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RESEARCH ARTICLE
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PREVALENCE OF GESTATIONAL DIABETES IN RURAL AREAS AND ITS ADVERSE EFFECTS ON PREGNANCY

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Abstract

Background: Gestational diabetes mellitus (GDM) is associated with adverse maternal and fetal outcomes arising rapidly. In a developing country like Pakistan, it poses a serious threat to mother and child health. The study focuses on educating women about health, maintaining a healthy diet during pregnancy, and the role of HbA1c estimation during GDM in determining maternal complications.

Method: A cohort retrospective study was conducted on women delivered at the Obstetrics Department of Sughra Shafi Hospital, Narowal, from January 2022 to December 2022. 305 women were diagnosed with GDM using fasting blood sugar levels and OGTT using the American Diabetes Association (ADA), 2015 criteria. Furthermore, HbA1c levels were estimated to correlate with maternal complications.

Results: Out of the 1240 women who gave birth at the institute hospital over the course of the year, 305 (24 %) had a diagnosis of GDM. When gestational diabetes first appeared, the mean fasting blood sugar was ≥140 mg/dl, the HbA1c was ≥ 6.0 mg/dl, and the average gestational age was 24.8±6.7 weeks. The Chi-square goodness-of-fit test in SPSS v23 was used to test each complication separately. P-values < 0.01 denote highly significant differences, suggesting that GDM women experience higher than anticipated rates of complications. 169 (55 %) and 109 (35 %) of the 305 GDM patients had PROM and polyhydramnios, respectively.

Conclusion: The study shows a high frequency of GDM (24.5%) in rural area women and this leads to increased risk of polyhydramnios (p-value= <0.01), preterm labor (p-value= <0.01), and cesarean deliveries (p-value= <0.01).

Keywords: Oral Glucose Tolerance Test (OGTT), Gestational Diabetes Mellitus (GDM), Glycated hemoglobin (HbA1c), Pre-Term Birth (PTB), Premature Rupture of Membrane (PROM).

Introduction:

Gestational diabetes mellitus (GDM) is a metabolic disorder that impacts pregnant women due to the suppression of insulin function caused by the release of placental hormone. GDM is a challenging health issue faced by pregnant women. Worldwide the incidence of GDM is about 14% [(1)]. Glucose intolerance occurs because of insulin resistance during normal pregnancy, more insulin secretion in pregnancy leads to hyperinsulinemia. GDM develops in women with inadequate compensation of β-cell[(2)]. The major risk factor for women in poor nations like Pakistan is GDM with a prevalence of 10% in both urban and rural areas[(3)]. In urban areas of developing countries, GDM is found to be linked with an unhealthy lifestyle (lack of physical activity), and excessive intake of inorganic food. Despite a non-sedentary lifestyle, a rapidly increasing percentage of GDM has been observed in rural areas. Several reasons have contributed to the rise in GDM incidence in Pakistan's rural areas i.e. excessive eating behavior, and too much intake of carbohydrates[(4)]. GDM is associated with adverse outcomes like (polyhydramnios, stillbirth, macrosomia, premature rupture of membranes (PROM), preterm labor, and preeclampsia)[(5, 6)]. Polyhydramnios due to GDM leads to higher maternal and fetal complications, causing emergency fetal extraction, premature birth, and fetal death[(7)]**.** Preterm birth (PTB) is delivery before completing 37 weeks of gestation which is associated with an increased risk of impairments and infant deaths[(8)].

The purpose of this study is to determine the prevalence of GDM and its impact on pregnancy in rural areas.

Methodology:

This study was devised as a retrospective cohort study conducted at the Sughra Shafi Medical Complex, Narowal, Punjab, Pakistan. The study scrutinized the electronic medical data of pregnant women who delivered between January 2022 and December 2022 to assess the predominance of gestational diabetes mellitus (GDM) and its relationship with pregnancy outcomes and complications, particularly polyhydramnios and preterm labor leading to premature rupture of membranes (PROM). During this period of study, 1275 women between the age of 25-35 years were delivered at the hospital out of which, 305 consecutive single-ton pregnancies with GDM were eligible for analysis keeping a focus on polyhydramnios and preterm labor (PROM). Women with GDM were identified by fasting blood glucose levels≥140mg/dl. Women who were diagnosed with high blood glucose levels were further investigated by oral glucose tolerance testing (OGTT) using the American Diabetes Association (ADA), 2015 Criteria and HbA1c. Confirm diagnosis of GDM in women was made by following In accordance with the American Diabetes Association (ADA) 2015 diagnostic criteria, a 75 g oral glucose tolerance test (OGTT) is administered in the morning following a minimum fasting period of ≥8 hours[(9)].

