

Frequency of Gestational Diabetes In Obese Pregnant Ladies

Gulaly Ayub Khan¹, Maryam², Chandnee Rehman^{*1}, Asia Rubab³

1. Police Services Hospital, Peshawar, Pakistan
2. Alfalah Diagnostic Centre, Timargara, Lower Dir, Pakistan
3. Federal General Hospital, Islamabad, Pakistan

*Corresponding Author: chandnerehman@gmail.com

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Abstract

Background: Gestational diabetes mellitus (GDM) is a common pregnancy complication associated with adverse maternal and fetal outcomes, particularly among obese women. Understanding the prevalence and risk factors for GDM in this population is crucial for effective clinical management and prevention strategies.

Objective: This study aimed to determine the frequency of GDM among obese pregnant women and assess its association with body mass index (BMI) categories. Additionally, it investigated obstetric outcomes associated with GDM in this cohort.

Methods: This cross-sectional study was conducted in the Department of Obstetrics & Gynecology at Khyber Teaching Hospital, Peshawar, from February 2021 to July 2022. The sample size was calculated to be 152 participants using standard statistical methods. Data collection included demographic information, medical history, BMI measurements, and results of glucose tolerance tests. BMI was calculated using the formula weight (kg) / height (m²). GDM was diagnosed according to the American Diabetes Association criteria. Statistical analysis was performed using SPSS version 25.0. The frequency of GDM was calculated, and associations between BMI and GDM were explored using chi-square tests. Statistical significance was set at a p-value of ≤ 0.05 .

Results: The mean age of the participants was 28.6 ± 4.8 years, with a range of 19 to 40 years. The majority of participants (64.5%) were in the age group of 25-34 years. Out of the 152 participants, 45 were diagnosed with GDM, resulting in a prevalence rate of 29.6%. The BMI distribution showed that 71 women (47%) had a BMI of 30-34.9 kg/m², while 81 women (53%) had a BMI of ≥ 35 kg/m². Women with a BMI of ≥ 35 kg/m² had a significantly higher prevalence of GDM (38.5%) compared to those with a BMI of 30-34.9 kg/m² (22.9%) ($p < 0.05$). The study also found higher incidences of preeclampsia (31.1% vs. 12.1%, $p = 0.008$) and cesarean delivery (53.3% vs. 29.0%, $p = 0.015$) in women with GDM compared to those without GDM.

Conclusion: The study highlights a high frequency of GDM among obese pregnant women, emphasizing the importance of addressing obesity as a modifiable risk factor for GDM. Effective strategies for GDM screening and management in obese populations are essential to improve maternal and fetal outcomes.

1 Introduction

Gestational diabetes mellitus (GDM) is a condition characterized by glucose intolerance that is first identified during pregnancy. It has become a significant public health concern due to its increasing prevalence and the potential risks it poses to both maternal and fetal health. GDM can lead to various complications, such as preeclampsia, cesarean delivery, and a heightened risk of developing type 2 diabetes postpartum. For infants, potential complications include macrosomia and neonatal hypoglycemia (1). Among the numerous risk factors for GDM, obesity is one of the most influential. Obesity, defined as a body mass index (BMI) of 30 or greater, has been linked to an increased risk of several pregnancy-related complications, including GDM (2). The physiological changes associated with obesity, such as increased insulin resistance, significantly contribute to the development of GDM (3). Recent years have seen a rise in the prevalence of obesity among women of childbearing age, which has, in turn, led to a higher incidence of GDM (4). This trend underscores the importance of understanding the relationship between obesity and GDM to implement effective prevention and management strategies.

Several studies have documented the correlation between obesity and the increased risk of GDM. Research indicates that obese women are up to six times more likely to develop GDM compared to their normal-weight counterparts (5). The mechanisms underlying this

increased risk include chronic inflammation, altered adipokine profiles, and heightened insulin resistance, all exacerbated by excess body fat (6). Additionally, obesity-related metabolic dysregulation can impair pancreatic β -cell function, further contributing to the onset of GDM (7). These insights highlight the need for targeted interventions to reduce the incidence of GDM among obese pregnant women. The implications of GDM in obese pregnant women extend beyond the pregnancy itself. Women who have had GDM are at a significantly higher risk of developing type 2 diabetes and cardiovascular disease in the future (8). Moreover, their children are more likely to experience obesity, glucose intolerance, and metabolic syndrome as they age (9). This intergenerational transmission of risk factors highlights the long-term public health consequences of GDM and emphasizes the need to address obesity as a modifiable risk factor.

Understanding the prevalence and risk factors for GDM in obese pregnant women is crucial for effective clinical management and prevention strategies. This study aims to determine the frequency of GDM among obese pregnant women and assess its association with BMI categories, as well as investigate obstetric outcomes associated with GDM in this cohort. The results of this study will provide valuable insights into the relationship between obesity and GDM, emphasizing the need for enhanced screening and management protocols for this high-risk population. By focusing on obesity as a modifiable risk factor, healthcare providers can implement effective interventions to mitigate the adverse maternal and fetal outcomes associated with GDM, ultimately improving the health of both mothers and their offspring.

