

Section **Gynaecology**

Original Article

A Cross-sectional Study on Gestational Diabetes Mellitus and its Associated Risk Factors in Pregnant Women in a Tertiary Care Teaching Hospital in Udaipur

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ABSTRACT

Background: Gestational Diabetes Mellitus (GDM) is the most common complication of pregnancy that may result into chronic hypertension, increased rate of cesarean delivery, fetal mortality and morbidity. Therefore, early diagnosis of GDM is very essential to reduce maternal and fetal morbidity. Moreover, it can reduce the onset of type 2 diabetes. **Objectives:** The main objective of this study was to determine the prevalence of GDM in pregnant women. **Methods:** A cross-sectional study was carried out at Department of Obstetrics and Gynaecology, Pacific Medical College & Hospital, Bhilo ka bedla, Udaipur using a sample size of 46 pregnant women. Blood glucose levels were measured using glucose oxidase method with a glucometer. Data were analyzed by using Microsoft Office Excel and SPSS version 20.

Results: Out of 46 pregnant women who participated in the study, 10.8% were found to have GDM with the mean \pm 2SD of 198.12 ± 35.53 mg/dl of their blood glucose results. The highest proportion of GDM was revealed in pregnant women aged between 21 - 35 years. The lowest proportion of GDM fell in age group of 36 - 45 years. **Conclusions:** The findings of this study revealed that the prevalence of GDM was 10.8% and the most affected pregnant women were in the age group of 31 - 40 years.

Key words: Gestational Diabetes Mellitus (GDM), Prevalence, Pregnancy, Age Group, Risk Factors

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INTRODUCTION

GDM is a high blood sugar condition that some women acquire during pregnancy and it usually starts halfway through the pregnancy between the 24th and 28th week of pregnancy.^[1] Placental hormones and increased fat deposits mediate insulin resistance during pregnancy thereby blocking insulin action to bind its receptors that is why this condition causes high level of glucose in pregnant women.^[2] This hyperglycemia is first recognized during pregnancy in previously undiagnosed patients but it usually resolves after pregnancy.^[3] It is a public health problem that currently

affects a large part of the female population and has short- and long-term consequences for the fetus and the mother.^[1] Approximately 7% of all pregnancies are complicated by GDM, resulting in more than 200,000 worldwide cases annually and the prevalence may range from 1% to 14% of all pregnancies depending on the population studied and the diagnostic tests employed.^[4] Approximately between 3 and 10 percent of expectant mothers develop this condition (GDM), making it one of the most common health problems

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of pregnancy.^[5] It is a major cause of prenatal morbidity and mortality, as well as maternal morbidity.^[1] It is therefore imperative that these mothers are diagnosed during pregnancy and that they have a regular postpartum follow-up for identification and treatment of any complications.^[6] More important is that women with GDM have an increased risk of developing diabetes after pregnancy when compared to the general population, with a conversion rate of up to 3% per year.^[7] In the majority of cases, the response to Oral Glucose Tolerance Test (OGTT) reverts to normal after pregnancy, but about 50% of women go on to develop Non-Insulin Dependent Diabetes Mellitus (NIDDM) within the next seven years.^[8] The maternal hyperglycemia causes the fetus to secrete more insulin, resulting in stimulation of fetal growth and macrosomia.^[1] Offspring of women with GDM is at an increased risk of developing diabetes later in life.^[9] The recognition of GDM is important because the therapy can reduce the prenatal morbidity and mortality.^[9] Although GDM occurs only temporarily in pregnant women worldwide with glucose regulation returning to normal after delivery, it poses risks to the pregnancy itself, prenatal morbidity, chronic hypertension, and increased risk to woman of developing type 2 Diabetes (T2D) formerly known as Non-Insulin Dependent Diabetes Mellitus (NIDDM) after delivery or later in life.^[1] Although many studies have been conducted on the complications and risks associated with GDM in other parts of India, hence the need to carry out this study in our set up was necessary to know the prevalence of GDM.

METHODS

A cross-sectional study was carried out at Department of Obstetrics and Gynaecology, Pacific Medical College & Hospital, Bhilo ka bedla, Udaipur using a sample size of 46 pregnant women.

The gestation period of pregnant women was recognized through record of prenatal care service in order to know which trimester they were. Data was collected using laboratory diagnostic tests (Glucose Oxidase method), questionnaires and data capture sheet. The Questionnaire helped us to capture the following information: age, weight, family history of diabetes and fasting status. Data capture sheet was used to record the glucose concentration and observations about the results found in order to classify as either having GDM or not. Fasting capillary blood samples were collected from pregnant women who were selected as participants from the studied areas. Participants had their blood samples tested for glucose using an ACCU-CHECK-Aviva Plus glucometer which applies glucose oxidase method principle. The tables were done using Microsoft office word and Microsoft office excel.

