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SCREENING AND FREQUENCY OF GESTATIONAL DIABETES MELLITUS IN GUJRANWALA: A STUDY BASED ON LABORATORY DIAGNOSTICS

Maliha Mushtaq[1], Amna Bashir[2*], Akif Saeed[3]
Noreen Fatima[4], Ayesha Mansoor[5]

ABSTRACT

Gestational Diabetes Mellitus (GDM) is the most prevalent medical condition in pregnancy, caused by glucose intolerance, and results in high blood sugar levels during pregnancy. It causes complications for both mothers and their fetus. This study aims to determine the frequency of gestational diabetes mellitus in Gujranwala population. The current study was conducted from April 2023 till September 2023, at Bashir (maternity) Hospital. A total of 145 pregnant women were selected in this study. Blood sugar random, Blood sugar fasting, and Oral glucose test data was collected from their electronic records. There was no need for preparation before BSR, 8-12 hours of fasting was required for BSF, and in the Oral glucose test, there was a need for fasting for 1st sample then 75g of glucose solution was given to pregnant women and then samples were taken at different time interval. The frequency of Gestational diabetes mellitus was 10.3% in Gujranwala population. GDM was significantly higher in women of age group ≥30 years. The mean blood glucose level of women with gestational diabetes was 188±16 md/dl. The most common risk factors with gestational diabetes mellitus were advanced maternal age, lack of physical activities, imbalanced diet, and a positive family history of gestational diabetes. The frequency of gestational diabetes mellitus in the Gujranwala population was 10.3% and it is associated with advanced maternal age. Thorough care and attention are required towards this problem as it is increasing day by day and has adverse outcomes both for mothers and fetuses.

Authors Affiliation
[1,2,]Institute of Medical and Emerging Sciences, Gujranwala (GIMES), Pakistan
[3]Collaborative Care of Diabetes (CCD), Tehsil Head Quarter Hospital Faisalabad, Pakistan
[4]BPP University Shepherd's Bush Campus London
[5]Faisalabad Medical University, Faisalabad, Pakistan
Correspondence Author Email: amnabasheer32@gamil.com

KEYWORDS: Gestational Diabetes Mellitus, GDM occurrence, GDM Frequency, Gestational diabetes risk factors, Oral Glucose Tolerance test, Macrosomia.

INTRODUCTION

High blood sugar levels brought on by inadequate insulin secretion or abnormalities in cellular function are referred to as diabetes. It can cause metabolic problems related to carbohydrates, fats, and proteins, these metabolic problems can appear in many ways (1). There are three basic types of diabetes i.e., diabetes mellitus (T1DM and T2DM), diabetes insipidus, and gestational diabetes. Diabetes-related morbidity and death are mostly brought on by numerous microvascular and macrovascular problems that are frequently brought on by long-term hyperglycemia (1). According to estimates, 463 million adults in the world with the disease will be adults in 2019 between the ages of 20 and 79, accounting for 9.3% of all adults worldwide. Due to its rising rates of morbidity and mortality among the human population, diabetes has surpassed cardiovascular disease and cancer to become the third "silent killer" in the world (2).

The onset of diabetes mellitus type 2 varies, if it occurs in less than 40 years' people it is known as young-onset type 2 diabetes mellitus and if it occurs in people older than age 40, it is known as later-onset diabetes mellitus type 2 (3). Gestational diabetes mellitus (GDM), which is on the rise globally,

is an underappreciated health risk for mothers and their children in low-resource nations (4).

Glucose intolerance leading to hyperglycemia that starts or is initially diagnosed during pregnancy is characterized as gestational diabetes, the most prevalent medical condition in pregnancy (5). Blood glucose levels rise during pregnancy as a result of hormones produced by the placenta, gestational diabetes mellitus is brought on when the pancreas fails to control this rise in blood sugar levels (6). The rise in gestational diabetes mellitus cases contributes to a notable economic load, emphasizing the importance of giving more attention and creating awareness about the issue (7).

GDM is becoming more common in Asia, the world's largest and most populous continent (8). GDM does not have particularly evident symptoms, but increased urination, exhaustion, UTIs, nausea, and upset stomach are likely to be present, which is one of the causes of the rise in GDM prevalence (9). The causes of GDM are several. Uncertainty surrounds the clinically and economically best ways to screen for GDM (10).

