A STUDY OF SCREENING OF GESTATIONAL DIABETES MELLITUS IT'S RISK FACTOR, PERINATAL OUTCOME AND MANAGEMENT

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Abstract

Background: Gestational diabetes mellitus (GDM) is a transient form of glucose intolerance with onset or first recognition during pregnancy. It constitutes a major and growing public health concern worldwide, with a global prevalence ranging from 2% to 6%, and up to 20% in high-risk populations. Women diagnosed with GDM have an increased risk of adverse maternal and fetal outcomes; therefore, early diagnosis and appropriate management are essential to improve fetomaternal health.
Objective: To assess the prevalence, risk factors, and fetomaternal outcomes associated with gestational diabetes mellitus.
Materials and Methods: A prospective hospital-based study was conducted in the Department of Obstetrics & Gynecology, Shri Balaji Institute of Medical Sciences, Raipur, Chhattisgarh. A 75-g oral glucose load was administered irrespective of meal status, and plasma glucose estimation was performed after 2 hours. GDM was diagnosed when the 2-hour plasma glucose level exceeded 140 mg/dL, as per DIPSI criteria. All women diagnosed with GDM were followed and managed using dietary modification and/or insulin therapy until delivery. Maternal and fetal risk factors and outcomes were recorded.
Results: The prevalence of GDM in the study population was 8%. A significant proportion of women with GDM had a prior history of delivering a large baby, stillbirth, or spontaneous abortion. Maternal complications included pregnancy-induced hypertension (41.7%) and polyhydramnios (33.3%), while 61.7% underwent caesarean section. Preterm labour occurred in 8.3% of cases. No complications were noted in 11.7% of women. Among newborns, 21.7% had a birth weight >3.5 kg, and 16.7% weighed

<2.5 kg.
Conclusion: Women with GDM are at increased risk of obstetric and fetal complications. The DIPSI single-step testing method is a simple and cost-effective approach for screening and diagnosing GDM, enabling timely management to reduce adverse outcomes.

Keywords: Gestational Diabetes Mellitus, Glucose Intolerance, DIPSI

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance of variable severity with onset or first recognition during the present pregnancy. This definition applies regardless of whether insulin is required for treatment or whether the condition persists after delivery, and it does not exclude the possibility that glucose intolerance may have predated the pregnancy [1,2]. Although the global prevalence of GDM is commonly reported as 2–5%, it may be as high as 14%, depending on the population studied and the diagnostic criteria applied [3]. Among women with defined high-risk factors—such as age above 25 years, obesity, or a family history of diabetes—the prevalence ranges from 3.3% to 6.1% [4]. Furthermore, approximately 50% of women with GDM are at risk of developing type 2 diabetes later in life [5].

Multiple studies have demonstrated that diabetic pregnancies are associated with significantly higher rates of maternal and fetal complications compared with normal pregnancies [6]. Pregnant women with diabetes are at an increased risk of developing hypertension in late gestation [7], and other obstetric complications such as polyhydramnios, preterm labour, and spontaneous abortions are also frequently observed. Infants born to diabetic mothers experience a range of complications including sudden intrauterine death, respiratory distress syndrome, hypoglycaemia, cardiomyopathy, neonatal jaundice, and disturbances in calcium and magnesium homeostasis.

The rising prevalence of diabetes, particularly among women of reproductive age, has made GDM an increasingly significant medical complication of pregnancy. Women with GDM are at increased risk for adverse obstetric and perinatal outcomes, making early diagnosis and timely management essential for improving maternal and fetal health [8]. The prevalence of GDM varies across populations and is influenced by factors such as ethnicity, race, and socioeconomic status.

