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Assessment of Knowledge and Practices Related to Gestational Diabetes Mellitus Among Pregnant Women in Al-Hilla City, Iraq

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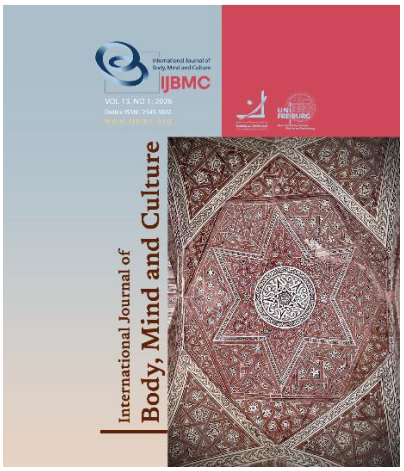

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ABSTRACT

Objective: To assess pregnant women's knowledge and practices regarding gestational diabetes mellitus (GDM), examine associations with demographic characteristics, and identify key sources of GDM information in Al-Hilla City, Iraq.

Methods and Materials: A facility-based cross-sectional study with analytic components was conducted in Primary Health Care Centers in Al-Hilla City (November 2024–February 2025). A total of 345 pregnant women (18–45 years) were recruited after informed consent. Data were collected using a validated interviewer-administered questionnaire covering sociodemographic characteristics, GDM knowledge (Yes/No/Don't know), practices (3-point Likert scale), and information sources. Knowledge and practice scores were computed and classified using mean cut-offs. Data were analyzed using IBM SPSS (v25); chi-square tested associations, and Spearman correlation assessed the relationship between knowledge and practice ($p \leq 0.05$).

Findings: Most participants were aged 21–30 years (60.6%), urban residents (86.7%), and housewives (70.1%). Based on scoring criteria, 71.6% demonstrated adequate knowledge and 88.4% demonstrated adequate practices regarding GDM. Knowledge scores were positively correlated with practice scores ($r=0.139$, $p<0.05$). Major information sources reported by participants were family/friends and health-related sources (health institutions/health workers).

Conclusion: Pregnant women attending PHCCs in Al-Hilla generally showed adequate knowledge and practices regarding GDM, with a modest but significant knowledge–practice relationship. Strengthening structured, facility-based education and integrating GDM messages into local health-promotion programs are recommended.

Keywords: gestational diabetes mellitus, knowledge, practices, pregnant women, primary health care centers.