Pluriparity continues to have a linear association with the occurrence of GDM even when the woman's age is taken into account (7). An earlier pregnancy with GDM carries a more than six-fold increased chance of recurrence (11). As per the International Diabetes Federation, in 2017, GDM affected 14% of all expecting women worldwide, with rates varying from 9% in Africa to 12.6% in North America and 21% in Southeast Asia (12).

MATERIAL AND METHODS

Study Design

An observational, Cross-sectional study was conducted to determine the frequency of gestational diabetes mellitus in Gujranwala population. The data of the study was collected from Bashir Hospital, Gujranwala. The duration of the study was 6 months.

Sample size:

A sample size of 145 pregnant females was calculated by the average method from relevant articles

$$\bar{X} = \frac{\Sigma x}{N}$$

$\bar{X}$ ☐ Mean

∑x ☐ Sum of all values

N ☐ Number of all values

Eligibility Criteria

Inclusion criteria:

All pregnant women, aged between 18-45 years.

Women who have been screened for gestational diabetes mellitus

Exclusion criteria:

Women having diabetes before pregnancy

Pregnant women with infections such as HIV or Hepatitis

Sample

Blood

Sample Collection

From each pregnant woman, the blood sample of about 2-3 ml was collected in a grey top (fluoride oxalate) vial or golden top (gel) vial.

Sampling Technique

A convenient sampling technique was used for the sample collection.

Sample Transport

The samples were delivered to the chemistry laboratory with a properly filled request form as soon as possible after collection. The samples were transported at room temperature in leak proof vials.

Processing

The participating pregnant women went through screening by 75g Oral glucose tolerance test (OGTT) (the standard method for screening of gestational diabetes) and some by Blood sugar random (BSR) test or Fasting Blood Sugar (BSF) test for general screening of pregnant women. The samples

were analyzed in specialized laboratory equipment such as Microlab 300.

Procedure for Samples collection:

Fasting Blood Sugar:

This test Patient was advised to fast for about 8 to 12 hours before sample collection. When the patient arrived for the test procedure, a trained phlebotomist used to take samples.

After sample analysis, the test reports were handed over to them after a while.

Blood Sugar Random:

It is also a screening test of glucose level analysis, done for general screening of diabetic patients, pre-diabetic people, and pregnant women.

Whenever patients arrived at the laboratory, a trained phlebotomist used to draw their blood.

The collected samples were analyzed through Microlab 300 or Selectra, and reports were given to the patients.

Data Collection Procedure

- For this study purpose, I went to the Bashir (Maternity) Hospital, Gujranwala, and collected clinical BSR, BSF, and OGTT laboratory reports.
- From the reports the data of 145 pregnant women was obtained on a data collection sheet, used to collect various information and the variables were age, the status of the patient (diabetic or non-diabetic), value of blood glucose level, and the type of test taken (BSR, BSF, or OGTT).
- All the patients were evaluated based on their eligibility for the inclusion criteria.

Data Analysis Procedure:

- The variables from collected data, were entered on a Word spreadsheet.
- Frequency of gestational diabetes mellitus was calculated by SPSS v27 software.
- The analyzed data was presented in the form of pie charts, tables, and bar charts.

RESULTS

In this cross-sectional study, 145 pregnant women were examined, focusing on the age, the status of the expecting mother, and the results of their clinical reports of Blood glucose levels. In the current study, the calculated frequency of gestational diabetes mellitus was 10.3%. From the collected data of 145 pregnant women, 15 pregnant women were diagnosed positive; having gestational diabetes mellitus, and 130 were healthy. The analyzed data was represented in the table, bar chart, and pie-chart form. One of the major risk factors related to gestational diabetes was advanced maternal age.

The mean age for developing gestational diabetes was found 33 years with a standard deviation of ±4. The age ranges between 29 years to 37 years. The minimum age of pregnant women with gestational diabetes mellitus from the sample was 24 years and the maximum age was 41 years old pregnant women. The mean blood glucose level of pregnant diabetic women from the collected data record was 186 mg/dl with an SD of ±16.

Pregnant women were divided into 3 age groups. Group 1 ranges from 18 years to 27 years, group 2 ranges from 28 years to 37 years and last the 3rd group ranges between 38 years to 47 years. The ratio of pregnancies was higher between the ages of 25 to 30 but the rate of developing gestational diabetes was higher between the ages of 29 to 37 years.

