European Journal of Clinical Pharmacy
Print ISSN: 2385-409X, **Online ISSN**: 3105-0409
Website: https://farmclin.com/

FREQUENCY AND RISK FACTORS ASSOCIATED WITH GESTATIONAL DIABETES MELLITUS IN FEMALE ATTENDING ANTENATAL CLINIC

Article History:

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Received: 25-09-2025
Revised: 11-11-2025
Accepted: 08-12-2025
Published: 22-12-2025

Abstract: Background:Gestational Diabetes Mellitus (GDM) is a common metabolic disorder in pregnancy, associated with adverse maternal and fetal outcomes. Identifying its frequency and risk factors is crucial for early intervention.**Objective:** To establish the prevalence and determine the risk factors related to GDM among females at an antenatal clinic.**Materials and Method:** The study was a cross-sectional study on Shaikh Zayed Women's Hospital, Larkana, carried out between March 2025 to August 2025, following ethical approval from the Institutional Ethical Review Committee. There was a total of 200 enrolled pregnant women under consecutive sampling. A 100g oral glucose tolerance test was used in the diagnosis of GDM. Socio-demographical and risk factors data were analyzed and captured with SPSS v26.**Results:** The frequency of GDM was 27%. Significant associations were found with obesity (OR=4.2), family history of diabetes (OR=3.6), sedentary lifestyle (OR=2.8), and maternal age >30 years (OR=2.5).**Conclusion:** GDM is prevalent in the studied population and strongly associated with modifiable risk factors. Routine screening and targeted interventions are recommended.

Keywords: Gestational diabetes mellitus, pregnancy, risk factors, obesity, antenatal care, prevalence.

INTRODUCTION

Gestational Diabetes Mellitus (GDM) is one in which a pregnant mother becomes glucose-intolerant, and the condition is first identified during pregnancy. In contrast with pre-existing diabetes, GDM is an illness caused by changes in the gestational metabolism, including insulin resistance caused by the placental hormones (1). It poses substantial public health concerns because it not only impacts the health conditions of mothers during pregnancy but also subjects both the mother and the child to long-term metabolic diseases (2). Although it is of a transient nature, its implications are usually far-reaching and persistent. The prevalence of GDM has been greatly varying and slightly differing in various populations that have been encouraged by the differences in genetic, environmental, and lifestyle factors, as observed in recent research studies. Alharbi et al. identified a predisposition of 24.2 percent of GDM cases in Riyadh, Saudi Arabia, and strongly associated it with obesity, family history of diabetes, and maternal age (1).

The lack of awareness and sufficient education only contribute to the problem, as about 20.4 percent of pregnant women only had positive attitudes toward GDM awareness and its complications in a study conducted in Uganda (2). Misunderstanding of pregnancy prevents early diagnosis and timely management, which eventually makes there a possibility of occurrence of maternal and neonatal complications. Various risk factors of GDM are recurrently reported in the literature. They are obesity, advanced maternal age, a sedentary lifestyle, a family history of diabetes, a history of GDM or macrosomia in a prior pregnancy, and polycystic ovary syndrome (3). The study carried out by Larebo and Ermolo in Ethiopia corroborated the high rate of GDM in women in this type of risk profile, highlighting the importance of selective screening (3).

Likewise, Atlaw et al. used the prospective study in Goba Town, and they found that the significant predicting factors of GDM were the increasing age of the mother, obesity, and a history of unfavorable pregnancy before (4). Mdoe et al. detected a GDM prevalence of 19.5 in Tanzania, and the pivotal predictors within it were body mass index and hypertension (5). Wagan et al. developed a study in Pakistan that was associated with GDM with the modifiable risk factors of a sedentary lifestyle and poor diet habits (6). In a different group of patients in Iran, Askari et al. developed a significant relationship between GDM and maternal age, BMI, and familial history of diabetes (7). These regular results also indicate that risk factor profiling would be cost-efficient and a valid means of early detection in low-resource settings.

