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Original Research Article

Prevalence and risk factors of gestational diabetes mellitus among pregnant women in Saudi Arabia: a cross-sectional study

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) is a common pregnancy complication associated with significant short- and long-term health risks for both mother and child. Understanding the local prevalence and associated risk factors is essential for improving antenatal care and long-term maternal health in Saudi Arabia. This study aimed to determine the prevalence of GDM among pregnant women and to assess its associated risk factors, management strategies, adherence levels, and postpartum outcomes.
Methods: A cross-sectional study was conducted among 120 pregnant women attending antenatal clinics. Data were collected using structured interviews and medical records, focusing on demographics, obstetric history, GDM diagnosis, trimester of diagnosis, management modalities, treatment adherence, and postpartum follow-up including diabetes development. Statistical analysis was performed using chi-square tests to identify significant associations.
Results: A total of 120 women participated in this study. The prevalence of GDM was 51.7%. The majority of cases were diagnosed in the first trimester (41.7%), followed by the second (30.8%) and third trimesters (27.5%). GDM was managed primarily through diet control (53.3%). A total of 71.7% reported treatment adherence, and 78.3% indicated adequate glycemic control and follow-up. Significant associations were found between GDM and employment status, BMI, and post-delivery diagnosis of diabetes. Postpartum, 21.7% were diagnosed with T2DM**.**
Conclusions: This study reveals a high prevalence of GDM among pregnant women in Saudi Arabia. Despite good adherence and management rates, the transition to T2DM postpartum remains a concern. These findings highlight the importance of early screening, lifestyle interventions, and continuous postpartum monitoring to reduce GDM-related complications.

Keywords: Gestational diabetes mellitus, Prevalence, Risk factors, Saudi Arabia, Maternal health

INTRODUCTION

Gestational diabetes mellitus (GDM) is one of the most prevalent complications during pregnancy and remains a significant public health concern globally. Defined as glucose intolerance first recognized during pregnancy, GDM typically emerges in the second or third trimester due to insulin resistance induced by placental hormones.[1] Although usually transient, GDM is associated with both immediate and long-term health consequences for the mother and child. The condition not only complicates the course of pregnancy but also predisposes affected individuals to a heightened risk of type 2 diabetes mellitus (T2DM), metabolic syndrome, and cardiovascular disorders later in life.[1,2]

The global prevalence of GDM has seen a notable rise over the past two decades, mirroring the escalating rates of obesity, sedentary lifestyles, and advanced maternal age. According to the International Diabetes Federation, approximately 14% of pregnancies worldwide are complicated by hyperglycemia, with over 80% attributed to GDM.[2-4] However, these estimates can vary substantially based on the diagnostic criteria applied, geographic region, and population characteristics. In the Middle East, including Saudi Arabia, the prevalence of GDM is reportedly higher than the global average, with studies indicating rates ranging from 12% to over 24% among pregnant women.[2,3]

Several risk factors have been consistently associated with the development of GDM. These include maternal age above 25 years, obesity or being overweight (as measured by body mass index), a family history of diabetes, a previous history of GDM, polycystic ovary syndrome (PCOS), and certain ethnic backgrounds. Parity, prior macrosomia (birth weight ≥4 kg), and sedentary behavior also increase susceptibility. In Saudi Arabia, the burden of GDM is compounded by high rates of obesity and metabolic disorders among women of reproductive age, making it a pressing concern for maternal-fetal healthcare services.[4-6]

Timely diagnosis and effective management of GDM are crucial for reducing maternal and neonatal complications. Poorly controlled GDM is linked to increased risks of preeclampsia, cesarean delivery, polyhydramnios, and perinatal morbidity, including macrosomia, neonatal hypoglycemia, and respiratory distress syndrome.[4,7] Moreover, mothers with GDM have a 7–10 times higher risk of developing T2DM within 10 years of delivery, while their offspring are at increased risk of obesity and metabolic disorders during childhood and adulthood.[7,8]

Management of GDM typically begins with lifestyle modifications, including medical nutritional therapy, physical activity, and regular glucose monitoring. If glycemic control cannot be achieved through non-pharmacological means, pharmacologic interventions such as insulin or oral hypoglycemic agents may be initiated.[5,9] Adherence to treatment and regular follow-up during and after pregnancy are key to minimizing risks and ensuring better outcomes. Nevertheless, studies have shown suboptimal follow-up practices postpartum, with a considerable proportion of women not being screened for persistent hyperglycemia or T2DM despite clear recommendations.[10]

This study aimed to assess the prevalence and associated risk factors of gestational GDM among pregnant women attending antenatal clinics in a selected healthcare facility in Saudi Arabia. Additionally, the study sought to explore clinical and behavioral factors influencing GDM diagnosis, timing of GDM diagnosis and methods of management. We also evaluated patients' adherence to GDM treatment during pregnancy, and assessed postpartum follow-up practices including physician-initiated T2DM screening and actual development of T2DM.

