

Prevalence of Gestational Diabetes and Associated Maternal Factor Among Patients of South Punjab

Gestational
Diabetes and
Associated
Maternal Factor

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ABSTRACT

Objective: To ascertain the prevalence of GDM, identify risk factors that are related with it, and examine the GDM in relation to sociodemographic factors such as age, income, family history, parity, education, physical activity, and nutrition.

Study Design: A cross-sectional study

Place and Duration of Study: This study was conducted at the Multan Medical and Dental College, Multan, Pakistan, from February 2023 to January 2024.

Methods: A 50 gm glucose challenge test was used to screen 158 pregnant women for GDM during the study period. If the results were normal, the test was re-conducted between 23 and 26 week's duration of gestation and then at 32 week's duration. An oral glucose tolerance test was performed and, repeated between weeks 22-27 of gestation, and GDM is identified. GDM risk factors were also noted.

Results: In studied population, GDM prevalence was 21.66%. Increased body mass index (BMI) was substantially correlated with a higher prevalence of GDM patients. Strong correlation exists for BMI > 27 kg/m² (0.001%). There is also a high correlation with a history of diabetes, a recent history of GDM ($p < 0.0001$), and large for gestational age (LGA) babies. The prevalence of GDM was found to be substantially higher in mothers over the age of 26 (0.001), but parity did not show any statistically significant correlation ($p = 0.439$). Substantially more common in GDM patients were pre-eclampsia and polyhydramnios.

Conclusion: Globally, gestational diabetes mellitus (GDM) incidence has been rising, and major contributing factors to this trend include sedentary lifestyles, urbanization, lack of exercise, and dietary changes. Important risk factors for GDM included maternal age over 26, BMI over 27 kg/m², history of diabetes in family, history of GDM, and history of live birth. We advise screening expectant mothers for GDM and opening a distinct diabetes prenatal clinic with a diabetic counselor and diabetician on staff.

Key Words: Gestational Diabetes, Associated Maternal Factor, South Punjab

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INTRODUCTION

The medical term for impaired glucose tolerance (IGT) that first manifests or begins during pregnancy is gestational diabetes mellitus (GDM)⁽¹⁾. During gestation, there are two types of diabetes: GDM and overt diabetes⁽²⁾.

Significant difficulties for both the mother and the fetus can result from undiagnosed or inadequately treated GDM. GDM misdiagnosed or treated incorrectly can cause serious problems for both the mother and the fetus^(3,4).

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Polyhydramnios, pre-eclampsia, protracted labor, obstructed labor; cesarean delivery, uterine atony, postpartum hemorrhage, infection, and advancement of retinopathy are examples of maternal complications associated with gestational diabetes mellitus⁽⁵⁻⁶⁾.

Congenital defects, macrosomia or other organ/growth issues, intrauterine growth limitations (IUGR), stillbirth or intrauterine foetal death (IUFD), and other conditions can all affect a developing foetus⁽⁷⁾. The estimated prevalence of GDM in India is 10.3–14.3%. GDM prevalence was reported to be 17.8% in urban areas and 12.7% in areas as semi-urban, and 9.4% in the areas as countryside⁽⁸⁻¹⁰⁾. Many of these issues have been targeted for prevention by focusing on maternal euglycemia⁽¹¹⁻¹²⁾.

GDM's short- and long-term clinical impacts a significant role in the rising non-communicable disease burden in many nations. The objective of our cross-sectional study was to ascertain the progression of GDM, identify factors that are related with it, and examine the GDM in relation to sociodemographic

factors such age, family history, income, physical activity, parity, education, and nutrition.

METHODS

From February 2023 to January 2024, the study was carried out at the Multan Medical and Dental College, Multan, Pakistan. Sample size was determined using a 95% confidence level and a 10% prevalence of the GDM. Patients at south Punjab who were pregnant underwent screening in this rural context. 158 consented, eligible women are being screened for this study while they are in the hospital. The data was intended to be collected through a cross-sectional research conducted in a hospital. The study's design was entirely observational and quantitative. The information was gathered from a single hospital. Through the use of a pre-made series of questionnaires, the participants' necessary information was gathered. Gestational age was determined using a history and examination, and after meeting the inclusion criteria, patients were willing to participate in the study, gave their informed consent standards. A comprehensive history of the patients was obtained, and a systematic examination, general examination, and standard fundamental investigation were carried out. The controls were healthy patients. Every patient underwent a glucose challenge test at their initial appointment. If the GCT came out normal, the test was run again between weeks 22 and 28 and then again at week 32 of pregnancy. Regardless of fasting status, a glass of water containing 50 grams of dissolved glucose was given as part of the glucose challenge test. The patients' two milliliters of blood were drawn by venipuncture, and the serum was separated at room temperature using centrifugation. Between 3 to 7°C the serum was kept until it was needed. GOD-POD was used to estimate the blood glucose level. For the purpose of diagnosing GDM, a blood sugar threshold of ≥ 140 mg/dl was used. Oral glucose tolerance test (2-hour) was conducted to check the results of the glucose challenge test were abnormal. After a fast of eight hours, blood was drawn. Following testing, administered orally, 75 gm of oral glucose and dissolved in about 300 ml of water. After an hour and a half, blood glucose levels were measured. If vomiting happens within half an hour of ingesting glucose orally, the test was redone the following day. After 30 minutes, if vomiting still hadn't stopped, the test went on. Pregnancy progress was tracked and documented. Chi-square testing technique was used for statistical analysis (SPSS version 25.0). In relation to related GDM risk variables, logistic regression using a backward model, analysis was conducted. Only dependent variable was GDM; while, independent variables were all other risk factors for GDM. For quantitative data, displayed results were as an arithmetic mean $\pm$ standard deviation, and for qualitative data, as a percentage. Logistic regression

