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CLINICAL STUDY OF FOETO-MATERNAL OUTCOME IN GESTATIONAL DIABETES USING IADPSG CRITERIA

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ABSTRACT **Objectives:** Gestational diabetes mellitus is a transient form of diabetes (glucose intolerance) with onset or first recognition during pregnancy. It is a growing global health problem that have short and long term health consequences for both the mother and the child. Hence, this prospective study was sought to find the prevalence of GDM by IADPSG criteria and to correlate the abnormal results with maternal and fetal outcome. **Material and Methods:** Random selection of 210 antenatal patients, irrespective of age and parity attending the antenatal OPD was carried out in the Department of Obstetrics and Gynaecology, MMCH&RI, Kanchipuram, from Feb 2015 to Oct 2016. The women were screened for GDM between 24-28 weeks of gestation by 75g oral glucose tolerance test (OGTT) and GDM diagnosed by the IADPSG criteria. **Results:** In the present study, among 210 antenatal patients attending the OPD, 35.2% were diagnosed as GDM. The prevalence of GDM increased with maternal age and pre-pregnancy body mass index. Antepartum as well as neonatal complications were seen more frequently in GDM group. Past history for GDM, positive family history and poor past obstetric history posed a greater significance for GDM. **Conclusion:** The study concluded a significant feto-maternal morbidity in patients with gestational diabetes mellitus. Hence, considering the risk to the mother and the baby, both during pregnancy and perinatal period, screening of GDM and early identification of those at risk is important for subsequent management and reduction of maternal and perinatal morbidity and mortality.

KEYWORDS : Gestational Diabetes Mellitus, IADPSG Criteria, Feto-Maternal Outcome

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic disorders characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both. It is a major global public health problem, with an estimated 300 million individuals affected worldwide by 2030. The burden of diabetes is increasing across both developed and developing regions, significantly affecting young adults and women of reproductive age. Consequently, diabetes is becoming an integral part of obstetric practice as its prevalence in pregnancy continues to rise.

Gestational diabetes mellitus (GDM) is defined as glucose intolerance of variable severity with onset or first recognition during pregnancy. It typically presents in the late second or third trimester. Certain populations are particularly vulnerable due to genetic, environmental, and social factors. Women with GDM exhibit relatively impaired insulin secretion along with pregnancy-induced insulin resistance, primarily affecting skeletal muscle tissue. Although the precise cellular mechanisms remain unclear, insulin receptor binding and activation of insulin receptor tyrosine kinase are crucial for insulin action. GDM is often asymptomatic, and its diagnosis applies regardless of whether insulin therapy is required or whether the condition persists postpartum.

GDM has important short- and long-term implications for both mother and child. It predisposes mothers to obesity, metabolic syndrome, type 2 diabetes mellitus, and cardiovascular diseases later in life. Offspring are also at increased risk of obesity, glucose intolerance, and metabolic disorders. Early detection and timely intervention significantly improve maternal and fetal outcomes, making screening an essential component of antenatal care.

Diabetes is among the most common medical complications of pregnancy, affecting approximately 1%–14% of pregnancies, with GDM accounting for nearly 90% of cases. Nearly half of women with GDM may develop overt type 2 diabetes within 5–20 years after pregnancy. In India, the prevalence of GDM ranges from 3.8% to 21%, depending on geographic and diagnostic variations. Asian ethnicity, particularly among Indian women, is associated with a higher risk, with studies indicating an approximately 11-fold increased susceptibility compared to Caucasian populations. This highlights the importance of universal screening in pregnancy.

Various diagnostic approaches for GDM exist. The American Diabetes Association (ADA) recommends the 3-hour 100 g oral glucose tolerance test (OGTT), while also accepting the 2-hour 75 g OGTT. The World Health Organization (WHO) categorizes GDM under diabetes and impaired glucose tolerance, using criteria similar to non-pregnant individuals (2-hour plasma glucose of 140–200 mg/dL). More recently, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) has proposed standardized diagnostic thresholds to improve consistency in diagnosis.