The corresponding plasma glucose thresholds are defined as follows: 92 mg/dL at fasting, 180 mg/dL at 1 hour, and 153 mg/dL at 2 hours post-glucose load.

Those having pre-existing diabetes, multiple gestations, age above 35, and other chronic diseases were omitted from the research.

Statistical analysis was done using SPSS.23 version Chi-square goodness-of-fit test was applied for complications of GDM. Expected frequencies were based on typical GDM complication rates from the literature (20% for polyhydramnios, 30% for preterm labor with premature rupture of membranes (PROM), 50% for cesarean-section delivery[(10)].

Results:

The frequency of the GDM group was 24.5% (305), whereas the non-GDM group had 75% (935) frequent deliveries. Pregnancy complications were analyzed in gestational diabetes patients only. The diagnosis was made based on fasting blood sugar levels during their follow-up. Moreover, HbA1c was performed to monitor pregnancy progress. Using SPSS v23's Chi-square goodness of fit test, each complication was examined independently (presence versus absence). In women with GDM, P-values < 0.01 signify highly significant differences, suggesting higher than anticipated complication rates. Result showed a significant p-value for all the complications.

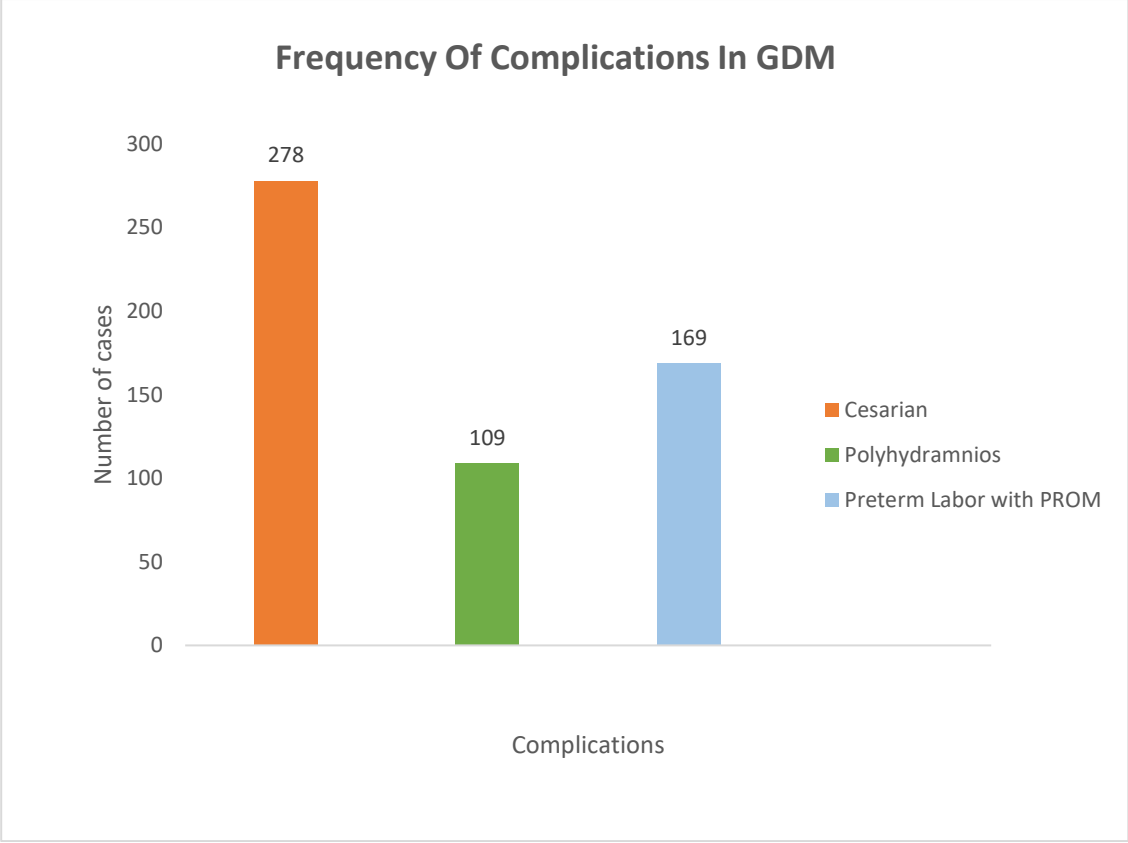
Table 1: Descriptive Statistics for GDM

Parameter	GDM Group
Number of Women	305 (24.5%)
Mean Gestational Age for diagnosis of GDM (weeks)	24.8 ± 6.7
Mean Fasting Blood Sugar (mg/dl)	≥140 ± 9.0
Mean HbA1c (%)	≥6.0 ± 4.0

Table 2: Chi-Square Goodness-of-Fit Test Results for Gestational Diabetes Mellitus (GDM) Pregnancy Complications in Women (n=305).

