

## Original Research Article

# To study the incidence of gestational diabetes mellitus and risk factors associated with GDM

Maxima Anand\*, Manan Anand, Devinder Singh Mahajan

Department of Medicine, Sri Guru Ram Das University of Medical Sciences and Research, Amritsar, Punjab, India

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### \*Correspondence:

Dr. Maxima Anand,

E-mail: maxima.khuyrana@gmail.com

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## ABSTRACT

**Background:** Diabetes is estimated to complicate 2-5% of all pregnancies of which 90% of those are detected during pregnancy i.e. gestational diabetes mellitus (GDM) and the rest are overt or pregestational i.e. either Type 1 or Type 2. According to ADA, approximately 7% of all pregnancies are complicated by GDM resulting in more than 2,00,000 cases annually. The aim was to study the incidence of GDM among pregnant women between 24 to 28 weeks of gestation, to evaluate and compare the occurrence of risk factors e.g.; family history of diabetes, prematurity, history of foetal loss and congenital anomaly associated with diabetes in pregnancy.

**Methods:** 50gm of glucose, glucose challenge test (GCT) was given to women coming for antenatal check-up between 24 to 28 weeks of gestation irrespective of presence or absence of risk factors for GDM. 1 hour glucose levels were checked. Patients with glucose levels more than 130mg/dl were subjected to 100gm of oral glucose tolerance test (OGTT) according to Carpenter and Coustan modification of the National Diabetes Data. Data was compiled and statistically analysed.

**Results:** In this study it was observed that 20 (women had raised GCT, 11 (5.3%) women developed GDM out of 206 women. All GDM patients have one or more risk factors. Age >25 years (63.6%) fetal loss (36.3%), BMI (33.3%) are common risk factors followed by family history of diabetes (27.3%).

**Conclusions:** Family history of diabetes and past history of congenital anomalies are statistically significant in GDM group as compared to non GDM.

**Keywords:** Congenital anomaly, Family, Gestational Diabetes Mellitus, GCT, History of Diabetes Mellitus, OGTT, Pregnancy, Risk factors

## INTRODUCTION

Diabetes in pregnancy was first described by Bennewitz in Germany (1826). He described a woman with recurrent glycosuria and intense thirst in 3 successive pregnancies. In 1967, the term “gestational diabetes” was probably first used by Jorge Peterson in Copenhagen. The discovery of insulin in 1921, by Banting and Best changed the outlook for the pregnant diabetic patient

completely.<sup>1-4</sup> GDM is defined as carbohydrate intolerance of variable severity with onset or first diagnosed during pregnancy.<sup>5</sup> The definition was first accepted in the First International Workshop.

Clinical classification of diabetes mellitus in pregnancy

- Type 1 or insulin dependent diabetes mellitus.
- Type 2 or non-insulin dependent diabetes mellitus.

## METHODS

Women coming for antenatal check-up between 24 to 28 weeks of gestation irrespective of presence or absence of risk factors for GDM were included in the study.

Cases of pre-existing diabetes were excluded from the study.

### Method of performing GCT

50 gm glucose was given to females between 24 to 28 weeks of gestation irrespective of presence or absence of risk factors for GDM. 1 hour glucose levels were checked. Value >130mg/dl was taken positive.

### Method of performing OGTT

100gm of OGTT (Carpenter and Coustan modification of the National Diabetes Data Group) was done in the following manner. The patient should be fasting for at least 8 to 10 hours before the test. After drawing the fasting sample, patients were asked to drink 100gm of glucose dissolved in 200 - 400 ml of water within 5 min. Subsequent blood samples were done at 1, 2 and 3 hours using glucose strips and glucometer.

- Fasting blood glucose: 95mg/dl
- 1 hour glucose: 180mg/dl.
- 2 hour glucose: 155 mg/dl.
- 3 hour glucose: 140 mg/dl.

More than or equal to 2 of the 4 values should be elevated for the test to be positive. At least 3 days of unrestricted carbohydrate diet and physical activity.

- HbA1c >6.5 - diabetes.
- 5.7 to 6.4 - prediabetes.

(ADA revised diabetes guidelines December, 2009)

### Risk factors

- Age > 25 years.
- Family history of diabetes.
- BMI > 25kg/m<sup>2</sup>.
- GDM in previous pregnancy.
- Macrosomia in previous pregnancy.
- Congenital anomaly, prematurity, unexplained foetal loss in previous pregnancy.

206 GCT were done in which 20 raised, 11 patients as were positive for GDM, 9 were found negative.

## RESULTS

In this study 206 pregnant women in gestational period of 24 to 28 weeks according to selection criteria listed in material and method.