Early identification of GDM offers a valuable opportunity to reduce adverse perinatal outcomes through appropriate management strategies. Evidence supports that timely diagnosis and intervention can significantly decrease complications. Maternal complications associated with GDM include asymptomatic bacteriuria, urinary tract infections, pre-eclampsia, polyhydramnios, preterm labour, placental abruption, postpartum haemorrhage, and increased rates of operative delivery. Fetal and neonatal complications include intrauterine death, macrosomia, shoulder dystocia, respiratory distress syndrome, hypoglycaemia, hypocalcaemia, congenital anomalies, polycythaemia, and hyperbilirubinemia. Long-term consequences for the offspring include obesity, type 2 diabetes mellitus, impaired motor development, and increased risk of attention deficit disorders

Objective

To assess the feto-maternal outcome of pregnancy in women with gestational diabetes mellitus

MATERIALS AND METHODS

This prospective study was conducted in the Department of Obstetrics and Gynaecology at Meenakshi Medical College Hospital and Research Institute, Kanchipuram, over 18 months (February 201bbb5 to October 2016). A total of 210 randomly selected antenatal women attending the outpatient clinic or admitted to the antenatal ward were included. Informed written consent was obtained from all participants. All women were evaluated between 24–28 weeks of gestation.

Each participant underwent detailed clinical evaluation, including history taking and general, systemic, and obstetric examination, with emphasis on identifying risk factors such as age >30 years, obesity, family history of diabetes in first-degree relatives, adverse obstetric history (stillbirth, neonatal death, congenital anomalies, recurrent

abortions), previous macrosomia (>4 kg), and current pregnancy complications such as polyhydramnios and pre-eclampsia. All cases were followed until delivery to assess maternal and fetal outcomes.

Screening for gestational diabetes mellitus (GDM) was performed using a 2-hour 75 g oral glucose tolerance test (OGTT) after an overnight fast of at least 8 hours. Blood samples were collected in fasting state and at 1 and 2 hours post-glucose load in fluoride vacutainers. Plasma was separated immediately and analyzed within 6 hours. Diagnosis of GDM was based on IADPSG criteria: fasting plasma glucose ≥92 mg/dL, 1-hour ≥180 mg/dL, or 2-hour ≥153 mg/dL. Statistical analysis was performed using SPSS version 21. Categorical variables were expressed as frequencies and percentages and analyzed using the chi-square test. Quantitative data were expressed as mean ± standard deviation. A p-value <0.05 was considered statistically significant.

Exclusion Criteria

1. Women who were not within 24-28 weeks of gestation.
2. Women who were already pre-gestational diabetes and proved gestational diabetes in the current conception.

RESULTS

Table 1- Comparison of Various Patient Variables.

		No of patients with GDM	No of patients without GDM	Total	P value
1) AGE (years)	18-20	2 (2.7%)	47 (34.6%)	49 (23.3%)	0.001 ***
	21-25	26 (35.1%)	64 (47.1%)	90 (42.9%)	
	26-30	39 (52.7%)	24 (17.6%)	63 (30.0%)	
	>31	7 (9.5%)	1 (0.7%)	8 (3.8%)	
2) RELIGION	Hindu	59 (79.9%)	107 (78.7%)	166 (79.0%)	0.968 (NS)
	Muslim	11 (14.9%)	22 (16.2%)	33 (15.7%)	
	Christian	4 (5.4%)	7 (5.1%)	11 (5.2%)	
3) BMI	<25	26 (35.1%)	93 (68.4%)	119 (56.7%)	0.001 ***
	25-30	43 (58.1%)	39 (28.7%)	82 (39.0%)	
	>30	5 (6.8%)	4 (2.9%)	9 (4.3%)	
4) GRAVIDA STATUS	Primi	27 (36.5%)	68 (50.0%)	95 (45.2%)	0.009 ***
	G2	22 (29.7%)	49 (36.0%)	71 (33.8%)	
	G3	15 (20.3%)	12 (8.8%)	27 (12.9%)	
	G4 and above	10 (13.5%)	7 (5.2%)	17 (8.1%)	
5) FAMILY H/O OF DM	Yes	20 (27%)	30 (22.1%)	50 (23.8%)	0.419 (NS)
	No	54 (73%)	106 (77.9%)	160 (76.2%)	
6) PAST H/O OF GDM		6 (8.1%)	8 (5.9%)	14 (6.7%)	0.615 (NS)
7) POG AT DELIVERY	<37 weeks	6 (8.1%)	24 (17.6%)	30 (14.3%)	0.059 (NS)
	>37 weeks	68 (91.9%)	112 (82.4%)	180 (85.7%)	
8) MODE OF DELIVERY	NVD	18 (24.3%)	72 (52.9%)	90 (42.9%)	0.001 ***
	Outlet forceps	2 (2.7%)	4 (2.9%)	6 (2.9%)	
	Ventouse	-	2 (1.5%)	2 (1.0%)	
	Emergency LSCS	40 (54.1%)	48 (35.3%)	88 (41.9%)	
	Elective LSCS	14 (18.9%)	10 (7.4%)	24 (11.4%)	

