women from the Indian subcontinent. Nilofer in Davengere, Karnataka, performed a similar study and found a prevalence rate of 6%.^[8] Wahi *et al.* from Jammu found a prevalence rate of 6.94%.^[6] DIPSI guidelines having suggested one-time plasma sugar level as a measure to detect GDM is an attempt to predict future possibility and predisposition for diabetes mellitus.

Our findings of this study are largely at tandem with those of literature at the national as well as international level. We, therefore, infer from the above study that western Rajasthan, despite its hot and arid climate, varying ethnicity, food habits, and living standards is very much a part of diabetes spectrum the world over.

Compared with non-GDM subjects, GDM patients were older, with the mean ages of the two groups being 24.7 ± 3.11 years and 27.1 ± 2.44 years, respectively. Similar study from South India showed age > 25 years as a risk factor

for GDM.^[9] Obesity as a significant risk factor for GDM is supported by several studies finding that overweight or obesity at the start of pregnancy predisposes to GDM. Das *et al.* and Gomez *et al.* found that 25% and 50% of women with GDM, respectively, had obesity.^[10,11] This may be due to increased demands on maternal metabolism during pregnancy from excess weight, resulting in imbalances in hormonal carbohydrate regulation mechanisms, and insulin sensitivity. Nilofer found obesity as a risk factor in 88.89% of GDM patients.^[8] In our study, a significant proportion of subjects with GDM were overweight [22 (66.67%)] and obese [6 (18.18%)]. Similar results were also found by Garshasbi in Iran.^[12] Family history of diabetes mellitus was found in 33.3% of our GDM women. Interestingly, history of diabetes in mother was twice as common as history of diabetes in father (18.18% vs. 9.09%). Probably the mothers of GDM women might also have had suffered from GDM in their pregnancies but remained undetected, hence supporting the familial association of GDM.

Our study shows that 15.15% of GDM mothers had history of previous fetal or early neonatal deaths. Hoseini conducted a similar study in Iran on 227 patients and found that 12.3% of the GDM women had history of previous fetal or early neonatal deaths.^[13] Wahi *et al.* also found 24.9% of their GDM patients with a positive family history of perinatal losses.^[6] Insulin being a potent growth factor promotes lipogenesis, protein synthesis, and therefore growth of the fetus. Hence, history of prior delivery of a big baby or a macrosomic baby (birth weight > 4 kg) is also indicative of existence of GDM in previous pregnancies. In our study, 6.06% of GDM women gave history of previous delivery of big baby.

Our study revealed that the most common complications seen in GDM mothers were gestational hypertension (36.4%) followed by vaginal candidiasis (24.2%), premature rupture of membranes (PROM; 18.1%), and abruptio placentae (12.12%). Gajjar found that most common maternal complication seen in GDM mothers was gestational hypertension (36.4%) followed by abruptio placentae (20%).^[7] Another study of 972 GDM mothers in Saudi Arabia showed that the common complications were perineal tear (18%) that caused postpartum hemorrhage, followed by gestational hypertension (2%).^[14]

Gajjar found a Cesarean rate of 19.5% in the GDM patients.^[7] Cesarean delivery rate in our study was 78.8% amongst the GDM patients, with the most common indication being arrest of labor. This is quite high probably because in our setup, there is lack of adequate intrapartum fetal monitoring and surveillance techniques due to less infrastructure and greater patient load. Hence, lesser number

Table 4: Fetal outcomes in non-GDM and GDM population

Fetal outcome	Non-GDM (n=467) No. (%)	GDM (n=33) No. (%)	P value
Stillbirths	7 (0.42)	3 (9.09)	<0.01
NICU admission	56 (10.9)	9 (27.2)	<0.02
Macrosomia	18 (3.64)	6 (18)	<0.001
Hypoglycemia	24 (5.13)	3 (9.09)	>0.5
Hyperbilirubinemia	27 (5.78)	6 (12.12)	>0.2

GDM: Gestational diabetes mellitus, NICU: Neonatal intensive care unit

of high-risk patients are given trial of labor and hence more number of patients are delivered by Lower Segment Cesarean Section. Our study demonstrated that 18.1% of newborns of GDM mothers were macrosomics as opposed to 3.64% in the non-GDM group. Hong *et al.* also found an incidence of 6.5% of macrosomia in the GDM group.^[15] Our study showed that prevalence of stillbirth was 9.09% in GDM deliveries. In a study conducted by Odar in Uganda, a stillbirth rate of 16.7% was found.^[16] The incidence of hypoglycemia and hyperbilirubinemia were 9.09% and 12.12%, respectively, which were in concordance with the observations of a case control study done in Brazil.^[17] The incidence of hypoglycemia and hyperbilirubinemia in that study were 16.3% and 6.1%, respectively.

CONCLUSION

Women with GDM are at an increased risk for adverse obstetric and perinatal outcomes, and western Rajasthan, in spite of its unique geographic and socioeconomic features, is no exception to it. Although eradication of GDM is impossible, we can definitely prevent its adverse effects on pregnancy outcome.

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