DISCUSSION

When the level of blood glucose rises during pregnancy, it not only causes complications for the mother but also causes problems for the fetus. It is therefore necessary to treat

this issue in time. Overall, the major risk factors associated with GDM; observed from previous studies were advanced maternal age, positive family history of diabetes, previous history of GDM, elevated BMI, obesity, advanced maternal age, lack of physical activities, and socioeconomic status. The frequency of gestational diabetes mellitus determined by the current study was 10.3%.

In contrast to numerous other studies presented from different cities, countries, and states, the results of this research were not exactly similar to any previous study but somehow it was nearly similar to a study by Iram Inam et al., (2022), their study found that the frequency of GDM was 9.47%. The sample size of their study was a bit larger 190 pregnant women and they used the OGT test as their diagnostic standard while the current study used the most common tests available for diagnosis like BSR, BSF, and OGTT.

The current study analysis discovered that age ≥30 years increases the risk of gestational diabetes mellitus. Dissimilarity to current results, Zakir et al., (2017) disclosed that women of age ≥30 years had a noticeably raised occurrence of GDM. There are other studies described that higher prevalence of gestational diabetes mellitus among women of age ≥35 years (13, 14). This variance could be due to the small sample size and unpredictability of diagnostic measures.

Different diagnostic tests are used for screening gestational diabetes mellitus; it is still unclear which method is the best for this purpose but for standard oral glucose tolerance test (OGTT) is used for the diagnosis of GDM. Blood sugar random (BSR) and Blood sugar fasting (BSF) are also used for routine screening of the blood glucose level of pregnant women (15, 16). This study used all of these three tests for data collection.

Recent studies informed that women with gestational diabetes mellitus had more chances of having a baby with a large birth weight; in 2023 a recent study from Karachi, Pakistan reported that the frequency of neonatal macrosomia in pregnant mothers was 14%. Additionally, females with gestational diabetes mellitus are more prone to develop heart & kidney diseases and T2DM in later life and chances of miscarriages and abortions are also very high in these females (12).

It is recommended that to lessen the chances of developing gestational diabetes mellitus, the suggestion is to modify dietary habits and lifestyle choices including low physical activities causing obesity, enhance educational efforts, and ensure better instructing couples about the significance of maintaining appropriate gaps between pregnancies. There is a need to educate women regarding the severe effects of GDM on them and their fetuses. Routine screening for blood glucose levels in pregnancy and even before pregnancy should be done to lower the chances of developing this disease.

It is recommended that during pregnancy, OGTT (oral glucose tolerance test) is the current best method for diagnosis of gestational diabetes mellitus. The sample size for this study was small. The literature was unavailable to confirm the previously calculated frequency of GDM in Gujranwala city. There is the possibility of selection bias as participants were not randomly selected. The data was collected from the electronic record of the patients, so, exact demographic information could not be collected such as their history, socioeconomic status, educational level, and others.

CONCLUSION

The results of the current study indicate that the frequency of gestational diabetes mellitus in Gujranwala population is 10.3%.

The current study concludes that females of age group 33±4 are more likely to develop gestational diabetes mellitus. The significant risk factors which are related to gestational diabetes mellitus are advanced maternal age, a positive family history of gestational diabetes, and the type of diet the women are taking nowadays but these are not the only factors that are associated with diabetes there are many others which are causing an increase in the frequency of gestational diabetes mellitus.

DECLARATION

All authors contributed equally.

COMPETING INTERESTS

There is no conflict of interest among the authors.

CONSENT FOR PUBLICATION

All authors agreed to the Publication.

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Table and Figures From Result