Gestational diabetes is commonly seen in (26-30) year age group. Majority of the patients with GDM were Hindu (79.9%). BMI was significantly higher in GDM group with 6.8% patients being obese and 58.1% being overweight. Among women with GDM 36.5% were primi, 29.7% were G2 and 20.3% were G3 and 13.5% were G4. GDM was more common in multigravidas (63.5%) than primigravidas. Among patients with GDM, 27% had family history of GDM and 8.1% had past history of GDM. In our study 8.1% of patients of GDM had preterm delivery but not statistically significant. LSCS rate was much high in GDM group (73%) compared to 42.7% in non GDM group (P=0.001)

Table 2- Association Between Number of Patients with GDM and Number of Patients without GDM in the Socio Economic Status.

		Number of Patients With GDM	Number of Patients Without GDM	Total	Chi Square Test	P Value
Socio Economic Status	CLASS 1	-	-	-	1,734 2 df	0.420 NS
	CLASS 2	-	-	-		
	CLASS 3	8 (10.8)	14 (10.3)	22 (10.5)		
	CLASS 4	28 (37.8)	40 (29.4)	68 (32.4)		
	CLASS 5	38 (51.4)	82 (60.3)	120 (57.1)		

Majority of GDM patients belonged to Class V i.e., 51.4%, 37.8% in Class IV, 10.8% in Class III.

Table 3- Association Between Number of Patients with GDM and Number of Patients without GDM in the Present Obstetrics Risk Factors.

		Number of Patients With GDM	Number of Patients Without GDM	Total	Chi Square Test	P Value
Present Obstetrics Risk Factors	Obesity	5 (6.8)	4 (2.9)	9 (4.3)	4.937 6 df	0.552 NS
	Pre-eclampsia	8 (10.8)	15 (11.0)	23 (11.0)		
	Polyhydramnios	3 (4.0)	5 (3.6)	8 (3.8)		
	Congenital malformation	-	2 (1.5)	2 (1.0)		
	Macrosomia	2 (2.7)	2 (1.5)	4 (1.9)		
	Anaemia	2 (2.7)	10 (7.4)	12 (5.7)		
	Nil	54 (73.0)	98 (72.1)	152 (72.4)		

Among GDM patients 6.8% had obesity, 10.8% had pre-eclampsia, 4% polyhydramnios, 2.7% had macrosomia and 2.7% had anaemia.

Table 4- Association Between Number of Patients with GDM and Number of Patients without GDM in the Abnormal Glucose Values According to IADPSG.

		Number of Patients With GDM	Number of Patients Without GDM	Total	Chi Square Test	P Value
Abnormal Glucose Values According to IADPSG	Abnormal FPG alone	48 (64.8)	-	48 (64.9)	NA	NA
	Abnormal 1-h PG alone	3 (4.1)	-	3 (4.1)		
	Abnormal 2-h PG alone	4 (5.4)	-	4 (5.4)		
	Any two abnormal values	17 (23.0)	-	17 (23.0)		
	All three abnormal values	2 (2.7)	-	2 (2.7)		

In our study, 64.8% were diagnosed with elevated FPG only, 4.1% with elevated 1-h PG, 5.4% with elevated 2-h PG, 23% with any two elevated values and 2.7% with all 3 elevated values.

Table 6- Association Between Number of Patients with GDM and Number of Patients without GDM in the Postpartum Complications.

	Number of Patients With GDM	Number of Patients Without GDM	Total	Chi Square Test	P Value

Postpartum Complications	Normal	67 (90.5)	116 (85.3)	183 (87.1)	7.494 3 df	0.058 NS
	30 Perineal tear	2 (2.7)	1 (0.7)	3 (1.4)		
	PPH	5 (6.8)	8 (5.9)	13 (6.2)		
	Post CS wound infection	-	11 (8.1)	11 (5.2)		

Among GDM patients 2.7% had 3^0perineal tear and 6.8% had PPH

Table 7- Association Between Number of Patients with GDM and Number of Patients without GDM in the APGAR Score at 5 Min.