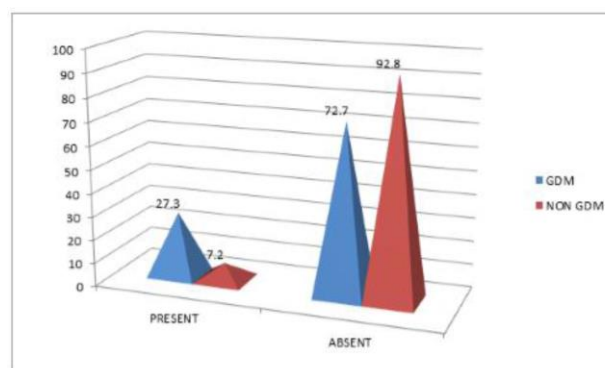


Figure 1: Family history of GDM in present study.

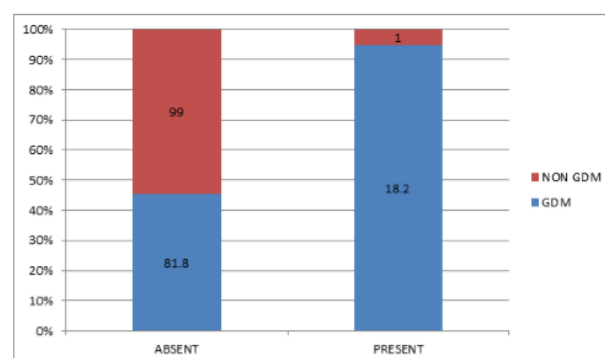


Figure 2: Congenital anomalies in present study.

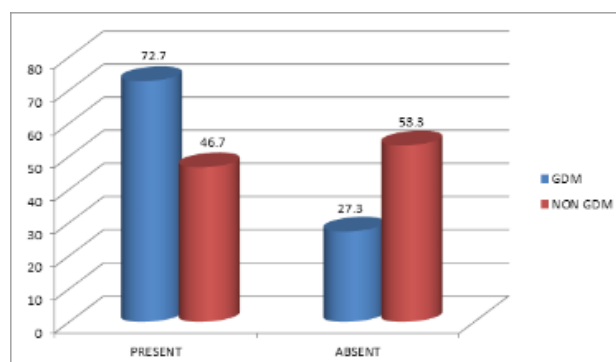


Figure 3: Risk factors in present study.

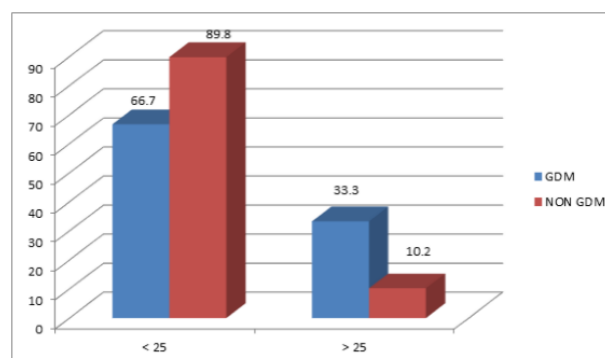


Figure 4: BMI in present study.

**Table 1: Risk factors of GDM.**

Factors	GDM	Non GDM
Insulin resistance	Present 2 (18.2%)	6 (3.1%)
Macrosomia	Present 1 (9.1%)	3 (1.5%)
Prematurity	Present 0	6 (3.1%)

## DISCUSSION

Fifth International Workshop Conference on GDM recommends that GDM incidence studies are of high priority and data remain insufficient. It is important to detect GDM as woman with GDM are associated with increased risk of developing Type II diabetes mellitus. Early detection helps in better maternal and fetal outcome.

The prevalence of GDM in the part of country is low and most patients of GDM have one or more risk factors. Hence an important public health priority in the prevention of GDM is to address maternal health both during prepartum, antepartum and postpartum period.

A short term intensive care gives a long term pay off in primary prevention of diabetes, as preventive measures start before birth.

**Table 2: Age distribution in various studies.**

Study	Age criteria (years)	%GDM	Percentage
Dixon DRD et al <sup>6</sup>	<25		17.8
	>25	3	82.2
Bhattacharya et al <sup>7</sup>	<25		66.2
	>25	3	33.7
Jindal et al <sup>8</sup>	<25		77.8
	>25	9	22.2
V Seshiah et al <sup>9</sup>	<25		52.7
	>25	13.8	47.3
Present study	<25		59.2
	>25	5.3	40.8

It is expected that prevalence of GDM in population structure will depend on the age distribution of the population studied. A number of investigators have found that maternal age is highly correlated with risk of GDM. In the present study 59.2 % of patients are less than 25 years and 40.8 % of population come under the risk category (age  $\geq$  25 years).