analysis employed the odds ratio (OR) with a 95% confidence interval. Less than 0.05, p-value was considered as statistically significant.

RESULTS

158 randomly chosen pregnant patients who were attending a tertiary healthcare facility participated in the study. In the current study, 21.66% of all pregnancies that were examined had GDM. GDM was identified in 21.66% of the high-risk group of study participants, who were aged ≥ 27 , comprising 58% of the total population.

Table No. 1: Age wise distribution of patients in GDM

Age	Cases	GDM cases	Percentage
<21	5	0	0
21-27	54	5	3.56
24-28	51	14	7.49
29-35	31	13	8.99
>34	17	7	3.45
Total	158	36	21.66

Table No. 2 : Distribution of patients BMI in GDM

BMI	Cases	GDM cases	Percentage
18.5-24.9	89	0	0
25.0-29.9	45	22	11.76
>30	30	17	9.98
Total	158	36	21.22

A normal BMI of 19.5-23.9 kg/m² was found in 51.97% of the participants. Of the cases, 45.16% had a BMI of ≥ 25 kg/m², and 23.78% had a GDM diagnosis. 59.8% of the pregnant women were multigravida patients, and 16.47% of them had GDM. 23 pregnant women (14.8%) had a history of diabetes mellitus in family, which is a factor for gestational diabetes mellitus (GDM).

Table No. 3 : With GDM, Gravida status

Gravida	Cases	GDM cases	Percentage
Primigravida	80	21	5.10
Multigravida	78	15	16.88
Total	158	36	21.22

Table No. 4 : Risk factors for GDM and their association among patients

Risk Factors	Cases	GDM cases	Percentage
Absent	76	13	7.53
Present	81	23	17.82
Total	158	36	21.22

Table No. 5: Distribution of patients with risk factors for GDM

Risk Factors	No. of cases	Percent
Present	132	85.3
Absent	24	14.9
Family history of DM	23	13.86
Macrosomia / large for gestational age (LGA)	8	2.08
Past History of GDM	12	9.12
Unexplained fetal/ neonatal loss or still birth previously	2	1.9
Previous premature baby	3	1.2
Previous pregnancy with congenital anomalies	2	0.8

Table No. 6: Plasma glucose levels in the study population at 1 hour (mg/dl).

PG at 1 hour (mg/dl)	Cases	Percentage
<140	49	74.9
≥140	55	20.0
>200	52	3.06
Total	158	100

Table No. 7: In the study population (mg/dl) level of plasma glucose

FPG (mg/dl)	Cases	Percentage
<93	130	78.24
93-123	31	18.70
>124	7	2.99
Total	158	100

Table 5 displays that 8 (2.08%) of the expectant mothers had an LGA baby during their prior pregnancy. In 12 cases (9.12%), a history of GDM during a prior pregnancy was noted. 2 (1.9%) of the expectant mothers had a prior pregnancy that ended in a stillbirth or inexplicable fetal or neonatal loss. Two (1.3%) of the expectant mothers had previously given birth prematurely. One (0.6%) of the expectant mothers had a congenital malformation during a prior pregnancy (Table 5). In this study, the presence of GDM was statistically correlated with maternal age ≥ 25 years. Of the 101 patients, 39 were diagnosed with GDM ($p=0.001$), and 64 percent of the patients were older than 27. In this investigation, all 39 (100%) of the GDM subjects had a BMI more than 25 ($p<0.001$). The frequency of GDM in our study is strongly correlated with a family history of diabetes ($p=0.00001$). The frequency of GDM in our study is strongly correlated with prior macrosomia/LGA babies ($p=0.00001$). The incidence of GDM in our study is strongly correlated with prior GDM history ($p=0.00001$).