METHODS

Study design

This study employed a cross-sectional design.

Study place

The study was conducted in antenatal care clinics located in a selected healthcare facility in Saudi Arabia.

These clinics provide comprehensive prenatal services, including routine screening for GDM and follow-up care for pregnant women. The healthcare facility serves a diverse population of Saudi and non-Saudi residents, which enabled the inclusion of participants from varied backgrounds to enhance the generalizability of findings.

The study targeted pregnant women attending routine antenatal visits at the selected clinic during the period from August 2024 to March 2025. A total of 120 women were recruited and included in the final analysis. The sample included women with varying gestational ages and socioeconomic statuses.

Inclusion criteria

Women were eligible for inclusion in the study if they were pregnant at any gestational age, aged 18 years or older, and had undergone screening for GDM during the current pregnancy. Participants also needed to be capable of providing informed consent and willing to share information regarding their medical history and follow-up care.

Exclusion criteria

Women were excluded from the study if they had pre-existing type 1 or type 2 diabetes mellitus diagnosed before pregnancy. Additionally, those with multiple

pregnancies (e.g., twins or more), incomplete medical records, or significant cognitive or communication impairments that interfered with data collection were excluded. Women who declined to participate or withdrew their consent were also excluded from the final analysis.

Data collection

Data were collected using a pre-designed, structured data collection sheet, which included both interview-based responses and data extracted from medical records. The data sheet was developed after reviewing existing literature and validated tools, and it was piloted on a small sample to ensure clarity and comprehensiveness.

It captured information under several domains: demographic data (age, nationality, education, work status), obstetric history (gravidity, parity, mode and timing of last delivery), GDM-related information (diagnosis status, trimester of diagnosis, method of management, treatment adherence), and postpartum outcomes (follow-up, physician recommendations, and T2DM development). Trained data collectors conducted face-to-face interviews and verified responses against participants' medical records to ensure accuracy and minimize recall bias.

Collected data were entered into a password-protected Microsoft Excel spreadsheet and later imported into IBM SPSS Statistics, version 25 for statistical analysis. Descriptive statistics, including frequencies and percentages, were used to summarize categorical variables. The chi-square test (χ^2) was applied to assess associations between GDM diagnosis and potential risk factors such as age group, BMI category, occupation, trimester of diagnosis, and mode of delivery. A p-value of less than 0.05 was considered statistically significant. The data were double-checked for accuracy and completeness prior to analysis, and any discrepancies were resolved through review of source documentation. The authors obtained approval from Research and Ethics Committee of Najran Armed Force Hospital. The collected data did not include any personal identifying data and was used for research purposes only.

RESULTS

A total of 120 pregnant women participated in this study. As shown in Table 1, the overwhelming majority of respondents were Saudi nationals (97.5%). The age distribution was skewed toward younger women, with both the 18–24 and 25–34-year age groups each comprising 50 women (41.7%).

Regarding educational attainment, most participants held a university degree or higher qualification, totaling 83 (69.2%), followed by 24 women (20%) who had completed secondary education. Nearly half of the respondents were unemployed (n=59; 49.2%), while 45 women (37.5%) were students and 16 women (13.3%) were employed at the time of the study. In terms of BMI categories, the majority of participants were within the normal weight range (n=68; 56.7%). Overweight individuals constituted 22.5%, followed by underweight women at 11.7%. A relatively smaller group was classified as obese (9.2%).

Concerning the mode of delivery during the most recent childbirth, vaginal delivery was more common, reported by 76 women (63.3%). Regarding time interval since last delivery, more than half of the respondents (n=69; 57.5%) had delivered between 6 and 12 months prior to data collection. Another 21 women (17.5%) had given birth within 1–3 months, while 17 women (14.2%) reported a 3–6-month interval. A smaller proportion (n=13; 10.8%) had delivered less than a month before the survey.

Table 2 illustrates the prevalence of GDM and related clinical characteristics. Among the 120 women surveyed, 62 (51.7%) had been diagnosed with GDM, among which diagnosis was most frequently occurred in the first trimester (n=50; 41.7%). The second and third trimesters saw diagnoses in 37 (30.8%) and 33 (27.5%) women, respectively.

In terms of management strategies, dietary control was the most frequently employed intervention, used by 64 women (53.3%). Pharmacological treatment with medications was reported by 32 women (26.7%). Adherence to the prescribed treatment regimen was relatively high, with 86 women (71.7%) reporting compliance, compared to 34 (28.3%) who were non-adherent.

Follow-up care during pregnancy was reported to be adequate in the majority of cases, with 94 women (78.3%). After delivery, 95 participants (79.2%) stated that their physician had requested follow-up testing for T2DM. Regarding actual T2DM diagnosis after delivery, 26 women (21.7%) were confirmed to have developed it. A substantial portion (n=38, 31.7%) reported that they had not undergone any assessment for T2DM postpartum, while 56 women (46.7%) were not diagnosed with the condition.