		Number of Patients With GDM	Number of Patients Without GDM	Total	Chi Square Test	P Value
APGAR Score at 5 Min	> 8	71 (95.9)	128 (94.1)	199 (94.8)	0.323 1 df	0.570 NS
	5-7	3 (4.1)	8 (5.9)	11 (5.2)		
	1-4	-	-	-		

Majority of infants born to GDM patients had good Apgar score.

Table 8- Association Between Number of Patients with GDM and Number of Patients without GDM in the Birth Weight.

		Number of Patients With GDM	Number of Patients Without GDM	Total	Chi Square Test	P Value
Birth Weight	< 2 kg	-	4 (2.9)	4 (1.9)	2.56 5 df	0.766 NS
	2-2.4 kg	5 (6.7)	8 (5.9)	13 (6.2)		
	2.5-2.9 kg	39 (52.7)	70 (51.5)	109 (51.6)		
	3-3.4 kg	22 (29.7)	42 (30.9)	64 (30.5)		
	3.5-3.9 kg	7 (9.5)	11 (8.1)	18 (8.6)		
	4 kg and above	1 (1.4)	1 (0.7)	2 (1.0)		

Fetal macrosomia was seen in 1.4% of babies in GDM group and 0.7% in non GDM group.

Table 9: Association between Number of Patients with GDM and Number of Patients without GDM in the Fetal Complications.

		Number of Patients With GDM	Number of Patients Without GDM	Total	Chi Square Test	P Value
Fetal Complications	Normal	58 (78.4)	112 (82.4)	170 (81.0)	10.882 5 df	0.054 NS
	Hypo-glycaemia	2 (2.7)	-	2 (1.0)		
	Hyper-bilirubinemia	10 (13.4)	18 (13.2)	28 (13.3)		
	RDS	1 (1.4)	4 (2.9)	5 (2.4)		
	Congenital anomalies	-	2 (1.5)	29 1.0)		
	Shoulder dystocia	3 (4.1)	-	3 (1.4)		

In our study 21.6% babies of GDM mothers got admitted in NICU where as in non GDM it is only 17.6%.

DISCUSSION

Gestational diabetes mellitus is one of the most common medical complications of pregnancy and has been recognized as a distinct clinical entity for several decades. Its importance lies not only in the short-term effects during pregnancy, but also in the long-term risk of type 2 diabetes, which varies by ethnicity and duration of follow-up. Untreated glucose intolerance in pregnancy has consistently been associated with increased maternal morbidity and adverse perinatal outcomes, which is why screening, treatment, and follow-up are essential. The main aim of GDM management is to prevent stillbirth, congenital anomalies, recurrent abortion, pre-eclampsia, intrauterine death, and large-for-gestational-age births, thereby reducing both maternal and perinatal morbidity and mortality.

The present study showed that women with GDM had a higher rate of adverse pregnancy outcomes than non-GDM women. Obstetric complications such as pre-eclampsia, preterm labour, pregnancy-induced hypertension, macrosomia, caesarean delivery, and intrauterine death were more common among the GDM group. This is consistent with broader evidence showing that GDM increases the risk of gestational hypertension, pre-eclampsia, and caesarean section, while also affecting neonatal outcomes. These findings reinforce the need for early recognition and active management of abnormal glucose tolerance in pregnancy.

Using IADPSG criteria, 35.2% of women in this study were classified as having GDM. This prevalence is higher than that reported in the HAPO study, which found 17.8%, though Indian women were not included in that cohort. Other studies have also shown wide variation in prevalence depending on ethnicity, diagnostic criteria, and setting. For example, South Asian women in Norway had a markedly higher prevalence of GDM, and studies from the UAE reported a prevalence of 38% using IADPSG criteria compared with 13% by ADA 2010 criteria. Indian studies have reported prevalence ranging from 7% to 45.4%, which highlights the heterogeneity of GDM burden in different populations. The relatively high rate in the present study may reflect both the population characteristics and the sensitivity of the diagnostic criteria used.

Age appeared to be an important risk factor in this study, with most GDM cases occurring in the 26–30 year group and a rising trend with increasing age. This pattern agrees with earlier Indian studies showing that GDM prevalence increases with maternal age. Similarly, parity showed an association, with a higher occurrence of glucose intolerance among women with increasing gravida status. This suggests that cumulative reproductive and metabolic stress may contribute to the development of GDM.