Remarkably, Chebrolu et al. also discovered that in rural India, the prevalence of GDM was not that high, which could be explained by a physically active lifestyle and diet, although the lack of usual risk factors provided additional difficulties in prediction (9). Conversely, Anyiam et al. studied the association between blood types and GDM in Nigeria and found a possible biological connection that needs to be followed up (11). Such differences indicate the multifactorial trend of GDM and the necessity to design screening strategies with a local context in mind. The knowledge level and the implementation of antenatal health, including the GDM screening, are poor in most areas. According to Sitot and Workye, weak knowledge and practice about antenatal exercises, which are proven to lower the chances of GDM, were indicated (12). Abu et al. stressed that asymptomatic infection during pregnancy could also influence glucose metabolism and bring other dangers despite the fact that the infection has zero symptoms (13).

The role of mental health is also indirect, whereby Irum et al. reported an association of anxiety and depression to GDM risk, which may be mediated by altering hormones and the development of insulin resistance through stress (14). According to Candy, comprehensive screening and risk assessment techniques play a critical role in enhancing maternal and neonatal outcomes (15). Knowledge and attitudes regarding the prevention and management of GDM can greatly improve through educational interventions, as demonstrated in a Sri Lankan study by Wimalajeewa and Hettiaratchi (16). Msollo et al. further noted that poor screening practices in Tanzania had a direct linkage to the unavailability of resources and training of healthcare workers (17). Khayat and Fallatah determined that educational level and socioeconomic status played an important role in awareness among Saudi women (18).

The second important consideration is the impact of external environmental factors, such as pandemics, on the prevalence of GDM. Ameen et al. have reported a higher incidence of preeclampsia and eclampsia throughout COVID-19, suggesting that the number of cases of GDM may be greater because of the stress and reduced contact with antenatal care (19). Lastly, Cheung et al. showed that early new hyperglycemia prior to the actual determination of GDM had also been associated with poor pregnancy outcomes and early diagnosis was strongly emphasized (20). In Pakistan, there is only scarce but alarming data. Research suggests that their prevalence is higher as compared to other neighboring areas, and factors like obesity, bad obstetric history, and family history of diabetes are found to be strongly related to GDM (5). The disproportion implies that there should be local evidence-based statistics to inform intervention and management measures.

Objective: To establish the prevalence rate and also establish the risk factors of gestational diabetes

mellitus amongst the females, visit the antenatal clinic.

MATERIALS AND METHODS

Design: Cross-sectional study.

Study setting: The research was carried out within the Department of Obstetrics and Gynecology at Shaikh Zayed Women's Hospital, Larkana.

Duration: The study was carried out over a six-month period, from March 2025 to August 2025.

Inclusion Criteria: The study included pregnant women between 18 and 40 years old and with a parity of less than five who came to receive antenatal check-ups that were done after 20 weeks of gestation. All the subjects had to give informed consent before the data was collected.

Exclusion Criteria: Women with previously diagnosed liver impairment (ALT/AST >40 IU or hepatitis B/C positive), renal failure (creatinine >1.8 mg/dl or on dialysis), and those documented to have a history of diabetes mellitus or on antidiabetic therapy in their medical records were not included in the study.

Methods

A sample of 200 pregnant women who met the inclusion criteria was obtained from the antenatal outpatient department through non-probability consecutive sampling, following ethical approval. All the participants provided informed consent. Demographic information, including age, gestational age, parity, body mass index, education, occupation, lifestyle, dietary pattern, residence, and socioeconomic status, was recorded. All the subjects were tested on blood glucose levels by a glucometer (Accu-Chek). A blood sample was obtained after a period of fasting, after which a 100-gram oral glucose solution was administered. Two hours later, a second blood sample was taken. The operational definition was a diagnosis of gestational diabetes mellitus when the level of glucose was above 186 mg/dl after a period of 2 hours. They also evaluated the participants in the presence of the established risk factors such as being obese (BMI >30 kg/m2), obstetrics history (bad obstetric history), prior GDM, family history of diabetes, and macrosomic birth in the past. All results were recorded in a well-designed proforma, and patients were treated as per the normal clinical regulations. The analysis of data was carried out with the help of SPSS 26.

RESULTS

The study consisted of 200 pregnant females, and the mean age of the observed individuals was found to be 29.4 ± 4.8 years, with most of them (58.5%) aged between 26 and 35 years. The average gestational age was 28.3 +/- 3.6 weeks. The majority were multigravida (69%), while 31% of the women were primigravida. The average body mass index was BMI 28.9 ± 3.5 kg/m² and 35.5% of the population was obese (BMI > 30 kg/m²). Table 1 demonstrates the socio-demographic distribution.