Complication	Observed Frequency (n, %)	Expected Frequency (n, %)	Chi square goodness of fit Statistics	df	P-Value
Polyhydramnios	109 (35.7%)	61 (20%)	47.21	1	< 0.01
Preterm Labor with PROM	169 (55.0%)	91.5 (30%)	93.77	1	< 0.01
Cesarean-Section Delivery	278 (91.0%)	152.5 (50%)	206.56	1	< 0.01

Graph: 1



Discussion:

The study finds that Gestational diabetes prevalence is increasing in rural areas even though people living in rural areas have increased physical activity and healthy lifestyles. Whereas the percentage of obesity has intensified due to change in lifestyle and eating habits that leads to increased insulin resistance due to central fat deposition[11]. Lack of health awareness and low socioeconomic status ultimately cause an increased incidence of GDM. In our study 25 to 35 years of age women have a 24.5% incidence of GDM as depicted by Table 1. This is consistent with rates reported in similar groups with high-risk characteristics, including as advanced maternal age, obesity, and ethnicity[12]. This increased incidence emphasizes the necessity of comprehensive prenatal screening programs for detecting and managing GDM early. Research reported that women who have gestational

diabetes mellitus have HbA1c levels greater than 5.8% had an increased risk of polyhydramnios, urinary tract infections, premature labor, cesarean births, and postpartum hemorrhages[13]**.** GDM was diagnosed at an average gestational age of 24.8 ± 6.7 weeks. The American College of Obstetricians and Gynaecologists [ACOG], 2021, states that this period aligns with the typical diagnostic window throughout the second trimester. Early identification during this stage of pregnancy is essential for starting glycemic control measures, which may lower the chance of problems later on[14].

HbA1c values (≥6.0 ± 4.0%) and mean fasting blood sugar (≥140 ± 9.0 mg/dl) indicate inadequate glycemic management in GDM patients. These readings indicate a need for stricter glucose management since they surpass recognized diagnostic limits (≥126 mg/dl for fasting glucose and ≥5.7% for HbA1c)[15]. Persistent hyperglycemia has been linked to poor maternal and fetal effects such as macrosomia, preeclampsia, and neonatal hypoglycemia[16]. Improved glycemic monitoring and early treatment measures, like nutritional therapy or insulin therapy, are critical for reducing these risks[17].

We observed that the majority of women have complications like polyhydramnios 35.7% and PROM in 55.0% and c-sections 91.0% prevalent in women with GDM (Table 2) which is consistent with previous studies[18].

Previous studies have shown that GDM is a risk for abortion, preterm labor, and premature rupture of membranes[19]. PROM is known to be associated with polyhydramnios (abnormally high levels of amniotic fluid) that may lead to a higher incidence of c-sections. Patients with gestational diabetes mellitus have a markedly increased risk of complications during delivery, such as fetal compromise, labour dystocia, and macrosomia. These findings support research showing GDM to be a major reason for caesarean birth[20]. It is important to prioritize individualized birth planning to balance the risks to both the mother and the newborn.

It is important to implement universal GDM screening to enable prompt diagnosis and intervention[16]. Regular glycemic management evaluations based on fasting blood glucose and HbA1c readings, as well as prenatal monitoring for problems.

Health education and proper guidance about diet during pregnancy are lacking in women of rural areas and need much attention in this regard. Our study suggested that women in rural areas need much attention to decrease the incidence of c-sections and adverse maternal health outcomes.

The results of this study provide critical insights into the maternal and obstetric complications associated with gestational diabetes mellitus (GDM), reinforcing the need for early diagnosis and management to mitigate adverse outcomes.

Study Limitations:

While compelling, the study has a few limitations. The study lacked a non-GDM comparison group, limiting its generalizability. The study did not examine how glycemic control measures, like as insulin usage, affect outcomes. Future studies should include control groups and investigate the impact of specific treatments on maternal and fetal outcomes.

Conclusion:

GDM considerably raises the risk of maternal and obstetric problems such as polyhydramnios, premature labour, and caesarean birth. These data highlight the important need for early screening, tailored therapy, and multidisciplinary care to enhance pregnancy outcomes in women with GDM. Women of reproductive age should be educated about gestational diabetes mellitus and the need for an adequate nursing lifestyle.

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Author's contributions:

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Conflict of Interest
No conflicts of interest were disclosed by any of the writers.

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