

# Factors affecting prevalence of gestational diabetes mellitus in pregnant women

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## Abstract

**Background:** Gestational Diabetes Mellitus causes life threatening complications to the mother and the foetus. Prevalent progression of Gestational Diabetes Mellitus leads to type 2 diabetes in future. Identification of the risk factors for GDM at the earliest can prevent both antepartum and postpartum complications. **Aim and Objective:** To study the factors affecting incidence of Gestational Diabetes Mellitus in pregnant women in private hospital **Methodology:** Total 500 patients visiting a private hospital were studied. Sociodemographic data, clinical history recorded with pretested questionnaire. Diagnosis of Gestational Diabetes Mellitus was done with OGCT and OGTT. **Results and Discussion:** Maternal age of 30 years and above and BMI > 23 were the significant risk factors for development of Gestational Diabetes Mellitus.

**Keywords:** gestational diabetes mellitus.

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## INTRODUCTION

Gestational Diabetes is defined as onset of glucose intolerance of varying degree first diagnosed during pregnancy<sup>1</sup>. GDM has a potential risk to the mother as well as the fetus. Especially in South Asian countries, there is a growing prevalence of GDM. In India GDM has been found to be more common in women living in urban areas than in women living in rural areas<sup>2</sup>. The prevalence of GDM is high in India and fluctuates according to geographical areas and diagnostic methods used<sup>2,3</sup>. The prevalence of GDM in India ranges from 3.8% to 21% depending upon the diagnostic method used<sup>4</sup>. Risk indicators for GDM are increasing maternal age, parity, weight, positive family history of diabetes, previous history of GDM, less physical activity, and previous history of macrosomia. As women with Gestational Diabetes Mellitus and their children are at increased risk of developing Diabetes Mellitus in future, special

attention should be paid to this population especially in developing countries.

## MATERIAL AND METHODS

Present study was a hospital based cross sectional study. The study population was pregnant women between 24 and 28 weeks gestation who are coming to a private hospital for their antenatal check-ups. Total 500 patients were studied over the period of three years.

### Inclusion Criteria

1. Reproductive age from (15-49) years, pregnant woman.
2. Pregnant women between 24 and 28 weeks of gestation.
3. Pregnant women who are willing to take part in the study.

### Exclusion Criteria

1. Diabetes prior to pregnancy.
  2. Multiple pregnancies.
- Significant maternal diseases like connective tissue disorders, endocrinediseases, asthma, chronic liver disease etc.

The study was approved by ethical committee of the hospital. Patients were explained in detail about the study by the investigator then written valid consent was taken. The necessary information was collected from the participants through the pretested questionnaire. The question was asked individually to each participant. All patients underwent 50gm OGCT (Oral Glucose Challenge Test). If the result of OGCT  $\geq 140$ mg% then the patient

underwent 75 gm OGTT (Oral Glucose Tolerance Test). The GDM was diagnosed after performing OGTT based on WHO criteria. The independent variables used in this study includes:

1. Socio demographic risk factors- Maternal age, education, occupation, monthly income.
2. Anthropometrical factor- Height, pre-pregnancy weight, BMI (Body Mass Index).
3. Obstetrical risk factor- Parity, previous obstetrical history.

4. Bio chemical variable – Random Blood Glucose, Fasting Blood Glucose, OGCT, OGTT.

Once the mother was diagnosed with Gestational Diabetes Mellitus then she was managed conservatively by diet and exercise. If blood sugar levels not controlled then they were started on Insulin. Further follow up included regular blood sugar monitoring and scheduled hospital visits. Data was analyzed by appropriate statistical methods.

## RESULTS

**Table 1:** Distribution of GDM in patients with risk factors studied:

Variables	GDM		Total 500
	YES (26)	NO (474)	
Age in years (mean± SD)	(26.53±2.41)	(25.6±3.24)	(25.24±2.86)
BMI (mean± SD)	(28.32±4.03)	(25.21±2.87)	(25.48±3.27)

**Table 2:** Distribution of GDM in patients with independent risk factors:

Variables	GDM	
	YES	NO
<b>Age</b>	<b>26(100%)</b>	<b>474(100%)</b>
≤ 20 years	2(7.7%)	61(12.87%)
21-30 Rs	7(26.92%)	361(76.16%)
>31 years	17(65.38%)	52(10.97%)
<b>BMI</b>	<b>26(100%)</b>	<b>474(100%)</b>
18.5-22.9	3(11.54%)	159(33.54%)
≥23	23(88.46%)	315(66.46%)
<b>Parity</b>	<b>21(100%)</b>	<b>436(100%)</b>
Primigravida	11(52.38%)	246(56.43%)
1 child	09(42.86%)	158(36.23%)
2 or more child	01(4.76%)	32(7.34%)
<b>Education</b>	<b>26(100%)</b>	<b>474(100%)</b>
Illiterate	00(0%)	09(1.89%)
Literate	26(100%)	465(98.1%)
<b>Economic status</b>	<b>26(100%)</b>	<b>474(100%)</b>
≤ 30,000	14(53.85%)	395(83.33%)
>30,000	12(46.15%)	79(16.67%)
<b>Occupation</b>	<b>26(100%)</b>	<b>474(100%)</b>
Housewives	14(53.85%)	312(65.82%)
Employed	12(46.15%)	162(34.18%)

