

# Prevalence of gestational diabetes mellitus and adverse pregnancy outcomes

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## Abstract

**Aims and Objectives:** To study Prevalence of gestational diabetes mellitus and adverse pregnancy outcomes. **Material and Methods:** This prospective study was carried out at tertiary care hospital over a period of 2 years in 700 patients between 24 to 34 weeks of gestation, attending the antenatal outdoor based on laboratory investigation. These patients were given 100 gm oral glucose and there plasma glucose was estimated at fasting, 1st hour, 2nd hour, 3rd hour using Carpenter and Coustan criteria. The statistical analysis done by Chi-square test. **Result:** The Prevalence of GDM was 8.00%, while Impaired GTT was 12.86% and Normal patients were 79.14%. The incidence of GDM in primigravida was 14.3%, in secondgravida is 37.5%, in thirdgravida is 48.2%. It was seen that as the parity increases the incidence if GDM is also increases this was statistically highly significant ( $\chi^2 = 174.2$ ,  $df=4$ ,  $P < 0.000$ ). The risk of adverse maternal outcome overall was higher in women with GDM compared with normal women. Women with GDM were at increased risk of developing pre-eclampsia (58.3), abruptio placenta (16.7), polyhydramnios (8.3%) urinary tract infection (8.3%), and postpartum haemorrhage (8.3%). The incidence of shoulder dystocia in GDM patient is 50% as compared to euglycemic patient its 29.4%. In GDM patient incidence of macrosomia is 33.3%. Incidence of fetal demise in GDM patient is 16.7% and in euglycemic patient its 11.8%. NICU admission was near about equal in normal GTT patient and GDM patient, that was 4% in normal GTT patient and 3.6% in GDM patient. NICU admission in GDM patient was due to hypoglycaemia and hyperbilirubinaemia. This observed difference was statistically significant ( $\chi^2 = 9.820$ ,  $df=2$ ,  $P < 0.007$ ). **Conclusions:** Prevalence of GDM in this study found to be 8%. Which is not small and cannot be ignored thus GTT test to be done as screening test in pregnant women. In our study we found that incidence of GDM increases with increase in parity. Outcomes of pregnancy of patient of GDM shows significantly raised incidence of preeclampsia, abruptio placenta, macrosomia and NICU admission for more than 24 hours compared to euglycemic patient delivered in our hospital. We recommended that all antenatal patients should be screened for GDM.

**Key Words:** GDM (Gestational Diabetes Mellitus), adverse pregnancy outcomes, GTT(Glucose Tolerance Test)

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## INTRODUCTION

Gestational diabetes mellitus (GDM) defined as carbohydrate intolerance of variable severity with onset or first recognition during current pregnancy and with

glucose tolerance reverting back to normal after the puerperium. GDM represent a high risk factor in pregnancy. Diabetes is estimate to complicate 2-5% of all pregnancies of which 90% of those detected during pregnancy i.e. gestational diabetes mellitus and rest are overt pre-gestational either Type I or Type II. According to ADA approximately 7% of all pregnancy are complicated by Gestational diabetes mellitus resulting in more than 2 lakh cases annually.<sup>1,2,3</sup> Women with gestational diabetes are individuals with genetic or metabolic predisposition towards diabetes who are incapable of adequately compensating for the diabetogenic effect of pregnancy. All complications associated with GDM are potentially preventable with early recognition of GDM. Moreover, in view of high prevalence of diabetes mellitus and its early onset among

