

Prevalence of Gestational Diabetes among Pregnant Women

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ABSTRACT

Background and Objectives: Diabetes that is initially identified during pregnancy is known as Gestational Diabetes. An increased incidence of Type 2 diabetes in mothers and their offspring is associated with gestational diabetes, a condition that poses a significant risk to both parties. To determine the prevalence of Gestational Diabetes among Pregnant Women, frequency of Gestational Diabetes in Pregnant Women on the Basis of Age and frequency of Gestational Diabetes in Pregnant Women on the Base of Trimester.

METHODOLOGY: A retrospective study was conducted in the Gynecology Department of Ali Fatima Hospital Lahore, Punjab. The study was conducted during the 3 months from May to July, 2024. We examined 170 expectant mothers aged between 26 to 45 years. We compared 12 pregnant women diagnosed with diabetes (7.1%) with 158 pregnant women who were not diagnosed (92.9%). A self-designed Performa was used to collect the patient data. Data were entered and analyzed by using excel and displayed by using Tables and Bar Charts.

RESULTS: We utilized the oral glucose tolerance test (OGTT) to determine the prevalence of gestational diabetes. Among the 158 pregnant women without diabetes, 12 (7.1%) were found to have gestational diabetes. The age range of pregnant women diagnosed with gestational diabetes varied from 15 to 45 years. Most instances of gestational diabetes are detected in the second and third trimesters of pregnancy.

CONCLUSION: The conclusion of this study is that the frequency of gestational diabetes is significantly influenced by age. Therefore, it is recommended that expectant mothers undergo an oral glucose tolerance test (OGTT) during the latter part of pregnancy to screen for gestational diabetes.

KEYWORDS: Gestational diabetes, Oral glucose tolerance test (OGTT), Gynecology, Trimester.

INTRODUCTION

The pancreas releases the hormone insulin, which is used by the body to metabolize blood sugar. Insulin is released when blood glucose levels are high, facilitating the body's utilization of glucose. Different types of diabetes are studied over period of time which include diabetes insipidus, diabetes mellitus type 1, diabetes mellitus type 2 and gestational diabetes(1). Gestational diabetes refers to a situation where women who haven't been determined to have of gestational diabetes, contributing to the development of subsequent medical knowledge in this area diabetes before pregnancy experience irregular blood sugar levels during their pregnancy. Gestational diabetes mellitus (GDM) was first portrayed in 1823 by the German doctor Heinrich Bennewitz, who depicted thirst and polyuria in a pregnant lady. He thought about that diabetes really was a side effect of the pregnancy, since the side

effects and the glycosuria vanished after pregnancy. Bennewitz noted a correlation between these symptoms and the delivery of a large stillborn baby. His findings marked a pivotal moment in understanding the signs, symptoms, and consequences(2). Gestational diabetes mellitus (GDM) can characterize as A1 Gestational Diabetes Mellitus (A1GDM) and A2 Gestational Diabetes Mellitus (A2GDM). Gestational diabetes oversaw without prescription and receptive to wholesome treatment is diet-controlled gestational diabetes (GDM) or A1GDM. On the opposite side, gestational diabetes dealt with medicine to accomplish sufficient glycemic control is A2GDM(3). Insulin resistance can be brought on by things like weight gain, hormone changes, and molecules the placenta releases that disrupt the way insulin works(4). Ladies with gestational diabetes mellitus (GDM) have just

How to cite this: Uzair M, Arshad Z, Sehar T, Haider T, Bibi A. Prevalence of Gestational Diabetes among Pregnant Women. International Journal of Healthcare Professions. 2025; 2(2): 11-15

somewhat raised glucose levels, others might encounter essentially undeniable levels. Women with unmanaged gestational diabetes are at a more serious gamble of encountering unfavorable pregnancy results, and both mother and infant are at expanded chance of creating type 2 diabetes later in life(5).