In the present study, population is younger as compared to study by Dixon. In study by Seshiah, percentage of patients in risk age group is almost similar to our study population but prevalence is higher.

**Table 3: Prevalence of gestational diabetes mellitus.**

Study	Prevalence
Tan et al. <sup>10</sup>	8.2 %
Vitoratlos et al. <sup>12</sup>	4.98%
Kumar et al. <sup>11</sup>	5.5 %
Yalcin et al. <sup>13</sup>	6.6 %
Present study	5.3 %

### Risk factors in study population

Prevalence of GDM in a study population will depend on prevalence of various risk factors and degree of correlation of risk factors with GDM. In present study we included the risk factors as recommended by the Fourth International Workshop Conference on GDM with some modification.

In the present study, out of 206 pregnant women 99 (48.1%) patients has one more risk factors. The commonest risk factor is age (40.8%) followed by fetal loss (13.5%), BMI (11.1%) and family history (8.3%). It is comparable to study by Jindal et al. In the present study, risk age group is low as compared to the Dixon et al because pregnancy is usually delayed in Western countries and most of the pregnant females fall in the risk age group. In the study by Seshiah et al, commonest risk factor is age more than 25 years followed by family history of diabetes and BMI more than 25 kg/m<sup>2</sup>.

Past history of fetal loss is second common risk factor in present study. This is unlikely to be a reflection of high prevalence of GDM in our population because there are multiple other causes responsible for fetal loss that are more common in our population.

In our study, age > 25 years (63.6 %) is the most common risk factor in GDM group followed by fetal loss (36.3%), BMI (33.3%) and family history (27.3%). The risk factors are almost comparable with Jindal et al. study. In the study by Seshiah et al, BMI (22.7%) and family history of diabetes (19.4%) are statistically significant. In our study and study by Seshiah et al, family history of diabetes are statistically significant. In our study and study by Seshiah et al, family history of diabetes are statistically significant.

Age is the most common risk factor in Western countries. Our study has more patients with risk age group than Jindal et al study. Its increasing trend is comparable to that of Western countries.

Past history of GDM and macrosomia are not statistically significant in our study due to smaller number of study population.

**Table 4: Prevalence of risk factors in study population.**

Risk factors	Dixon DRD et al. <sup>9</sup>	Jindal a et al. <sup>10</sup>	Seshiah et al. <sup>11</sup>	Present study
Age(>25 years)	82.2%	22.2%	47.3%	40.8%
Past history of fetal loss	0.5%	14.66%	—	13.59%
Past history of congenital anomalies	—	2.3%	—	1.9%
Past history of gdm	2.1%	2.33%	—	0.4%
Family history of diabetes mellitus	7.7%	10%	32.3%	8.3%
Past history of prematurity	—	—	—	2.3%
BMI	-	-	21.4%	11.1%
Past history of macrosomia	14.5%	5.33%	—	1.9%

**Table 5: Prevalence of risk factors in GDM patient.**

Risk factors	Dixon et al <sup>9</sup>	Jindal et al <sup>10</sup>	Seshiah et al <sup>11</sup>	Present study
Age(>25 years)	90.4%	44.4%	—	63.6%
Past history of fetal loss	2.7%	44.4%	—	36.3%
Past history of congenital anomalies	—	3.7%	—	18.2%
Past history of GDM	19.4%	22.2%	—	9%
Family history of diabetes	22.7%	22.2%	19.4%	27.3%
Past history of macrosomia	29.2%	29.6%	—	9.1%
Past history of prematurity	—	—	—	0%
BMI	—	—	22.7%	33.3%

Prevalence of risk factors in GDM patient. In our study, out of 11 GDM patient, 8 (72.7%) has one or more risk factor and 3 (27.3%) are without risk factors.

Another important finding in my study is – there is no past history of prematurity in GDM patients. Its important finding as diabetes is associated with posmaturity. Large scale study is required to conclude and give a better insight to the inferences of our study.

## CONCLUSION

The following are salient features observed:

- 5.3% of study population had GDM tested by OGTT.
- 72.7% of GDM patient had 1 risk factor.
- 72.7% of GDM patients were multigravida and 27.3% were primigravida.
- All GDM patient have one or more risk factors. Age >25 years (63.6%) fetal loss (36.3%), BMI (33.3%) are common risk factors followed by family history of diabetes (27.3%).
- Family history of diabetes and past history of congenital anomalies are statistically significant in GDM group as compared to non GDM.

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