Indians, all pregnant women should be screened for GDM. Gestational diabetes mellitus develops due to the physiological increase in insulin resistance that develops progressively throughout pregnancy as a consequence of multiple factors including placental hormone secretion, increased caloric intake, and reduce physical activity. It is difficult to estimate the prevalence of GDM due to differences in diagnostic criteria as well as local and ethnic variation. Traditionally quoted prevalence are around 5-7%, and the prevalence of GDM directly reflects that of type 2 diabetes in a given population and therefore can be expected to be rising.<sup>4</sup> With newer diagnostic thresholds, the prevalence in the general obstetric population may be upto 18%.<sup>5</sup> An increased risk of various maternal and foetal adverse outcomes have now been well documented, although the benefits of treatment have remained controversial. Major recent research in gestational diabetes has focused on redefining glucose threshold for diagnosis and treatment targets, as well as more flexible approaches to treatment based on foetal parameters and treatment option available. Prior to advent of insulin by Fredrich and Banting in 1921,<sup>6</sup> most women were too ill to conceive and the cause for infertility was not known. Amenorrhea was common in 50% of diabetic women, if at all she conceived there were a high perinatal (65%) and maternal (44%) mortality rate. The better understanding of maternal glycaemic control

and of insulin has reduced perinatal mortality to 25%.<sup>7</sup> The reduction in perinatal mortality is also due to availability of many screening methods with the aid of which gestational diabetes mellitus is detected early and controlled before it can affect mother or foetus and also prevent long term complications to both mother and foetus.

### MATERIAL AND METHODS

This was a prospective study was carried out at tertiary care hospital, over a period of 2 years in 700 patients between 24 to 34 weeks of gestation, attending the antenatal outdoor based on laboratory investigation. These patients were given 100 gm oral glucose, and there plasma glucose was estimated at fasting, 1st hour, 2nd hour, 3rd hour using Carpenter and Coustan criteria. All GDM patients were followed up till delivery to know maternal and foetal outcome. All primigravida patients, all multigravida patients, Patients with family history of diabetes mellitus, Patient with previous history of gestational diabetes mellitus, Patients with bad obstretic history, Patient with ethinical group were included into study while known case of diabetes mellitus were excluded from the study. The statistical analysis done by Chi-square test.

### RESULT

**Table 1:** Distribution of study group as classification of Study groups

Study Group	Frequency	Percentage (%)
Normal	554	79.14%
Impaired GTT	90	12.86%
GDM	56	8.00%
<b>Total</b>	<b>700</b>	<b>100.00%</b>

In our study the Prevalence of GDM was 8.00%, while Impaired GTT was 12.86% and Normal patients were 79.14%.

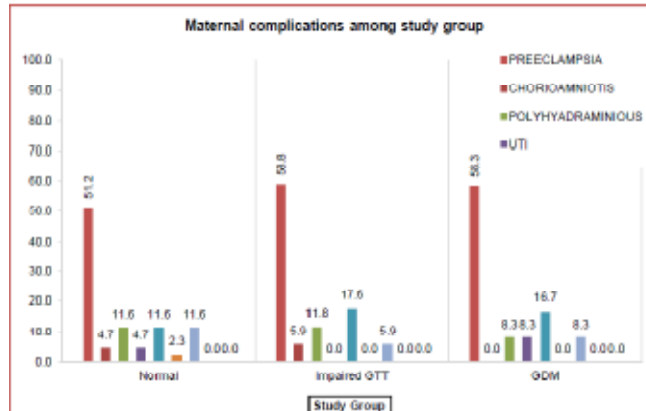
**Table 2:** Distribution of Parity among 3 study group

Study Group	Count/ Percentage	Parity			Total
		Primi	Gravida 2	Gravida 3	
Normal	Count	410	127	17	554
	Percentage	74.01%	22.92%	3.07%	100.00%
Impaired GTT	Count	50	3	9	90
	Percentage	55.56%	34.44%	10.00%	100.00%
GDM	Count	8	21	27	56
	Percentage	14.3 %	37.5 %	48.2 %	100.0 %
<b>Total</b>	<b>Count</b>	<b>468</b>	<b>179</b>	<b>53</b>	<b>700</b>
	<b>Percentage</b>	<b>66.9 %</b>	<b>25.6 %</b>	<b>7.6 %</b>	<b>100.0 %</b>