Gestational diabetes is a state that is caused by a variability of circumstances. Macrosomia, polycystic ovarian syndrome, hypertension, either essential or related to pregnancy, a history of spontaneous abortions or inexplicable stillbirths, a family background of diabetes, obesity, age greater than 25, persevering glucosuria, and a previous instance of GDM in an earlier pregnancy are approximately of the most common(6). Gestational diabetes usually doesn't cause any perceptible signs. If blood sugar levels rise significantly, it may lead to problems such as fatigue, real weakness, or polydipsia, which are common in various forms of diabetes. Furthermore, older women are at a higher risk of developing gestational diabetes(7). Oral glucose tolerance test (OGTT), fasting blood sugar (FBS), and random blood sugar (RBS) are the three methods used to detect gestational diabetes mellitus (GDM). Normal values of these parameters are <140 mg/dl, <100 mg/dl, <110 mg/dl respectively(8). In 2021, According to the International Association of Diabetes and Pregnancy Study Groups (IADPSG), the prevalence of Gestational diabetes mellitus (GDM) was reported to be 14.7% globally(9). According to previous studies in Pakistan, the prevalence percentage of Gestational Diabetes diverse from 4.41% to 57.90% and increased day by day(10).

Pregnancy is the physiological condition in which a female mammal carries a developing embryo or fetus within her uterus. In human pregnancy, it typically lasts about 40 weeks from the last menstrual period (LMP) to childbirth. The phases of a human pregnancy are commonly divided into three segments by obstetricians and patients referred to as "trimesters." This system seems to stem from the division of the "9 months of pregnancy" into three-month intervals(11). During pregnancy, various hormonal and physical changes occur in the mother's body to assist the fetus's growth and development. These changes comprise but are not deficient to increase in weight, changes in hormone levels, enlargement of the uterus, and development of the placenta to provide oxygen and nutrients to the fetus(12). Women who have never had diabetes before may develop gestational diabetes mellitus (GDM) during pregnancy, marked by higher blood sugar levels. In a typical pregnancy, hormones

like human placental lactogen and prolactin prompt the growth of pancreatic B-cells, leading to increased insulin production. However, insulin resistance is induced by the production of several hormones from the placenta, including progesterone, growth hormone, corticotropin-releasing hormone, and placental lactogen. Despite the increased insulin production from B-cell growth, Gestational Diabetes arises when the body struggles to overcome this insulin resistance brought on by pregnancy(13).

METHODOLOGY

It was a retrospective study. Data was collected from the Gynecology Department of Ali Fatima Hospital Lahore, Punjab. Total 170 samples of pregnant women were collected from the Gynecology Department of Ali Fatima Hospital Lahore, Punjab. Pregnant Women were included. A Performa were used to collect patient data of diabetes mellitus type 1 patients. Aseptic phlebotomy procedures were used to obtain intravenous blood samples from diabetes type 1 patients. The examination of glucose levels and Oral Glucose Tolerance Test (OGTT) were performed using different methods. The methods and instruments we used for analysis were Microlab 300 and Cobas C 311.

Microlab 300 uses the concepts of photometry and spectrophotometry to measure a sample's absorbance of light at a particular wavelength. Absorbance is proportional to the concentration of the analyte. Cobas C 311 works on the principles of spectrophotometry, particularly the Beer-Lambert Law. As stated by this law, the level of light absorbed by a sample corresponds directly to the concentration of the substance it contains. In addition to spectrophotometry, Cobas C 311 also follows the principles of potentiometry and ion selective electrode (ISE).

Data were entered and analyzed by using excel for statistical analysis. Tables and Bar charts were used to display the data.

RESULTS

The research was carried out in the Ali Fatima Hospital, Lahore, Punjab. A group of 170 individuals, including 81 from 2nd trimester (47.6%) and 89 from 3rd trimester (52.4%), were examined to detect the existence of Gestational Diabetes.

Table 1 Trimester based Distribution of Pregnant Women

2nd Trimester	3rd Trimester	Total
81 (47.6%)	89 (52.4%)	170 (100%)

Among the group of 170 pregnant women, total of 81 pregnant women (47.6%) were between the ages of 15-25 years. Furthermore, within the study, 79 pregnant women (46.4%) fell into the 26-35 Years age range. Additionally, there was 9 pregnant women (5.2%) who belonged to the 36-45 Years age group and 1 pregnant woman (0.5%) from 46-65 age group.

