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## To study effects of early screening for gestational diabetes mellitus on maternal and fetal outcome

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### Abstract

**Background and Method:** This study, observational non-randomized clinical study to evaluate the Effect of early screening for GDM on maternal and fetal outcome. The study was conducted in the Department of Obstetrics and Gynecology at a Multi-specialty Tertiary Care Centre Sri Aurobindo Medical College & P.G. Institute, Indore M.P. Pregnant women attending the ante natal clinic at a tertiary care hospital before 16 weeks, and follow up at 24 weeks to 28 weeks and 32 weeks to 34 weeks of pregnancy. Registration details of all the patients including their OPD number, name, age, sex were noted. Consent of each patient was taken.

**Result:** It was observed that women with positive family history of diabetes were significantly associated with increased risk of GDM as out of 19 patients (18.8%) with positive family history of diabetes 9 were GDM. Family history plays an important role for predicting occurrence of GDM significantly (p-value < 0.05, Chi square – 12.4953). The rate of detection of GDM by the 75g GCT during 16 - 18 weeks gestation was 23 and at 24 - 28 weeks was 19. The decrease in detection of blood glucose level by DIPSI test reflects those cases which were managed by lifestyle modification alone. At 32 - 34 weeks, the case detection rate was 17 which was still comparatively less than the 23 detected at 16 - 18 weeks and also included two new cases of abnormal GCT which were earlier observed to be normal. It is also to be noted, that there were 2 cases in which the GCT was not performed at 32 - 34 weeks as these two were already on insulin therapy for glucose control.

**Conclusion:** Diabetes mellitus is one of the most common endocrine disorder found during pregnancy. It is associated with various maternal and fetal complications if untreated. Compared to selective screening, universal screening for GDM detects more cases and improves maternal and neonatal prognosis if done early. Hence, universal screening for GDM is essential, as it is generally accepted that women of Asian origin and especially ethnic Indians are at a higher risk of developing GDM and subsequent type 2 diabetes.

**Keywords:** gestational, diabetes mellitus, maternal and fetal

### Introduction

Gestational diabetes mellitus is defined as having high blood glucose levels during pregnancy. It usually begins during the 24th week of pregnancy as a consequence of the body's inability to make and use all the insulin it needs during the gestation period (American Diabetes Association, 2014). Gestational diabetes mellitus is associated with stillborn, macrosomia, shoulder dystocia, birth trauma, need for operative delivery, neonatal hypoglycemia, and other perinatal morbidity <sup>[1]</sup>. Appropriate diagnosis and management of GDM can improve maternal and perinatal outcome. It also categorized the prevalence of women who had gestational diabetes mellitus and are at risk for developing Type 2 diabetes.

Gestational diabetes mellitus has significant impact on birth outcomes. Children who are born to mothers with gestational diabetes mellitus are likely to have health-related complications later in life and are at risk of infant death <sup>[2]</sup>.

GDM not only influences immediate maternal (preeclampsia, stillbirths, macrosomia, and need for cesarean section) and neonatal outcomes (hypoglycemia, respiratory distress), but also increases the risk of future Type 2 diabetes in mother as well as the baby <sup>[3]</sup>. A recent meta-analysis showed that women with gestational diabetes have a increased risk of developing Type 2 diabetes (relative risk 7.43, 95% confidence interval 4.79–11.51). In a recent study from North India, women diagnosed to have GDM were subjected to an oral glucose tolerance test (OGTT) 6 weeks after delivery, as per standard recommendations <sup>[4]</sup>. A disturbingly large proportion of GDM women had some persistent glucose abnormality after delivery.

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It is well-established that treatment of GDM reduces the risk of serious perinatal complications. In addition, clinical trials now provide evidence for the impact of multiple interventions in preventing the progression to Type 2 diabetes in women with a history of GDM. Both lifestyle modification and pharmacological therapies have been shown to reduce diabetes development by 50% or more. Breastfeeding can also reduce childhood obesity [5]. The American Diabetes Association's "Report of the Expert Committee on the Diagnosis and Classification of Diabetes mellitus," published in July 1997, described the selective screening criteria.

### Material and Method

This study, observational non-randomized clinical study to evaluate the Effect of early screening for GDM on maternal and fetal outcome. The study was conducted in the Department of Obstetrics and Gynecology at a Multi-specialty Tertiary Care Centre Sri Aurobindo Medical College & P.G. Institute, Indore M.P. from Sept 2016 to Sep 2018.