Chi square test Df	Chi-square value	p value	Association
Pearson Chi square	174.2 ,df=4	0.000*	Highly Significant

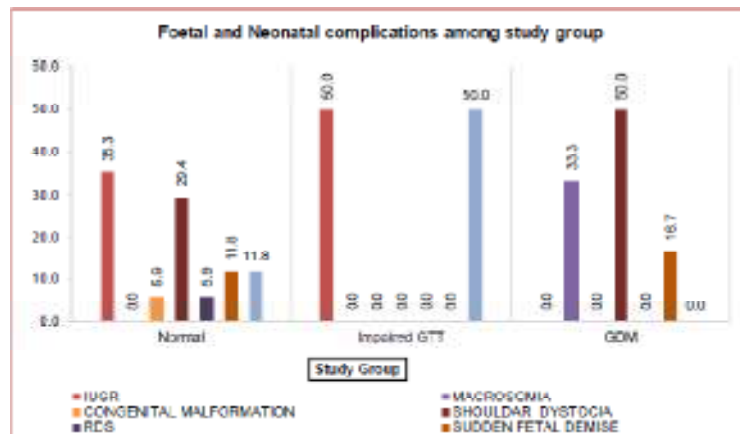
\*Highly Significant (p<0.001) (Note: 1 cells (11.1 %) have expected count less than 5.)

In our study the incidence of GDM in primigravida is 14.3%, in secondgravida is 37.5%, in thirdgravida is 48.2%. It is seen that as the parity increases the incidence if GDM is also increases. This difference is statistically highly significant ( $\chi^2 = 174.2$ , df=4, P< 0.000 )



**Graph 1:** Comparison of Maternal Complication amongst Study Group (% Graph)

From Graph 1: The risk of adverse maternal outcome overall was higher in women with GDM compared with normal women. Women with GDM were at increased risk of developing pre-eclampsia (58.3), abruptio placenta (16.7), polyhydramnios (8.3%) urinary tract infection (8.3%), and postpartum haemorrhage (8.3%).



**Graph 2:** Comparison of Foetal and Neonatal Complication amongst Study Group

From Graph 2: The incidence of shoulder dystocia in GDM patient is 50% as compared to euglycemic patient its 29.4%. In GDM patient incidence of macrosomia is 33.3%. Incidence of fetal demise in GDM patient is 16.7% and in euglycemic patient its 11.8%. There was no evidence of IUGR, congenital malformation, respiratory distress syndrome, uteroplacental insufficiency

**Table 3:** NICU Admission Study Group Count

Study Group	Count/Percentage	NICU Admission	Total
Normal	Yes	02	554
	No	552	554
Impaired GTT	Yes	0	90
	No	90	90
GDM	Yes	02	56
	No	54	56
Total	Yes	3.6 %	96.4 %
	No	0.6 %	99.4 %

Chi square test	value	p value	Association
Df Chi-square	9.820 ,df=2	0.007*	Significant

NICU admission was near about equal in normal GTT patient and GDM patient, that was 4% in normal GTT patient and 3.6% in GDM patient. NICU admission in GDM patient was due to hypoglycaemia and hyperbilirubinaemia. This observed difference was statistically significant ( $\chi^2 = 9.820$ ,  $df=2$ ,  $P<0.007$ )