Over the years, several professional bodies have proposed diagnostic criteria for GDM, including O'Sullivan, the American Diabetes Association (ADA), Australian Diabetes in Pregnancy Society (ADIPS), Carpenter–Coustan (CC), International Association of Diabetes and Pregnancy Study Groups (IADPSG), European Association for the Study of Diabetes (EASD), American College of Obstetricians and Gynecologists (ACOG), Diabetes in Pregnancy Study Group of India (DIPSI), Japan Diabetes Society (JDS), National Diabetes Data Group (NDDG), World Health Organization (WHO), and Canadian Diabetes Association (CDA). These criteria differ in screening approaches and diagnostic thresholds, contributing to variability in reported prevalence rates. The prevalence of GDM is expected to increase further, particularly in Asia [9–11], possibly due to rising maternal age and obesity in the region [12,13]. A recent review estimated the prevalence in Eastern and Southeast Asia at 10.1% (95% CI: 6.5–15.7%) [15].

Common risk factors for GDM include maternal age >30 years, obesity, family history of diabetes mellitus, previous macrosomic baby, unexplained neonatal death, recurrent abortions, congenital anomalies in previous pregnancies, history of hydramnios or stillbirth, and previous gestational hypertension or preeclampsia [14]. Interestingly, one study noted that teenage mothers who consumed alcohol were less likely to develop GDM [15]

MATERIALS AND METHODS

A prospective hospital-based study was conducted in the Department of Obstetrics & Gynecology, Shri Balaji Institute of Medical Sciences, Raipur, Chhattisgarh. A total of 400 pregnant women with singleton pregnancies between 24 and 28 weeks of gestation who attended the antenatal clinic were informed about the nature of the study, and written informed consent was obtained. A structured questionnaire was used to collect data on maternal age, gravida, and body mass index (BMI).

A detailed history of risk factors, including family history of diabetes and previous obstetric outcomes, was recorded. Clinical examination was performed for all participants. Women with known cardiac, hepatic, or renal disorders were excluded from the study.

Each participant received 75 g of oral glucose dissolved in 200 mL of water in a non-fasting state, following DIPSI guidelines. Venous blood samples were collected after 2 hours for plasma glucose estimation. A plasma glucose value ≥140 mg/dL was diagnostic of GDM, and values <140 mg/dL were classified as normal glucose tolerance (NGT).

Women diagnosed with GDM and having 2-hour plasma glucose <200 mg/dL were advised dietary and lifestyle modifications for two weeks, after which a repeat 2-hour postprandial blood sugar (PPBS) test was performed. Adequate control was defined as a 2-hour PPBS <120 mg/dL. If the 2-hour PPBS remained ≥120 mg/dL, the patient was referred to a physician for initiation of insulin therapy.

Maternal complications—including gestational hypertension, polyhydramnios, abruptio placentae, preterm labour, mode of delivery, and delivery-related complications—were recorded. Fetal outcomes such as birth weight, Apgar score, and need for NICU admission were also noted and analysed. All women diagnosed with GDM were advised to return for a postnatal follow-up at 6 weeks, during which fasting and postprandial blood glucose levels were assessed.

Statistical Analysis

Statistical analysis was performed using SPSS software version 23.0. Categorical variables were analysed using the chi-square test or Fisher's exact test as appropriate. Logistic regression analysis with a backward elimination model was conducted to determine the association of potential risk factors with GDM. In this analysis, GDM was the dependent variable, while all identified risk factors served as independent variables. Quantitative data were expressed as mean ± standard deviation, whereas qualitative data were presented as percentages. Odds ratios (ORs) with 95% confidence

intervals (CI) were calculated in logistic regression. A p-value of <0.05 was considered statistically significant.

RESULTS

Table-1: Distribution of subjects according to their age (N=60)

Age (in years)	Number of Cases	Percentage (%)
<20 years	4	6.7
20-25	18	30
25-30	26	43.3
>30	12	20

Out of 60 were diagnosed with GDM. Majority (43.3%, n= 26) were of age group 25-30 year. The second largest age group was of person aged 20-25 year (30%, n= 18) followed by >30 year (20%, n= 12), greater than <20 year age group (6.7%, n= 4). Table 1 showed that the proportion of the patients in the age group 25-30 years (43.3%) were significantly higher than other age group (p<0.001)

Table-2: Distribution of subjects according to Parity (N=60)

Gravida	Number of Cases	Percentage (%)
Primigravida	17	28.33
Multigravida	43	71.7

Table 2 shows that the majority (71.7%, n=43) were Multigravida. Test of proportion showed that there was higher proportion of Multigravida (71.7%) than Primigravida (28.33%) (P< 0.05).