Table 3 presents the association between GDM diagnosis and various sociodemographic and obstetric characteristics. Work status, was significantly associated with GDM diagnosis (p=0.011). Women who were working had the highest proportion of GDM (75%), followed by housewives (57.6%), while students had the lowest prevalence at 35.6%.

A highly significant association was found between BMI and GDM status ($p<0.001$). All underweight women (100%) were free of GDM, while 72.7% of obese women and 66.2% of those with normal BMI were diagnosed with GDM. Other factors, such as Nationality, age, educational level and mode of delivery did not show any

statistically significant association with GDM (p>0.05). Table 4 explores the relationship between GDM diagnosis and various aspects of GDM history and management. The trimester during which GDM was diagnosed showed a statistically significant association with overall GDM status (p=0.003). The highest prevalence of GDM was found in women diagnosed during the second trimester (70.3%), followed by those diagnosed in the third trimester (57.6%). In addition, post-delivery diagnosis of T2DM showed a significant relationship with GDM diagnosis (p=0.004).

Of the women who were eventually diagnosed with T2DM after delivery, 67.9% had previously had GDM. In contrast, 65.4% of those who were later diagnosed with T2DM did not have prior GDM.

Table 1: Characters and demographic factors of respondents (n=120).

Parameter		Frequency (%)
Nationality	Saudi	117 (97.5)
	Non-Saudi	3 (2.5)
Age (in years)	18-24	50 (41.7)
	25-34	50 (41.7)
	35-44	17 (14.2)
	More than 44	3 (2.5)
Education	Secondary education	24 (20)
	University or higher	83 (69.2)
	Intermediate education	13 (10.8)
Work status	Unemployed	59 (49.2)
	Student	45 (37.5)
	Working	16 (13.3)
BMI Category	Underweight	14 (11.7)
	Normal	68 (56.7)
	Overweight	27 (22.5)
	Obese	11 (9.2)
Mode of last delivery	Vaginal	76 (63.3)
	C-section	44 (36.7)
Months since last delivery	< 1	13 (10.8)
	1 - 3	21 (17.5)
	3 - 6	17 (14.2)
	6 - 12	69 (57.5)

Table 2: prevalence of GDM and history related to GDM diagnosis (n=120).

Parameter		Frequency (%)
Diagnosed with GDM	No	58 (48.3)
	Yes	62 (51.7)
Diagnosis trimester	First	50 (41.7)
	Second	37 (30.8)
	Third	33 (27.5)
Management plan	Medication	32 (26.7)
	Dietary control	64 (53.3)
	None	24 (20)
Adherence to treatment	No	34 (28.3)
	Yes	86 (71.7)
GDM was controlled and followed up on during pregnancy	No	26 (21.7)
	Yes	94 (78.3)
Physician requested T2DM tests after delivery	No	25 (20.8)
	Yes	95 (79.2)
T2DM diagnosis after delivery	No	56 (46.7)
	Not assessed	38 (31.7)
	Yes	26 (21.7)

Table 3: diagnosis of GDM in association with characters and demographic factors of respondents (n=120).

Parameter		GDM Diagnosis		X^2	P value
		No (%)	Yes (%)		
Nationality	Saudi	58 (49.6)	59 (50.4)	2.9	0.090
	Non-Saudi	0 (0)	3 (100)		
Age (in years)	18-25	23 (46)	27 (54)	4.7	0.192
	26-35	26 (52)	24 (48)		
	36-45	6 (35.3)	11 (64.7)		
	More than 45	3 (100)	0 (0)		
Educational level	Secondary education	14 (58.3)	10 (41.7)	1.5	0.466
	University or more	39 (47)	44 (53)		
	Intermediate education	5 (38.5)	8 (61.5)		
Work status	Housewife	25 (42.4)	34 (57.6)	9	0.011
	Student	29 (64.4)	16 (35.6)		
	Working	4 (25)	12 (75)		
BMI Category	Underweight	14 (100)	0 (0)	26.3	0.000
	Normal	23 (33.8)	45 (66.2)		
	Overweight	18 (66.7)	9 (33.3)		
	Obese	3 (27.3)	8 (72.7)		
Mode of last delivery	Vaginal	32 (42.1)	44 (57.9)	3.2	0.073
	C-section	26 (59.1)	18 (40.9)		

Table 4: diagnosis of GDM in association with history related to GDM diagnosis (n=120).