**Table 3:** Odds ratios (OR) and their 95% CI showing the risk factors associated with GDM

Covariate (risk factors)	Univariate		Multivariate	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age group: 21 – 30 years				
≤ 20 years	0.50 (0.07- 4.00)	>0.05	0.93 (0.11- 8.31)	>0.05
31+	2.78 (1.03- 6.59)	<b>&lt;0.05</b>	3.32 (1.07- 8.26)	<b>&lt;0.05</b>
BMI: 18.5-22.9 kg/m <sup>2</sup>				
≥ 23 kg/m <sup>2</sup>	2.64 (1.08- 13.43)	<b>&lt;0.05</b>	3.15 (1.88- 11.63)	<b>&lt;0.05</b>
Parity: Primigravida				
1 child	1.42 (0.83- 3.11)	>0.05	1.04 (0.22- 3.01)	>0.05
2+ children	1.66 (0.22- 4.43)	>0.05	0.52 (0.11- 4.98)	>0.05
Education: Illiterate	1.02 (0.84- 2.07)	>0.05	0.92 (0.23- 2.94)	>0.05
Literate	1.72 (0.52- 3.83)	>0.05	0.54 (0.37- 2.78)	>0.05
**Income: Rs. 10000-30000				
>30000	2.12 (0.45- 3.96)	>0.05	2.43 (0.54- 5.64)	>0.05
Occupation: Housewives				
Employed	1.38 (0.56- 4.07)	>0.05	0.83 (0.24- 3.21)	>0.05

Table 1 shows the descriptive characteristics of the study participants. A total of 500 women were enrolled during the study period. Mean age of the study population was  $25.24 \pm 2.86$  years. BMI of the study group was  $25.48 \pm 3.27$  kg/m<sup>2</sup>. The prevalence of Gestational Diabetes Mellitus in study population was approximately 5.2%. As shown in Table 2, the prevalence is high for women in the age group 31 and above 17 (65.38%) and lowest in the age group  $\leq 20$  years (7.7%). Women in age group 21- 30 years women have a prevalence of 7(26.92%). The estimated percentage of Gestational Diabetes Mellitus for women with a BMI  $< 22.9$  kg/m<sup>2</sup> is 11.54% and it is quite high in women with BMI  $> 23$  kg/m<sup>2</sup> (3.9%) with 95% CI 2.64 (1.08- 13.43). Out of total 26 GDM patients 52.38% were pregnant for first time whereas women with 1 or at least 2 children were 42.86% and 4.76% respectively. Number of literate females were more in both the groups i.e. those presenting with GDM (100%) and those without GDM (98.1%). The study also showed that women from household earning of more than Rs. 30000 had a lower prevalence of (46.15%) while the prevalence was estimated at (53.85%) for women from households with earnings of less than Rs.30000. The prevalence is higher among housewives (53.85%) than among women who are employed (46.15%). Employed females with GDM 95% CI 1.38 (0.56- 4.07). Univariate analysis showed that maternal age above 30 years and BMI  $> 23$  were the risk factors for development of GDM among the pregnant females. ( $p < 0.05$ ). Multivariate analysis showed that increased maternal age above 30 years and BMI  $> 23$  were associated with GDM.

## DISCUSSION

In our study we found increasing maternal age is significant risk factor for Gestational Diabetes Mellitus. The mean age for GDM is  $27.73 \pm 4.18$  years. The prevalence is high for women in the age group 31 and above i.e., 17 (65.38%) The age specific prevalence was higher in 21- 30 group was about 26.92%. In the age group 31+ years the risk was higher compared to 21-30 age groups. After controlling for income, occupation, physical activity, parity and BMI the risk increased with 95% CI 3.32 (1.07- 8.26). With advancing age, the risk of getting Gestational Diabetes Mellitus also rises. Similar findings were seen in Seshiah, Balaji, *et al.*<sup>5</sup>. Multiple studies showed that GDM had an association with increasing age, like Zargar *et al.*<sup>2</sup> and Rajput *et al.*<sup>6</sup>. In our study GDM was found to be significantly higher in women with higher BMI. Other studies states that obesity is an important risk factor in the development of GDM like Seshiah *et al.*<sup>5</sup>, and Torloni, Betran, *et al.*<sup>7</sup>. Bo *et al.*<sup>(8)</sup> had observed that hyperglycaemia in pregnancy was a risk factor for excess gestational weight gain. Though

education did not show any significance in our study, a significantly higher prevalence of GDM was observed in other studies with increasing educational level. This could be because of higher age of these women. Innes *et al.*<sup>9</sup> had found an inverse association between the educational level of the pregnant woman and Gestational Diabetes Mellitus. Similar to our study Yang *et al.*<sup>10</sup> did not find an association between GDM and education in Chinese pregnant women. The study also showed that women from households earning more than Rs. 30000 had a lower prevalence of (46.15%) while the prevalence was estimated at (53.85%) for women from households with earnings of less than Rs.30000. This association could be related to multiple factors such as higher maternal age, higher pre-pregnancy weight and BMI, sedentary lifestyle. Similar findings were observed in Yang *et al.*<sup>10</sup>.

## CONCLUSION

Our study concluded that advancing maternal age (30 years and above) and BMI  $> 23$  were the significant risk factors for development of Gestational Diabetes Mellitus among the pregnant females in private hospital in Tamil Nadu, India.

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