Pregnant women attending the ante natal clinic at a tertiary care hospital before 16 weeks, and follow up at 24 weeks to 28 weeks and 32 weeks to 34 weeks of pregnancy. Registration details of all the patients including their OPD number, name, age, sex were noted. Consent of each patient was taken. A thorough history of each patient was taken regarding education of the attendant, past ocular history, Family history, previous Gynae surgery or IVF treatment, history drug allergy, systemic surgery, history of number of child. After enrolling into the study and taking informed valid consent for the same, history was taken, general physical examination, systemic examination and per abdomen examination conducted We evaluated the patient at presentation Complete history and physical examination - Details of family history of diabetes, history of previous pregnancies were obtained. Blood pressure was recorded using mercury sphygmomanometer, which was calibrated periodically. The body mass index (BMI) of the subjects was calculated from the pre-pregnancy weight and expressed in kg/m<sup>2</sup>. Complete blood cell count with differential and platelet counts, Urine

examination. USG – Dating scan, NT scan, detailed Anamoly scan, serial growth scan. Glucose challenge test (DIPSI test) was done at 16 - 18 weeks, 24- 28 weeks and at 32 - 34 weeks for all antenatal patients.

### Inclusion criteria

1. Pregnant women attending the ante natal clinic at a tertiary care hospital before 16 weeks of gestation
2. Irrespective of maternal age and gravidity and the presence or absence of clinical or historic risk factors of Gestation Diabetes Mellitus
3. All the women willing to provide voluntary written consent for participation in the study

### Exclusion criteria

1. Patients who are known case of Diabetes in preconceptional period (Pregestational Diabetes) and are on oral hypoglycemic drugs or insulin.
2. Patients who register in OPD in late pregnancy i.e. beyond 24 weeks of conception

### Results

**Table 1:** Age group wise distribution of cases

GE Group	GDM	Without GDM	Total	Percentage
16-25 YRS	1	7	8	8%
26-35 YRS	15	68	83	83%
36-45 YRS	3	7	10	10%
Total	19	82	101	100%

A observational non-randomized clinical study was carried out to determine the effect of early screening for GDM on maternal and fetal outcome carried out on 101 pregnant women between 16 to 20 weeks, 24 to 28 weeks and 32 to 34 weeks for the screening and diagnosing GDM in pregnancy for the period of 1 year according to the selection criteria listed in materials and methods and the results were analyzed.

**Table 2:** Correlation of BMI Distribution with GDM

BMI KG/M <sup>2</sup> )	GDM	Without GDM	Total	Percentage	Chi-Square Test
18-25	5	30	35	34.6%	0.8129 Not significant <i>p</i> >0.05
26-30	10	35	45	20.7%	
> 30	4	17	21	44.5%	
Total	19	82	101	100%	

It was observed that women with increased BMI are predisposed to develop GDM. The BMI category, 18-25 has statistically significant effect in predicting occurrence of GDM (p-value < 0.05). The Odds ratio of BMI category 18-25 vs. 30-35 explains that Patients with BMI within 18-25 have 0.104 times less chances of having GDM positive than that of patients having BMI within 30-35.

**Table 3:** Rate of Detection of GDM At 16 - 18 Weeks as Compared to 24 - 28 weeks & 32 - 34 weeks by 75gm GCT

DIPSI Test	16-18 Weeks	24- 28 Weeks	32-34 Weeks
< 140mg/dl	78 (77.2%)	82 (81.2%)	84 (83.2%)
> 140mg/dl	23 (22.3%)	19 (18.8%)	17 (16.8%)
Total	101	101	101

The rate of detection of GDM by the 75g GCT during 16 - 18 weeks gestation was 23 and at 24 - 28 weeks was 19. The decrease in detection of blood glucose level by DIPSI test reflects those cases which were managed by lifestyle modification alone. At 32 - 34 weeks, the case detection rate was 17 which were still comparatively less than the 23 detected at 16 - 18 weeks and also included two new cases of abnormal GCT which were earlier observed to be normal. It is also to be noted, that there were 2 cases in which the GCT was not performed at 32 - 34 weeks as these two were already on insulin therapy for glucose control.