Table-3: Distribution of subjects according to BMI (N=60)

BMI	Number of Cases	Percentage (%)
<19	6	10
19-25	30	50
>25	24	40

Table 3 shows that the BMI, Majority (50%, n= 30) had BMI of >25 followed by 19-25 (40%, n= 24), and <19(10%, n=6).Most of the patients (46.6%) were overweight (p<0.0001).

Table-4: Distribution of subjects according to Risk Factors (N=60)

Risk factors	Number of Cases	Percentage (%)
Previous history of abortion	25	41.7
Previous history of abortion	6	10
Unexplained still birth	21	35
History of Fetal weight>3.5kg	4	6.7
Previous history of	4	6.7

congenital anomalies		

Table 4 shows that majority of cases 25 (41.7%) had previous history of abortion and 21 (35%) had unexplained still birth. Family history of diabetes mellitus was present in 6 number of cases (10%), history of fetal weight >3.5 was found in 4 cases (6.7%) and previous history of congenital anomalies 4 cases (6.7%).

Table-5: Distribution of subjects according to Complications (N=60)

Complications	Number of Cases	Percentage (%)
PIH	25	41.7
Polyhydramnious	20	33.3
Chronic HTN	3	5
Preterm labour	5	8.33
No complication	7	11.7

Table 5 shows that majority of cases 25 (41.7%) had PIH. Abruptio placentae was observed in 20 cases (33.3%), Chronic HTN 3 (5), Preterm labour occurred in 5 case each (8.3%). No complications were observed in 7 cases (11.7%)

Table-6: Distribution of subjects according to Mode of Delivery (N=60)

Mode of Delivery	Number of Cases	Percentage (%)
SVD	15	25
LCSC	37	61.7
Assisted Vaginal delivery	8	13.3

Table 6 shows that LSCS delivery occurred in majority of cases 37 (61.7%) while 15 (25%) cases had to undergo SVD. Assisted Vaginal delivery accounted for 13.3%.Test of proportion showed that the proportion of the patients in the mode of LSCS delivery (61.7%) were significantly higher than other. ($p<0.001$)

Table-7: Distribution of subjects according to Delivery Complications (N=15)

Delivery outcome	Number of Cases	Percentage (%)
PPH	13	21.7
Shoulder dystocia	2	3.3

Table 7 shows that 13 (21.7%) subjects had PPH in the study and shoulder dystocia occurred in 2 (3.3%) case only. Test of proportion showed that the proportion of the patients in delivery outcome PPH (21%) were significantly higher than shoulder dystocia. ($p<0.001$).

Table-8: Distribution of subjects according to perinatal outcome (N=60)

Perinatal outcome	Number of Cases	Percentage (%)
Birth wt > 3.5 kg	13	21.7
Birth wt 2.5-3.5kg	27	45

Birth wt< 2.5 kg	10	16.7
APGAR < 7 in one minute	4	6.7
NICU Admission	6	10

5 kg were observed in 27 babies (45%), birth weight < 2.5 kg in 10 babies (16.7%), while 13 (21.7%) had birth weight >3.5kg respectively. APGAR score at<7 in 1 minute was observed in 4 babies (6.7%) and NICU admission in 6 (10%). Test of proportion showed that the proportion of the babies with the Birth weight 2.5-3.5 (45%) were significantly higher than other. ($p<0.001$).