Socioeconomic status and body mass index were also related to GDM in the present study. Most women with GDM belonged to lower socioeconomic groups, and a majority had BMI above 25 kg/m2. The association between higher BMI and GDM was statistically significant, supporting the well-established link between overweight, insulin resistance, and pregnancy hyperglycaemia. In practical terms, this means that antenatal screening should not be limited to women with obvious risk factors, because women across socioeconomic strata may be affected.

A family history of diabetes was common among GDM cases, and this is consistent with known genetic susceptibility. Family history in first-degree relatives is a recognized risk factor for abnormal glucose tolerance and may increase the likelihood of GDM several-fold. In clinical practice, this underscores the value of carefully eliciting diabetic family history during antenatal assessment.

Among maternal complications, pre-eclampsia occurred in 10.8% of women with GDM in this study. Published evidence is mixed, with some studies finding no significant difference from controls and others reporting approximately doubled risk. Hydramnios was seen in 4% of GDM cases, which is lower than expected in poorly controlled diabetes and may indicate reasonable glycaemic management in the study population. Preterm labour occurred in 8.1% of GDM patients, and most women delivered after 37 weeks. This is relevant because preterm delivery remains an important contributor to neonatal morbidity in diabetic pregnancies.

The study also suggests that some women may have had undiagnosed GDM in previous pregnancies, as reflected by histories of neonatal death, intrauterine death, and congenital anomalies. This highlights the clinical reality that missed or untreated GDM can recur and may explain adverse reproductive histories. Detecting GDM during the current pregnancy therefore serves both immediate and preventive purposes.

Treatment patterns in this cohort showed that most women with GDM required insulin because of poor glycaemic control with diet alone, while a smaller number were managed with meal plan alone or metformin. This is in line with evidence that many women with more significant glucose intolerance require pharmacologic treatment in addition to lifestyle modification. Education, glucose monitoring, dietary counselling, and timely intensification of treatment are all central to good outcomes.

Mode of delivery was notably affected. Caesarean section rates were much higher in the GDM group than in controls, with many operations

done for cephalopelvic disproportion, fetal distress, repeat caesarean, or failed induction. Increased caesarean delivery in GDM is a well-documented finding and likely reflects fetal size, obstetric complications, and a lower threshold for operative intervention in high-risk pregnancies. This finding adds weight to the argument for early glycaemic control and careful labour planning.

Neonatal outcomes were relatively favourable in this study, with most babies having good Apgar scores. Macrosomia was less frequent than expected, and this may be due to treatment of GDM during pregnancy. This is important because effective glycaemic control is known to reduce excessive fetal growth and related birth complications. However, NICU admission was still higher among babies of GDM mothers, mainly because of hypoglycaemia, hyperbilirubinemia, respiratory distress syndrome, and shoulder dystocia. These are typical neonatal complications associated with diabetic pregnancy and require anticipatory newborn care.

Overall, the findings support a multidisciplinary approach to GDM care involving obstetricians, diabetologists, neonatologists, laboratory personnel, diabetes educators, dieticians, and midwives. Patient education on diet, exercise, glucose self-monitoring, insulin use, and recognition of hypoglycaemia is especially important and has been shown to improve compliance and reduce complications. Early diagnosis, structured counselling, and coordinated care can substantially improve both maternal and neonatal outcomes

CONCLUSION

In the present study, 210 pregnant women attending Ante-natal OPD or admitted in Ante-natal ward, Meenakshi Medical College Hospital & Research Institute, were screened for GDM between 24- 28 weeks of pregnancy using IADPSG criteria. The prevalence of GDM reported is 35.2%.

The study concluded that risk factors for GDM include increased maternal age, obesity, poor past obstetric history, family history of DM and previous history of GDM. There was increased frequency of pre-eclampsia, preterm delivery, operative interference, macrosomia and post-partum haemorrhage in GDM women. The increased foetal complications observed in the study were neonatal intensive care unit admission, newborn hypoglycaemia, hyperbilirubinemia, respiratory distress syndrome and congenital anomalies in GDM.

Hence, considering the risk to the mother and the baby, both during pregnancy and perinatal period, timely screening of all pregnant women for glucose intolerance, achieving euglycemia in them and ensuring adequate nutrition is important to reduce adverse feto-maternal outcomes and promote healthy families.

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