DISCUSSION

Multan Medical and Dental College, Multan, Pakistan, was the site of this investigation. Wherein 158 expectant mothers were enlisted at their initial visit to the antenatal OPD. Patients with overt or pre-gestational diabetes were not allowed to participate in the trial. Mother age and the risk of GDM have been proven to be substantially associated by several researchers. The age distribution of the population is anticipated that will have an impact on the prevalence of GDM in that population. The age above which there is a statistically significant increase in the risk of GDM, there is no consensus. Less than 27 years of age is regarded as a minimal risk factor for GDM. Being older than 27 is seen as a risk factor for GDM⁽¹³⁾.

Among the 39 pregnant women with GDM diagnoses, 33 (84.62%) had an age below 25. In a study conducted in rural Haryana, Rajput et al. showed that the prevalence of gestational diabetes mellitus (GDM) was 12.9% and that there was a strong correlation between GDM and mother age above 25. A study carried out in Vellore by Rajasekar et al. found that 14% of hospital-based cases of GDM were hospital-based, and that prevalence significantly increased with age and was linked to a higher risk of getting GDM⁽⁸⁾. 15.2% of cases in a hospital-based investigation by Basu et al. had GDM prevalence⁽⁵⁾. The age of the mother was linked to an increased incidence of GDM. According to a study on 298 by Kaliyani et al, the prevalence of GDM was 7.29%⁽¹⁴⁾.

The incidence of diabetes mellitus in gestation was found to be negatively correlated with both BMI and unfavorable pregnancy outcomes. Using WHO criteria, Seshiah et al conducted a community-based investigation and found a significant increase in the prevalence of GDM as patient age increased⁽¹⁵⁾. The results of this investigation supported previous findings, with 82.58% of GDM-afflicted women in the ≥ 27 age range⁽¹⁶⁾.

In the most recent study, 54.84% of the pregnant women had normal BMIs (18.5-24.9), and 45.16% had BMIs of 25 or higher. Of those surveyed, only 2% had a BMI of 30 or more and were considered obese. In this study, there was a strong correlation between greater BMI and the prevalence of GDM (23.79%). Jali et al.'s hospital-based study revealed that obese patients with high-calorie diets with little physical activity were more likely to acquire GDM⁽¹⁷⁾. Of the pregnant women, 21 (12.8%) had a history of diabetes mellitus in family, which is a risk factor for gestational diabetes mellitus (GDM); 16 (73.29%) cases of GDM had a history of diabetes in family. Twelve (80%) of the pregnant women, of whom fifteen had previous GDM diagnoses, were found to have GDM this time around. Similar findings were found in a community-based study conducted in rural Haryana by Rajput et al. The study

found that a positive family history of diabetes and a history of having a baby (birth weight ≥ 4 kg) were associated with a significantly higher prevalence of gestational diabetes mellitus (GDM), with a prevalence of 13.9%.

A study conducted at a hospital by Basu et al. Estimated GDM prevalence was 17.2%; a family history of diabetes was linked to an increased risk (5). According to a study by Rajasekar et al., the hospital-based prevalence of GDM is 14%, and women with a family history of the disease had a much higher prevalence⁽⁸⁾. Investigation into the prevalence of gestational diabetes mellitus. A study conducted at a hospital by Jali et al⁽¹⁷⁾ the study's findings showed that a poor obstetrics history increased the risk of developing GDM. Asians have a high prevalence of GDM, which is linked to risk factors such a history of prior GDM, congenital abnormalities, or macrosomia, according to a systematic review and meta-analysis⁽¹⁸⁾.

This study demonstrated a strong correlation between multiparity and the frequency of GDM; 27 out of the 98 participants were multiparous. BMI was discovered to be the only modifiable risk factor for GDM among all the independent risk variables⁽¹⁹⁾. Globally, the incidence of gestational diabetes mellitus (GDM) has been rising, and major contributing factors to this trend include sedentary lifestyles, urbanization, physical inactivity, and dietary changes⁽¹¹⁾. According to World Health Organization (WHO) projections, over 33,000,000 would suffer from type II diabetes by 2025. The reasons for the heterogeneity in GDM prevalence across studies include variations in the study population's demographics, geographic location, sample size, and diagnostic techniques used.

CONCLUSION

Globally, the cases of diabetes mellitus in gestation (GDM) has been rising, having major contributing factors including sedentary lifestyles, physical inactivity, and dietary changes. The occurrence of GDM varies ranges 2.12 to 25% in different regions of Pakistan. The study suggests that a separate diabetes clinic should be established where all pregnant women can be screened, counseled about changing their lifestyles, and regularly monitored for any adverse outcomes related to diabetes. The study also notes that diabetes during pregnancy is linked with severe adverse maternal and foetal outcomes, such as miscarriages, anomalies, difficult deliveries, sudden death of infant, and stillbirth. The majority of these severe outcomes could be avoided by proper glucose control and its early detection.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Uzma Arshad, Anwish Ali, Shehlla Qadir
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Agreement to accountable for all aspects of work:	All the above authors

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