**Table 4:** Requirement of insulin in pregnant females with GDM

Intervention at 16-18 WKS	Number of Patient	Percentage (%)
Diet, Exercise & Home glucose Monitoring	23	22.8%
Intervention at 24-28 WKS	Number of Patients	
Diet, Exercise & Home glucose Monitoring	21	20.8%
Insulin	5	5%
Intervention at 32-34 WKS	Number of patients	
Diet, Exercise & Home glucose Monitoring	16	15.8%
Insulin	12	11.9%

It was observed that amongst the 101 women recruited, 23 women had a positive DIPSITEST when tested between 16-18 weeks. These 23 patients were counseled for diet and exercise. A DIPSITEST was repeated as per protocol at 28 weeks. Only 5 women had high sugar levels which required insulin. For the remaining 21 patients, blood sugar levels were controlled with diet and exercise till 28 weeks. At 32-34 weeks, all the women were once again subjected to DIPSITEST except the 5 women who were already on insulin. Out of 23 women who had impaired GTT detected at 16-18 weeks, only 10 women required insulin after 34 weeks. Hence in total 12 patients required insulin out of the 26 cases of GDM in the present study. So a strict diabetic diet and exercise effectively avoided the requirement of insulin in women, which was seen to be beneficial for good maternal and fetal outcome.

Out of 26 patients with GDM, 2 patients were newly diagnosed with GDM at 32-34 weeks who were effectively managed by Diabetic Diet and Exercise till delivery. We can conclude that out of 26 patients of GDM, only 12 women required insulin i.e. 65% pts. were managed on exercise and diet alone. Hence early screening of GDM and prompt intervention like diabetic diet and exercise helps to improve maternal and fetal outcome.

**Table 5:** Associated Risk Factors in Present Pregnancy

	Risk Factors	GDM	Without GDM	Total
1.	Breech	1	2	3
2.	IUGR	1	6	7
3.	Oligohydramnios	0	4	4
4.	PIH	1	1	-
5.	Polyhydramnios	2	3	5
6.	PROM	1	6	7
7.	Transverse lie	2	3	5
8.	Prev LSCS	3	18	21
9.	Prematurity (<37 weeks)	2	9	11
10.	None	6	30	36
	Total	19	82	101

It was observed that the most common associated risk factor with GDM were Previous LSCS (16%) followed by prematurity (10.5%) and polyhydramnios (10.5%) followed by and PROM, Breech and IUGR 5% each. But no statistical significance was found between any risk factors and GDM in the present study.

## Discussion

The concept of Gestational Diabetes Mellitus (GDM) goes back to at least 1946. The importance of GDM is that two generations - the woman herself and her children are at risk of developing diabetes in the future. Increasing the maternal carbohydrate intolerance in pregnant women is associated with graded increase in adverse maternal and fetal outcomes [6]. Ethnically, Indian women have a high prevalence of diabetes [7]. They have an eleven-fold increase in developing Gestational Diabetes compared to Caucasian women.

Gestational diabetes mellitus (GDM) is associated with an increased risk of maternal and perinatal short- and long-term complications [96]. Screening and diagnosis of GDM is traditionally delayed until the late second or early third trimester of pregnancy with the rationale that the diabetogenic effects of pregnancy increase with gestation, and therefore, delayed testing would maximize the detection rate [97].

Universal screening during pregnancy has become important in our country. For this we need a simple, reliable and cost effective procedure. Despite more than 30 years of research there is no consensus regarding the optimal approach to the screening of Gestational Diabetes [18]. Hence, a prospective study of 101 pregnant women between 16-34 weeks of gestation was done to find out several risk factors that play a role in the development of GDM, role of DIPSITEST procedure (which is attributed to be both a screening and a diagnostic tool) in pregnancy for early detection and the effect of early intervention with Diet and Lifestyle modifications on maternal and fetal outcome.

The parity distribution in the study group was Primi 40.5% and multi gravid 59.5%. In our study group among the Primigravida 8 were diagnosed to have GDM and 33 had normal glucose tolerance. In multi gravida group 11 GDM and 49 had normal glucose tolerance. This result obtained in this study tells us that irrespective of the gravid status the incidence of having GDM appears to be at the same risk. This may be because Indians as an ethnic group have a high risk for Diabetes. Hence parity in the study group has no significant difference.

A meta-analysis of PCOS in women found a significantly higher probability of developing gestational diabetes (OR 3.66; 95% CI: 1.20- 11.16) [100]. An incidence of GDM of 26.9% among pregnant women with a history of infertility and PCOS, Pregnant women with GDM and PCOS are 2.4 times at a higher at risk for developing PIH versus pregnant women with GDM alone.

In the present study it was observed that women with positive history of PCOD were not significantly associated with an increased risk of GDM as out of total 19 GDM patients, 8 had a positive history of PCOD.

## Conclusion

Diabetes mellitus is one of the most common endocrine disorder found during pregnancy. It is associated with various maternal and fetal complications if untreated. Compared to selective screening, universal screening for GDM detects more cases and improves maternal and neonatal prognosis if done early. Hence, universal screening for GDM is essential, as it is generally accepted that women of Asian origin and especially ethnic Indians are at a higher risk of developing GDM and subsequent type 2 Diabetes.

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