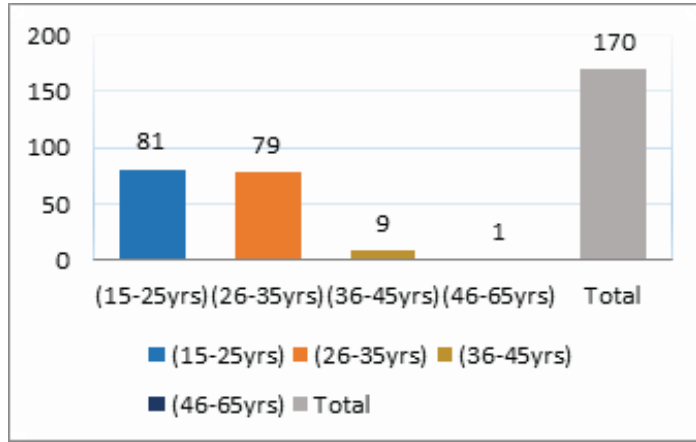


Figure No.1 Age based Distribution of Pregnant Women

A group of 170 individuals, including 12 Gestational Diabetic women (7.1%) and 158 Non-Gestational Diabetic women (92.9%), were examined to detect the existence of gestational diabetes.

Table No.2 Prevalence of Gestational Diabetes

Total	Gestational Diabetic Women	Non-Gestational Diabetic Women
170	12 (7.1%)	158 (92.9%)

Among the group of 170 pregnant women, a total of 81 pregnant women (47.6%) belonged to the 2nd trimester, comprising 5 Gestational Diabetic and 76 Non-Gestational Diabetic pregnant women. Furthermore, within the study, 89 pregnant women (52.4%) fell into the 3rd trimester, consisting of 7 Gestational Diabetic and 82 Non-Gestational Diabetic pregnant women.

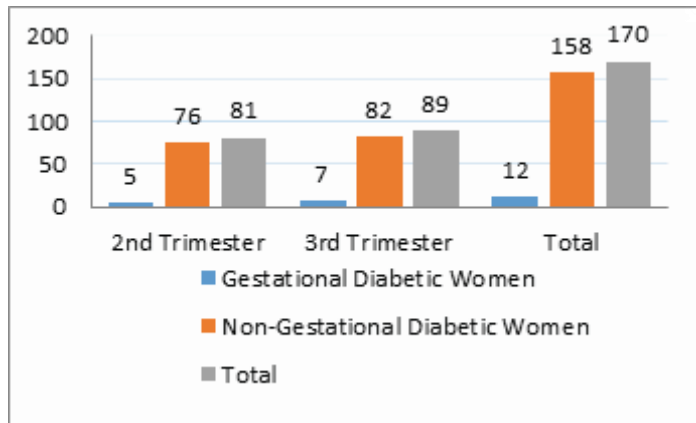


Figure No.2 Prevalence of Gestational Diabetes in Different Trimester

Among the group of 170 pregnant women, a total of 82 (48.2%) pregnant women with 1 Gestational Diabetic and 81 Non-Gestational Diabetic pregnant women were between the ages of 15-25 years. Furthermore, within the study, 78 (45.9%) pregnant women comprising 7 Gestational Diabetic and 71 Non-Gestational Diabetic pregnant women were between 26-35 years of age. Additionally, there were 9 (5.3%) pregnant women with 4 Gestational Diabetic and 5 Non-Gestational Diabetic pregnant women who belonged to the 36-45 years age group, and 1 (0.6%) pregnant woman was Non-Gestational Diabetic between 46-65 years of age group.

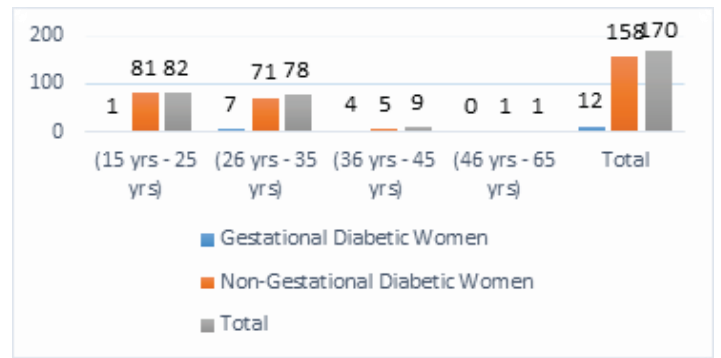


Figure No.3 Prevalence of Gestational Diabetes in Different Age Group

DISCUSSION

Pregnant women who do not have a prior history of diabetes may develop gestational diabetes. A metabolic condition characterized by newly onset hyperglycemia that typically resolves after childbirth. This condition arises because the mother's pancreas cannot meet the increased insulin requirements during pregnancy. During pregnancy, the body becomes less responsive to insulin, prompting the pancreatic beta cells to produce more of it. Insulin plays a crucial role in aiding glucose absorption by peripheral tissues, reducing glucose construction in the liver, and controlling the release of fat from adipose tissue.