All pregnant women who visited the studied health facilities during the study period aged between 21 - 45, who were between 24th and 28th week of gestation, who had not developed any type of diabetes before pregnancy and who fasted between 8 - 12 hours; were included in this project

RESULTS

During the study period, fasting blood glucose analysis was performed on 46 pregnant women. Prevalence of GDM was found to be 10.8%. Table 1 shows that out of 46 pregnant women, who participated in the study, 22% were hypoglycemic, 67.2% had normal blood glucose levels and 10.8% were found to have GDM. A high prevalence of GDM 3 out of 46, was found in pregnant women aged between 21 - 35, 2 out of 46 of pregnant women were in 36 - 45 age group (Table 2).

Table 1: Prevalence of GDM in pregnant women according to age

Age group	Low: <76 mg/dl (<4.2 mmol/l)	Normal 76 - 110 mg/dl (4.2 - 6.1 mmol/l)	High/GDM: >110 mg/dl (>6.1 mmol/l)	Total
21 - 35	5	17	3	24
36 - 45	4	15	2	22
Total	9	32	5	46

This table shows that among pregnant women that were found to have GDM in this study, n=3 were in the 21 - 35 age group.

Table 2 also shows that one pregnant woman with family history of diabetes developed GDM whereas obesity did not reveal any association with GDM.

Table 2. Frequency of risk factors associated with GDM.

S.N.	Types of risk factors	Number of Pregnant women	Proportion of GDM
1	Age group of 21 - 35 years (most prevalent)	21	4
2	Family history of diabetes	12	1
3	Obesity	4	0

DISCUSSION

The findings from this study were analyzed according to standards and compared with other studies. Some previous studies that were done used glucometer whereas others applied calorimetric assays for measuring blood glucose. The time of screening was generally between the 24th and 28th week of gestation. The difference in prevalence with other studies maybe due to differences in the screening methods, diagnostic criteria used or population studied.^[5]

The prevalence of GDM in this study was 10.8% and there were no previous studies done in our institute to compare with. This would have helped us for monitoring the status and progress of GDM in our set up. The prevalence of GDM has been reported variably from 1% to 14% worldwide depending on the population studied and the diagnostic tests employed.^[4] In the study done by Ahia *et al.*, 2008, in Tehran to evaluate the prevalence of GDM and its risk factors for the whole cohort study was reported to be 6.8%^[11] compared

to our study which revealed that 10.8% of pregnant women developed GDM.

A study that was carried out in northern Ethiopia by Berhane *et al.*, 1999, to determine the prevalence of gestational diabetes mellitus in rural pregnant mothers found that the prevalence of GDM was 3.7%.^[12] This prevalence was low compared to this study. A study done by Mamabolo *et al.*, 2007, to examine the prevalence of gestational diabetes mellitus and the effect of weight on measures of insulin secretion and insulin resistance in third-trimester of pregnant women residing in the central region of Limpopo Province, South Africa, found that the prevalence of GDM was 8.8%.^[13] Women with GDM were significantly older and had more children compared with women with a normal response to the Oral Glucose Tolerance Test (OGTT). However, the age and number of children leading to risk of developing GDM was not elucidated. Nevertheless, the age was in agreement with our findings where the peak of GDM was found in age group of 21 - 35 contributing to 5% of the total GDM %. In this study, we did not investigate the number of children per pregnant woman who participated in the study, but authors are convinced that it might be a contributing factor to GDM. In the study done by Ahia *et al.*, 2008, it was reported that family history of diabetes has a strong correlation with occurrence of GDM where the prevalence was 53 (2.8%) whereas in our study only one pregnant woman (1.04%) developed this condition. This variability might be due to the heritability or other diversities that need to be pin pointed out as the era of this research field progresses.

Advanced maternal age, low monthly income, family history of diabetes, and obesity were the main significant risk factors for GDM in their study.^[6] This is in accordance to our findings where the most affected age group was 21 - 35 years. In our findings, the obesity has not revealed any risk factor for GDM, the monthly income was not accounted in our study, but authors are also keen on finding out the conveying reasons behind the economic status and GDM. In the study done by Fatema Jawad and Parvin Kanji Irshaduddin (1996), in Pakistan, the most affected age group by gestational diabetes mellitus was in the range of 25.1 and 30 years of age with prevalence of 49.48% for GDM.^[14,15] A study done in Nigeria; the prevalence of GDM was 2.98% per 1000 pregnancies. Maternal age and gestational age at diagnosis (mean \pm SD) were 31.0 ± 2.4 years and 23.88 ± 8.2 weeks respectively.^[16] This prevalence is lower than that of this study and they did not assess family history or other associated risk factors to GDM.

CONCLUSION

To sum up, the findings of this study point out that the prevalence of GDM was 10.8% in the studied areas with the most affected age group of 21 - 35 years. Family history of diabetes and age were found to be risk factors of GDM. The authors recommend that further researches be carried out using a large sample size on the prevalence of GDM, its associated risk factors other than those assessed, but also hormones produced during pregnancy, fats deposits, number of children and monthly income per pregnant woman.

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