2 Material and methods

The study was a cross-sectional investigation conducted in the Department of Obstetrics & Gynecology at Khyber Teaching Hospital, Peshawar, from February 2021 to July 2022. The sample size, calculated using standard statistical methods to ensure adequate power, included 152 pregnant women with a body mass index (BMI) of 30 or greater. Inclusion criteria encompassed pregnant women receiving antenatal care at the hospital who consented to participate in the study. Exclusion criteria comprised women with pre-existing diabetes mellitus, those who did not provide consent, and women with multiple pregnancies due to the increased risk and different management protocols associated with such cases.

Data collection involved both direct interviews and medical record reviews. Participants were approached during their antenatal visits, informed about the study's purpose, and provided written informed consent. A structured questionnaire was used to gather demographic information, medical and obstetric history, BMI, and results of glucose tolerance tests. BMI was calculated using the formula $\text{weight (kg)} / \text{height (m}^2\text{)}$, with measurements taken using standardized equipment. GDM diagnosis adhered to the criteria set by the American Diabetes Association (ADA).

The study followed ethical principles in accordance with the Declaration of Helsinki. Ethical approval was obtained from the hospital's ethics committee prior to the commencement of the study. Confidentiality and anonymity of the participants were maintained throughout the research process.

Data were documented in pre-designed data collection forms to ensure consistency and completeness. The collected data included each participant's demographic details, medical and obstetric history, and oral glucose tolerance test (OGTT) results. The statistical analysis was conducted using SPSS version 25.0. Descriptive statistics were used to summarize the data, and the frequency of GDM among obese pregnant women was calculated. Associations between BMI and GDM were explored using chi-square tests, and statistical significance was set at a p-value of ≤ 0.05 .

3 Results

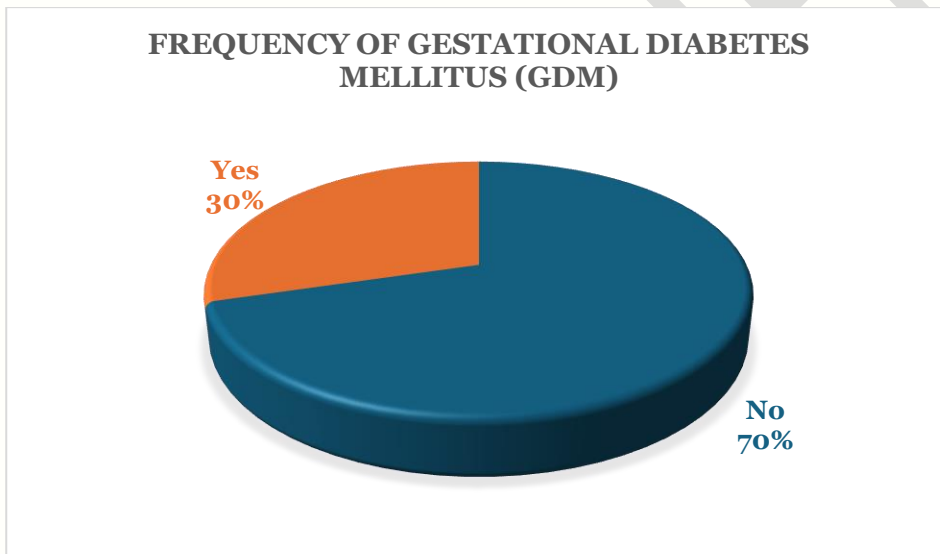
The study included 152 pregnant women, with a mean age of 28.6 ± 4.8 years, ranging from 19 to 40 years. The majority of participants (64.5%) were in the age group of 25-34 years. The distribution of gestational age, BMI, and gravida status among the participants is summarized in Table 1.

Table 1: Demographic and Clinical Characteristics of Study Participants

Variable	Frequency	Percentage
Age (years)		
19-24	32	21.1
25-34	98	64.5
35-40	22	14.5

Variable	Frequency	Percentage
Gestational age		
< 37 weeks	70	46.0
> 37 weeks	82	54.0
BMI (kg/m²)		
30-34.9	71	47.0
≥ 35	81	53.0
Parity		
Primiparous	68	44.7
Multiparous	84	55.3
Gravidity		
Primi gravida	53	35.0
Multi gravida	99	65.0

Out of the 152 participants, 45 were diagnosed with GDM, resulting in a prevalence rate of 29.6%.



The prevalence of GDM increased with higher BMI categories, as shown in Table 2. Women with a BMI of 35 or greater had a significantly higher prevalence of GDM compared to those with a BMI of 30-34.9 ($p < 0.05$).