Table 1: Reference Value for BSF Test

Name of Test	Reference Value	Units
Fasting Blood Sugar (BSF)	60 – 110	mg/dl

Table 2: Reference Value for BSR Test

Name of Test	Reference Value	Units
Blood Sugar Random (BSR)	80 – 140	mg/dl

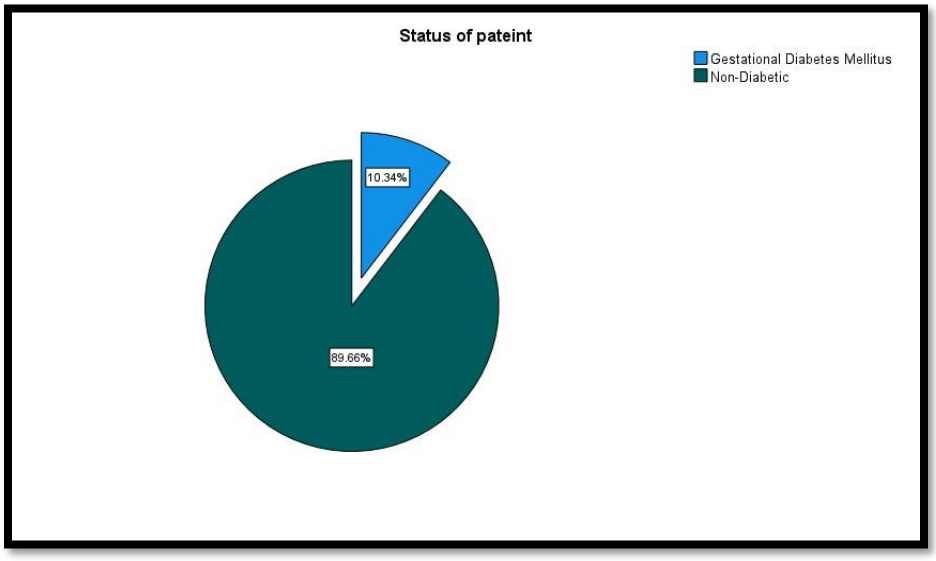

Figure 1: Out of 145 pregnant women, 15 were diagnosed with gestational diabetes

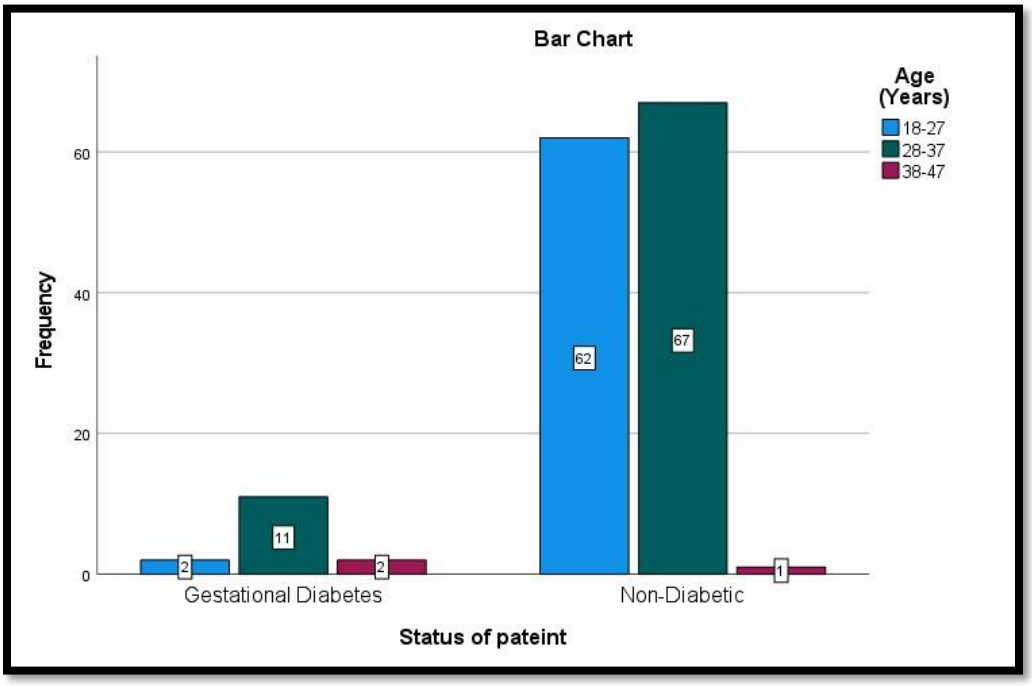

Figure 2: Frequency of gestational diabetes mellitus in different age groups.

Table 3: showing the mean age of women diagnosed with GDM in Gujranwala

Number	Valid	15
	Missing	0
	Mean	33.33
St	**d. Deviation**	4.593
	Minimum	24
	Maximum	41

Table 4: Mean and Standard Deviation of Blood glucose level of pregnant women

Number	Valid	15
	Missing	0
	Mean	186.93
Standard	**Deviation**	16.968