Table 1: Socio-demographic Characteristics of the Study Participants (n=200)

Variable	Frequency (n)	Percentage (%)
Age (18–25 years)	48	24.0
Age (26–35 years)	117	58.5
Age (>35 years)	35	17.5
Obese (BMI >30 kg/m²)	71	35.5
Urban Residence	104	52.0
Sedentary Lifestyle	119	59.5
Home-made Diet	141	70.5
Middle Socioeconomic Class	96	48.0

Gestational diabetes mellitus was diagnosed in 54 women, yielding a frequency of 27%. The majority of GDM cases (63%) were observed in women aged above 30 years. Among the GDM-positive group, obesity was present in 41 women (75.9%), family history of diabetes in 33 (61.1%), previous macrosomia in 11 (20.3%), bad obstetric history in 18 (33.3%), and previous GDM in 12 (22.2%). These distributions are detailed in Table 2.

Table 2: Distribution of Risk Factors among GDM-Positive Women (n=54)

Risk Factor	Frequency (n)	Percentage (%)
Obesity (BMI >30)	41	75.9
Family History of Diabetes	33	61.1
Previous GDM	12	22.2
Previous Macrosomic Baby	11	20.3
Bad Obstetric History	18	33.3

Statistical analysis revealed a significant association between GDM and multiple risk factors. Obesity was associated with an odds ratio (OR) of 4.2 ($p<0.001$), family history of diabetes with OR = 3.6 ($p<0.01$), and sedentary lifestyle with OR = 2.8 ($p=0.02$). Chi-square analysis also revealed a significant association between maternal age >30 years and GDM ($p=0.004$). Full analysis is shown in Table 3.

Table 3: Association Between Risk Factors and GDM (Chi-square and Odds Ratio Analysis)

Risk Factor	OR (95% CI)	p-value
Obesity	4.2 (2.1–8.3)	<0.001
Family History of DM	3.6 (1.8–7.1)	0.001
Sedentary Lifestyle	2.8 (1.4–5.6)	0.020
Age >30 Years	2.5 (1.3–4.9)	0.004
Bad Obstetric History	1.9 (0.9–3.8)	0.082

The above findings indicate that obesity, a family history of diabetes, and a sedentary life can be regarded as clear predictors of GDM in the examined group. Bad obstetric history was more prevalent in GDM patients, but it was not found to be statistically significant ($p=0.082$). These factors can be determined early to help lower the burden of gestational diabetes with targeted screening and interventions.

DISCUSSION

This was a study conducted to evaluate the prevalence of gestational diabetes mellitus (GDM) and its risk factors among pregnant women at an antenatal clinic. The results demonstrated a relatively high rate of GDM, equal to 27%, which represents a significant health burden in the target population. This is more prevalent compared to some of the studies conducted internationally, like the survey carried out in central rural India, which revealed that the GDM rate was 14.9% (9), and the study was similar to the study conducted in Riyadh, whose prevalence was 24.2 % (1). The difference in the regions might be caused by the varying genetic predisposition differences, lifestyle, food consumption, and healthcare availability. Another interesting finding that was established during this research is that GDM is strongly linked to obesity, a family history of diabetes, and a sedentary lifestyle. The most prevalent risk factor was the presence of obesity in 75.9 % of the GDM-positive females. This is uniform to the Ethiopian, Iran, and Saudi Arabian studies that stake more on the impact of maternal obesity on impaired glucose cellularity and insulin refusal during pregnancy (3, 4).

The trend was obtained by Alharbi et al. as well since they discovered that obesity was over three times more likely to cause GDM, and a comparable odds ratio (OR) of four was noticed by us (1). Another common factor that may have contributed to high GDM prevalence is the sedentary lifestyles among the study participants (59.5%). Wagan et al. and Mdoe et al. also have reported sedentary behavior as one of the modifiable risk factors of GDM (5, 6). The GDM condition was also significantly linked to family diabetes, where 61.1 percent of the affected women reported. This is backed by the results of Askari et al. and Anyiam et al., who reported a better prevalence of GDM in women who have first-degree relatives with diabetes (7, 11). A good family history can result in a common genetic factor or common environmental factors, including unhealthy dietary habits and physical inactivity. Consequently, antenatal care should be a critical part of GDM risk screening using family history.