Table 2: Association between BMI and Prevalence of GDM

BMI (kg/m ²)	Total	GDM	Prevalence of GDM (%)	p-value
30-34.9	87	20	22.9	0.031
≥ 35	65	25	38.5	

The study also assessed gestational outcomes among participants with and without GDM. Table 3 summarizes the comparison of obstetric complications between the two groups. Women with GDM had a higher incidence of preeclampsia (31.1% vs. 12.1%, $p = 0.008$) and cesarean delivery (53.3% vs. 29.0%, $p = 0.015$) compared to those without GDM. Although the rates of macrosomia and neonatal hypoglycemia were higher in the GDM group, these differences were not statistically significant.

Table 3: Comparison of Obstetric Complications Between Women With and Without GDM

Complication	GDM (N = 45)	No GDM (N = 107)	p-value
Preeclampsia	14 (31.1%)	13 (12.1%)	0.008
Cesarean Delivery	24 (53.3%)	31 (29.0%)	0.015
Macrosomia	9 (20.0%)	13 (12.1%)	0.217
Neonatal Hypoglycemia	7 (15.6%)	8 (7.5%)	0.135

These results indicate a significant prevalence of GDM among obese pregnant women, with a clear association between higher BMI and increased GDM risk. The findings highlight the need for targeted screening and management strategies for GDM in obese populations to improve maternal and fetal outcomes.

4 Discussion

The findings of this study revealed a significant prevalence of gestational diabetes mellitus (GDM) among obese pregnant women, with a rate of 29.6%. This high prevalence aligns with previous studies, indicating a consistent trend across various populations. For instance, studies in the United States and Pakistan have reported GDM prevalence rates among obese women ranging from 11.8% to 26.3% (14-16). The elevated prevalence in this study underscores the critical role of obesity as a modifiable risk factor for GDM.

The association between higher BMI and increased GDM risk was evident, with women having a BMI of 35 or greater showing a significantly higher prevalence of GDM compared to those with a BMI of 30-34.9. This dose-response relationship is well-documented in the literature, with obesity exacerbating insulin resistance and impairing glucose metabolism (6, 7). The mechanisms underlying this increased risk include chronic inflammation, altered adipokine profiles, and metabolic dysregulation, which are all exacerbated by excess body fat (6). This study's results reinforce the need for targeted interventions to address obesity in pregnant women to mitigate the risk of GDM.

In addition to the high prevalence of GDM, this study also highlighted the adverse obstetric outcomes associated with GDM in obese women. Women with GDM had a higher incidence of preeclampsia and cesarean delivery compared to those without GDM. These findings are consistent with previous research, which has shown that GDM increases the risk of hypertensive disorders and necessitates surgical interventions during delivery (18, 19). Although the rates of macrosomia and neonatal hypoglycemia were higher in the GDM group, these differences were not statistically significant, possibly due to the relatively small sample size. However, the observed trends align with broader literature documenting increased risks of these complications in pregnancies complicated by GDM (19).

The long-term health implications of GDM extend beyond the immediate perinatal period. Women with a history of GDM are at a substantially increased risk of developing type 2 diabetes and cardiovascular diseases later in life (8). Moreover, their children are more likely to experience obesity, glucose intolerance, and metabolic syndrome as they age, highlighting the intergenerational impact of GDM (9, 20). These findings emphasize the necessity of addressing GDM not only to improve pregnancy outcomes but also to break the cycle of metabolic diseases across generations.

This study's strengths included a well-defined cohort and the use of standardized diagnostic criteria for GDM, enhancing the reliability and generalizability of the findings. However, several limitations must be acknowledged. The cross-sectional design limited the ability to establish causality, and the relatively small sample size and single-center setting may affect the generalizability of the results to broader populations. Furthermore, the reliance on self-reported data for some variables may introduce recall bias (20).

Despite these limitations, the study provides valuable insights into the prevalence and risk factors of GDM among obese pregnant women, emphasizing the need for enhanced screening and management protocols tailored to this high-risk population. Healthcare providers should focus on obesity as a modifiable risk factor and implement effective interventions to mitigate the adverse maternal and fetal outcomes associated with GDM. Future research should explore region-specific factors and develop comprehensive prevention programs tailored to the needs of obese pregnant women, aiming to improve both immediate and long-term health outcomes for mothers and their offspring.

5 Conclusion

In conclusion, this study demonstrated a significant prevalence of gestational diabetes mellitus (GDM) among obese pregnant women, highlighting the strong association between higher BMI and increased GDM risk. These findings underscore the critical need for targeted screening, prevention, and management strategies to address obesity as a modifiable risk factor. By focusing on these interventions, healthcare providers can improve maternal and fetal outcomes, reducing the incidence of complications such as preeclampsia and cesarean

delivery. Furthermore, addressing GDM effectively has long-term healthcare implications, potentially decreasing the risk of type 2 diabetes and cardiovascular diseases in mothers, and mitigating the intergenerational transmission of metabolic disorders to their offspring.

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