## DISCUSSION

GDM is a well-established risk factor in pregnancy and there are clear benefits to the pregnant patient by effective screening and treatment. In this study 700 pregnant patients underwent OGTT test at 24-34 week of gestation. Study was carried out in tertiary care hospital. All the parameters were tested for significance in the differences between the study groups by the chi-square test or the kruskal-wallis one-way ANOVA test. Prevalence of GDM in this study was found to be 8%. The 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 prevalence rate of 6%. Wahi *et al.* from Jammu found a prevalence rate of 6.94%. Prevalence of GDM in ACOG was found to be 7%. Increase in the prevalence of GDM, pose a severe threat to the urban population in the near future. Research has been done in various fields of screening of GDM with no promising result in all the population. In our study the incidence of GDM in primigravida is 14.3%. In second gravida is 37.5%, in thirdgravida is 48.2%. It is seen that as the parity increases the incidence of GDM is also increases. In Bener *et al* (2011 nov.)<sup>8</sup> study women who had GDM were significantly more parous (>four children 55.3%,  $p=0.004$ ) than non GDM patients (>four children 44.8%). In our study sample, the risk of adverse maternal outcome overall was higher in women with GDM compared with normal women, Women with GDM were at increased risk of developing preeclampsia (58.3%) as compare to euglycemic patients( 51.2.). According to Priyanka *et al*<sup>9</sup> incidence of preeclampsia was 36.4%. Bener *et al*<sup>8</sup> explain the association of preeclampsia with GDM patient and euglycemic patient. GDM patient are prone for development of preeclampsia. Incidence of preeclampsia in GDM 19.1% and in non-GDM its 10.3%.

In our study we found association of abruption placenta with GDM patients (16.7%) whereas in non GDM patients 11.6%. Bener *et al*<sup>8</sup> also explains the association of abruption placenta in GDM patient. Incidence of

abruption in GDM patient 19.2% and in euglycemic patient its 14.6%.

According to Priyanka Karla *et al*(2013)<sup>9</sup>incidence of abruption placenta was 12.12%. Incidence of polyhydramnios in our study was found to be 8.3%. According to P. Vijaya *et al* (2015)<sup>10</sup>incidences of polyhydramnios is 10%. Incidence of UTI in our study was found to be 8.3% , According to Saudi J Med *et al*(2016)<sup>11</sup>incidence of UTI was found to be 6.7%, Incidence of PPH in our study was found to be 8.3%, In our study 3 baby's of GDM patient had shoulder dystocia, the incidence was 50% as compared to euglycemic patient 29.4%. whereas in study by Londen *et al*( 2009)<sup>12</sup> shoulder dystocia was found to be 1.5%vs 4%. Incidence foetal death was found to be lower because of early screening and diagnosis and due to better glycemic control. NICU admission was near about equal in normal GTT patient and GDM patient. In baby of GDM required NICU admission due to hypoglycemia and hyperbilirubinaemia. As per GODWIN *et al* (1999)<sup>13</sup>rate of congenital anomaly or neonatal death rate while neonatal born to women with GDM were seven times more likely to have hypoglycaemia and three times more likely to have hypocalcaemia and three times with hyperbilirubinaemia. As per Jindal<sup>14</sup>*et al* (2001), increase in incidence of neonatal complication including metabolic such as hypoglycaemia, hyperbilirubinaemia, hypocalcaemia, meconium aspiration, polycythaemia was observed in GDM group as compared to control group. As per Agrawal *et al* (2004)<sup>15</sup> study, comparison was done among the various aspect of foetal outcome between GDM and control group statistically significant association was found in term of hypoglycaemia, hyperbilirubinaemia, hypocalcaemia, meconium aspiration, polycythaemia was observed in GDM group as compared to control group.

## CONCLUSION

Prevalence of GDM in this study found to be 8%. Which is not small and cannot be ignored thus GTT test to be done as screening test in pregnant women. In our study we found that incidence of GDM increases with increase in parity. Outcomes of pregnancy of patient of GDM shows significantly raised incidence of preeclampsia, abruption placenta, macrosomia and NICU admission for more than 24 hours compared to euglycemic patient delivered in our hospital. We can definitely prevent adverse effects of GDM in pregnancy outcome with screening by 100 gm OGTT and regular antenatal follow up and management of GDM patients with a combined approach of endocrinologist, obstetricians and neonatologists gives good maternal and foetal outcome.

We recommended that all antenatal patients should be screened for GDM.

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