Parameter		GDM Diagnosis		X^2	P value
		No (%)	Yes (%)		
Diagnosis trimester	First	33 (66)	17 (34)	11.8	0.003
	Second	11 (29.7)	26 (70.3)		
	Third	14 (42.4)	19 (57.6)		
T2DM diagnosis after delivery	No	18 (32.1)	38 (67.9)	11.2	0.004
	Not assessed	23 (60.5)	15 (39.5)		
	Yes	17 (65.4)	9 (34.6)		

DISCUSSION

GDM is a significant public health concern characterized by glucose intolerance first recognized during pregnancy.[1] It poses risks to both maternal and fetal health, including increased chances of developing T2DM postpartum, preeclampsia, macrosomia, and the necessity for cesarean deliveries.[1,3] Understanding the prevalence and associated risk factors of GDM is crucial for developing effective prevention and management strategies, particularly in regions like Saudi Arabia, where lifestyle and demographic transitions may influence health outcomes.

In this cross-sectional study involving 120 pregnant women, we found a GDM prevalence of 51.7%. Notably, GDM diagnosis was most frequent during the first trimester (41.7%), followed by the second (30.8%) and third trimesters (27.5%). Management strategies varied, with dietary control being the most common (53.3%), followed by medication (26.7%), while 20% of the women reported no specific management plan. Adherence to treatment was reported by 71.7% of participants, and 78.3% indicated that their GDM was adequately controlled and followed up during pregnancy. Postpartum, 79.2% reported that their physicians recommended T2DM screening, and 21.7% were subsequently diagnosed with T2DM.

Our observed GDM prevalence of 51.7% is notably higher than figures reported in other studies within Saudi Arabia. For instance, Alsaedi et al reported a GDM prevalence of 15% among pregnant women attending National Guard primary health care centers in Jeddah.11 The higher prevalence in our study could be attributed to differences in diagnostic criteria, study populations, or regional variations within Saudi Arabia. Additionally, the small sample size in our study may have influenced the prevalence rate.

Employed women exhibited a higher prevalence of GDM (75%) compared to housewives (57.6%) and students (35.6%), with a statistically significant association (p=0.011). This finding contrasts with some studies

suggesting that sedentary lifestyles, often associated with unemployment, may increase GDM risk. However, it aligns with research indicating that occupational stress and irregular working hours can contribute to metabolic disturbances leading to GDM.[12,13]

A significant association was observed between BMI and GDM status (p <0.001). Obese women had the highest GDM prevalence (72.7%), followed by those with normal BMI (66.2%). Interestingly, all underweight participants were GDM-free, and overweight women had a lower prevalence (33.3%). These results underscore the complex relationship between BMI and GDM, suggesting that while obesity is a known risk factor, other elements such as fat distribution and metabolic health also play critical roles. This complexity is echoed in recent discussions advocating for diagnostic criteria beyond BMI, incorporating measures like waist circumference to better assess obesity-related health risks.[12,14,15]

The trimester during which GDM was diagnosed showed a significant association with overall GDM status (p=0.003). Women diagnosed in the second trimester had the highest prevalence (70.3%), followed by the third (57.6%) and first trimesters (34%). This pattern may reflect the progressive nature of insulin resistance during pregnancy, emphasizing the need for continuous monitoring throughout gestation.[12,14]

Among women diagnosed with T2DM postpartum, 67.9% had a prior GDM diagnosis, highlighting the well-documented progression from GDM to T2DM. This underscores the importance of postpartum screening and interventions to mitigate long-term metabolic risks.[3,12]

Dietary control was the predominant management strategy (53.3%), aligning with recommendations advocating lifestyle modifications as first-line interventions for GDM. Medication was utilized by 26.7% of participants, reflecting cases where glycemic targets were not met through lifestyle changes alone. Notably, 20% reported no specific management plan, raising concerns about potential gaps in care. Encouragingly, 71.7% adhered to their treatment regimens, and 78.3% reported adequate control and follow-up during pregnancy. These adherence rates are comparable to findings in other studies, suggesting a generally positive engagement with GDM management protocols.[14,16,17]

The high prevalence of GDM observed necessitates a re-evaluation of current screening and management practices in Saudi Arabia. Universal screening, as recommended by the International Association of Diabetes and Pregnancy Study Groups, may be warranted to ensure early detection and intervention. Additionally, targeted educational programs emphasizing the importance of preconception care, healthy weight maintenance, and lifestyle modifications could help reduce GDM incidence. Given the significant association between short interpregnancy intervals and GDM, counseling on optimal birth spacing should be integrated into maternal health services.

CONCLUSION

GDM presents a significant health challenge among pregnant women in Saudi Arabia, with a notably high prevalence observed in this study. Factors such as employment status and BMI are significantly associated with increased GDM risk. Effective management strategies, including dietary interventions and medication, coupled with high adherence rates, are crucial for mitigating adverse outcomes. These findings underscore the need for enhanced screening protocols, targeted educational initiatives, and comprehensive postpartum care to address the immediate and long-term health implications of GDM.

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