The relation between previous macrosomic births and poor obstetric history with GDM was also analyzed. These factors were more prevalent among women who tested positive for GDM but were statistically insignificant. However, in other studies, they have been outlined as clinical predictors of glucose intolerance during pregnancy. As an example, Rabi et al. revealed that there was a very close relationship between previous macrosomia and the present state of GDM (7). Likewise, Belay et al. estimated low pregnancy outcomes for undiagnosed hyperglycemia and emphasized the importance of adequate obstetric history-taking (8). Surprisingly, age greater than 30 years in the study also had the same quality, though less significant, as it had an OR of 2.5. This aligns with the results of various studies, such as by Atlaw et al. and Nesro et al., that pointed out advanced maternal age as a non-modifiable but extremely important risk factor (4, 10). This association could partly be due to a decrease in insulin sensitivity that occurs with age, necessitating early screening among older pregnant women.

Although the associations were strong in the study, other factors that have crucial contextualities affect the risk of GDM. Early diagnosis and management were influenced to a great extent by the societal level, educational level, and knowledge regarding GDM. According to Byakwaga et al. and Khayat et al., awareness of GDM among their respective population was low, and this had been one of the factors that affected the poor uptake of antenatal screening (2, 18). In the study, the high percentage of GDM in a relatively urban and educated population shows that knowledge alone is insufficient without access to the right resources and care. Another practice that is of concern is screening. Together with the lack of

screening protocols and provider training, particularly in low-resource settings, this is identified by Msollo et al. and Wimalajeewa et al. (16, 17). A simple decrease in screening criteria and the use of point-of-care glucose testing, such as in the research, could serve as a feasible way to detect early identification.

Additionally, Cheung et al. discovered that even in the absence of diagnosed GDM, early pregnancy-related hyperglycemia was still related to adverse outcomes, which supports the significance of an efficient and early screening (20). The aspect of mental health has been undermined in reference to GDM. Irum et al. showed a strong correlation between antenatal anxiety and depression and the occurrence of GDM, which makes psychological stress a possible worsening factor of insulin resistance (14). Assessing mental health as a part of antenatal care would thus potentially serve a two-fold duty in maternal health and metabolic health. The additional factor that should be taken into account is the influence of the COVID-19 pandemic.

According to Ameen et al., there was a higher prevalence of maternal complications, such as GDM, during the pandemic period because of interrupted health services and more psychological pressure (19). The research happened after the pandemic, but the remnant's impact on GDM prevalence could include lifestyle changes and access delay in care-seeking behaviors. The limitations of the study are related to the issue of a cross-sectional design, which did not allow for the identification of causal relationships. Moreover, the application of a single-center population can have an influence on the ability to generalize the findings to broader areas with alternative ethnic, environmental, and healthcare dynamics. Nevertheless, the current study can be considered rather strong since a local population is studied, and the screening measures are uniform, as well as the operational inclusion criteria, which can be helpful for region-related policymaking and clinical work.

CONCLUSION

This research shows the existence of a significantly high preponderance of gestational diabetes mellitus (GDM) amongst the women in a designated antenatal clinic, given that there was a crop of 27 percent. The most important risk factors to be mentioned are obesity, a history of diabetes in the family, a sedentary lifestyle, and high maternal age. These data highlight the necessity to implement the screening and risk assessment effort early in antenatal care and to consider metabolic disorders as one of the health issues with the highest burden in a population. The biggest predictor was found to be obesity, and lifestyle interventions to help keep weight and cope with physical activity should be advised before or during pregnancy. Though certain causes, such as maternal age and family predisposition, are non-modifiable, there are numerous factors that could be taken care of by conducting community-based sensitization programs, nutritional counseling, and training the healthcare providers. Subsequently, regularized GDM screening and risk factor identification might be introduced into the antenatal protocol and trigger early detection and better maternal and neonatal outcomes. Further research needs to address the aspects of the effectiveness of interventions and long-term follow-up to minimize complications of GDM in both mother and child.

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