Aditi Chakraborty et al. in 2024, the incidence of gestational diabetes between women in India rose from 0.53% in 2015-2016 to 0.80% in 2019-2020. This increase was noted in most regions, with a few exceptions. The occurrence of gestational diabetes varies with age, showing lower frequencies in women aged 15-19 and 25-29 years, and the highest frequencies in those aged 40-44 years(14). Sumi Singh et al. in 2022, among 3034 women treated at the tertiary hospital, the frequency of gestational diabetes was initiate to be 104 (3.42%) (with a confidence interval of 2.57-4.26 at nearly 100% certainty). The majority of these women were over the age of 30, comprising 69 (66.34%) of the cases. Out of these, 48 (46.15%) women had a history

of diabetes mellitus in their families(15). Tahziba Hus-sain et al. in 2020, diabetes was more frequent among younger, sedentary, overweight pregnant women residing in slum areas. Many pregnant women from slums and rural regions visit government hospitals because they are part of the State government's Mamata initiative. Out of 1557 expectant mothers, 154 were diagnosed with diabetes, indicating a prevalence of 9.89%. Compared to studies presented in other areas of the country, this occurrence is relatively modest(16).

Nuriye Buyukkayaci Duman et al. in 2015, a study investigated gestational diabetes in a cohort of 650 expectant mothers, identifying that 45 of them (6.9%) were diagnosed with gestational diabetes. The researchers established a statistically significant link between gestational diabetes and factors like older maternal age, family medical history, and body mass index (BMI). However, they did not find any notable connections with pregnancy frequency, gravidity, parity, or the count of live births(17). Rajesh Rajput et al. in 2013, a study focused on how common gestational diabetes mellitus (GDM) is and the factors that might cause it, like being overweight or obese, having had GDM in a previous pregnancy, and not being physically active. A total of 607 women took part in the study. GDM was found in 43 (7.1%) women's using ADA standards. The rate of GDM was higher in women aged 26-30 and over 30 years compared to those aged 16-20 and 21-25 years(18).

V Seshiah et al. in 2004, the study focused on the causes of Gestational Diabetes. A total of 1251 pregnant women underwent an initial 50 gm-1 hr test. Among them, 669 (53.5%) tested positive. Later, 891 (71.2%) women proceeded to the follow-up 75 gm-2 hr test. Among those who tested positive initially, 548 (81.9%) underwent the follow-up test, whereas among those who tested negative initially, 343 (58.9%) underwent the follow-up test. The strong correlation between testing positive on the initial 50 gm-1 hr test and undergoing the consequent 75 gm-2 hr test was quantifiably important (Mantel-Haenszel odds ratio after adjustment for age: 3.14, χ^2 (df=1) = 78.067)(19). Ardawi MS et al. in 2000, a total of 289 female participants had plasma glucose levels higher than 7.2 mmol/L after completing the 50-g glucose challenge test. Following the Public Diabetes Information Gathering symptomatic guidelines, 102 of the 289 female participants selected for the 100-gram oral glucose resistance test had positive test results, indicating gestational diabetes mellitus, and 187 were deemed to have negative test

results. Because of this, gestational diabetes mellitus affects 12.5% of women(20).

Our study is similar to these studies because our findings revealed that 7.1% of the 170 pregnant women tested positive for gestational diabetes. The age range of pregnant women diagnosed with gestational diabetes varied from 15 to 45 years. Most instances of gestational diabetes are detected in the second and third trimesters of pregnancy.

CONCLUSION

Women who do not manage their gestational diabetes effectively are more likely to have problems during their pregnancy, and both the mother and the child have a higher chance of developing type 2 diabetes later in life. Hence, early detection and diagnosis are crucial, pregnant people and healthcare practitioners need to be aware of and comprehend the available effective management and preventative techniques.

Sources of Support:

No funding was received for this article.

Data Availability:

All raw and processed data is available.

Disclaimer:

The views expressed in this manuscript are those of the authors and not those of the institutions they are affiliated with.

ACKNOWLEDGEMENT: None

CONFLICT OF INTEREST: None

GRANT SUPPORT AND FINANCIAL DISCLOSURE: None.

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Authors Contributions:

Muhammad Uzair, Zobia Arshad: Substantial contributions to the conception and design of the work.

Taha Sehar Tousif Haider: Design of the work and the acquisition. Drafting the work.

Alia Bibi: Final approval of the version to be published.

Submitted for publication: 22-04-2025

Accepted after revision: 30-05-2025