DISCUSSION

This prospective hospital-based study found the prevalence of GDM to be 8%. Reported prevalence rates in India vary widely, ranging between 10–14% depending on geographic region and diagnostic criteria used [3]. GDM is recognized as a growing global public health concern due to its significant short- and long-term consequences for both mother and child. Despite its importance, reliable epidemiological data are still lacking in many regions. In Kuwait, where rates of diabetes and obesity are high, a study reported a GDM prevalence of 6.7%. Similarly, Rajput et al. [16] from Haryana reported a prevalence of 7.1%. Many studies from South India, however, document higher prevalence rates. For example, V. Balaji, C. Anjalakshi et al. [17] in 2011, using the DIPSI-modified WHO criteria, also reported a comparably high prevalence. The prevalence rate of 8% observed in our study aligns well with these findings.

In the present study, the majority of women (43.3%) were between 25–30 years of age. This is consistent with findings from R. Joy et al. [18], who reported a mean age of 29.2 years, and P. Kalra et al. [19], who documented an average age of 27.1 years. Most participants were multigravida (71.7%), corroborating the findings of Rajput M. et al. [20], who noted a significantly higher prevalence of GDM among women with gravida ≥3.

Half of the participants (50%) had a BMI >25, indicating overweight status, which was statistically significant ($p<0.0001$). Several studies have reported a strong association between elevated BMI and GDM. Egbe TO et al. [21] in 2018 found that GDM was significantly associated with BMI ≥30 kg/m² (OR 6.2; 95% CI 2.9–13.1, $p<0.001$). Similar observations were made by Das et al. [22] and Bhat M. et al. [23]. In our study, 41.7% of women had a history of spontaneous abortion, and 35% had a history of unexplained stillbirth. Family history of diabetes was observed in 10% of women, and 6.7% had a history of delivering a baby weighing >3.5 kg. Pikee Saxena and Swati Tyagi et al. [24] reported family history of diabetes in 18% and spontaneous abortions in 14% of their subjects. Rajput et al. [21] also found that positive family history and previous macrosomia were significantly associated with GDM. Overall, multiple logistic regression in our study confirmed that age ≥25 years, multiparity, overweight/obesity, previous abortions, stillbirths, macrosomia, and family history of diabetes were significant predictors of GDM.

Pregnancy-induced hypertension (PIH) was the most common maternal complication in our study (41.7%). Abruptio placentae occurred in 17% of cases, chronic hypertension in 3%, and preterm labour in 8.3%. These outcomes align with findings

from Saxena et al. [25], who reported PIH in 40% and polyhydramnios in 20% of diabetic pregnancies. Kalra et al. [20] also observed a PIH prevalence of 40%. The caesarean section (LSCS) rate in our study was high (61.7%), similar to findings by Saxena et al. [25], who reported a caesarean rate of 42%, and Karunakaran et al. [26], who found caesarean delivery in 58.96% of GDM cases. Assisted vaginal deliveries accounted for 13.3%.

Regarding neonatal outcomes, 45% of newborns had a birth weight between 2.5–3.5 kg, while 16.7% weighed <2.5 kg and 21.7% weighed >3.5 kg. A low Apgar score (<7 at 1 minute) was recorded in 6.7% of neonates, and 10% required NICU admission. Saxena et al. [25] reported a mean birth weight of 3.1 ± 0.9 kg in infants born to diabetic mothers. Their study also found higher rates of congenital anomalies, respiratory distress (10%), and intrauterine fetal deaths in diabetic pregnancies when compared to non-diabetic pregnancies. Although congenital anomalies were not noted in our study, the spectrum of neonatal complications observed is consistent with previous literature.

CONCLUSION

Women with GDM are at significantly increased risk for adverse maternal and fetal outcomes. Early diagnosis and timely management are crucial to improving pregnancy outcomes. Universal screening for GDM using the DIPSI criteria is recommended, as it offers a simple, cost-effective, and convenient single-step method for identifying affected women. Effective screening and management can substantially reduce complications and promote better maternal and neonatal health.

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