Introduction

According to the World Health Organization (WHO), Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces (Organization, 2024). Diabetes Mellitus (DM), is a chronic, progressive metabolic disease caused by deficiencies in either insulin action or secretion, or both (Jazli et al., 2021). DM has several categories, including type 1, type 2, maturity-onset diabetes of the young (MODY), gestational diabetes, neonatal diabetes, and secondary causes due to endocrinopathies, steroid use, etc (Dissassa et al., 2023). Proper diagnostic groups of hyperglycemic patients to facilitate personalized therapy (Alduayji & Selim, 2023). Gestational diabetes is a condition in which glucose intolerance first appears during pregnancy (Maghalian et al., 2025). Gestational diabetes is a serious medical condition that has effects on both mother and fetus, and it is important to establish criteria for diagnosis and screening, especially for high-risk groups, early on (Sandu et al., 2021). As GDM is common worldwide, healthcare providers pay attention while screening and managing pregnant women to ensure good outcomes for both mother and child (Wang et al., 2022). Global estimation and comparison of the prevalence of GDM is difficult due to a large variation in the diagnostic criteria and screening strategies used to identify women with GDM (Siuluta et al., 2024). One of the most prevalent pregnancy complications is diabetes, which affects 7–10% of pregnancies globally, depending on risk factors, demographics, and diagnostic standards. Abnormalities in the placenta's growth and function may affect the fetus's outcomes because it is necessary for maintaining embryonic growth (Ramadhan & Zangana, 2022). Increased insulin resistance during a typical pregnancy serves as an adaptation to improve the flow of nutrients from the mother to the fetus and satisfy the growing fetus's nutritional needs, especially in relation to glucose requirements. However, about one in six pregnancies worldwide is affected by the inability of the mother's metabolism to maintain normoglycemia, with gestational diabetes mellitus (GDM) being the outcome of both insulin resistance and inadequate insulin production. Byrne et al., (2025) Common symptoms include excessive thirst, frequent urination, blurred vision, fatigue, and unintended weight loss. Diabetes can cause serious side effects such as neuropathy, renal failure, cardiovascular disease, and visual loss if left untreated (Chu & Godfrey, 2021). Gestational diabetes mellitus (GDM) Screening is a crucial step that is usually performed between 24 and 28 weeks of gestation using an oral glucose tolerance test (OGTT) (Baxtiyarovich, 2025). Mothers with GDM are at risk of developing gestational hypertension, pre-eclampsia [Preeclampsia overall included both mild and severe preeclampsia as well as diagnostic codes involving HELLP (hemolysis, elevated liver enzymes, and low platelets) syndrome and unspecified preeclampsia (Saad et al., 2025). and termination of pregnancy via Caesarean section. In addition, GDM increases the risk of complications, including obesity, cardiovascular disease, and impaired carbohydrate metabolism, leading to the development of type 2 diabetes (T2DM) in both the mother and infant (Valgeirsdóttir et al., 2022). Neonatal complications including hypoglycemia, hyperbilirubinemia, hypocalcemia, respiratory distress syndrome, polycythemia, and fetal loss. Long-term GDM patients have a 7-fold increased risk of type 2 diabetes mellitus (T2DM). Offspring women with a history of GDM are also at increased long-term risk of developing metabolic diseases such as T2DM, obesity, and metabolic syndrome (Modzelewski et al., 2022). Lifestyle changes, including diet, weight management, exercise, and are the first line of treatment for women with gestational diabetes mellitus and are an important adjunct to medication for pre-pregnancy diabetes and should be initiated immediately after diagnosis (Madan et al., 2023).

Knowledge: Awareness of GDM among antenatal women, and Practice**:** The lifestyle behaviors antenatal women practice to prevent GDM (Sheeza, 2022). Participants who heard or knew someone with gestational diabetes and those who received care in government facilities were more likely to have demonstrated excellent knowledge. Awareness campaigns are recommended to improve the level of knowledge about this disease, its treatment, risk factors, and complication (Zhang & Yuan, 2023).

Methods and Materials

Study Design

the Design Study A descriptive cross-sectional study with some analytic elements was carried out. The study

was conducted in AL-Hilla City, the center of Babel Governorate during the period between November 2024 and February 2025.

Regarding the study population, for the quantitative component, 345 pregnant women meeting the inclusion criteria were sampled and interviewed after obtaining written informed consent. Pregnant women of reproductive age group that could give written consent (aged 18–45 years) of any gestational age were eligible for participation. The participants were recruited by convenience sampling, because they were interviewed as they reported to the facility for an Primary Health Care Centers(PHCCs) . However, pregnant women who were not willing to be interviewed were respected and excluded from our study.

Sampling design

Data were collected using a multistage sample random sample design.

Sample size

The sample size was calculated by using the following formula used in medical studies (Daniel & Cross, 2018; Pourhoseingholi et al., 2013). "n" is the sample size and "Z" is the statistic for a level of confidence (1.96 for 95% confidence level), "P" is the expected prevalence or proportion and "d" Precision. After adjusting for the response of 15 %, 345 were considered as the sample size : $n = Z^2 P(1-P)/d^2$.

Data collection

For the quantitative component pregnant women were asked questions using face-to-face interviewer-administered standardized questionnaires. The questionnaires were designed by the principal investigator after reviewing various literature. For the pregnant women interview, the first part of the questionnaire covered the general information of the pregnant women. General information included participant ID, interviewer name, date of survey, (PHCCs) name, area name and participant name.

The second part covered the socio-demographic information including age, gestational age, parity, highest level of education, source of income, having heard about diabetes mellitus, and family history of diabetes mellitus. The third part assessed the past medical history of the clients, while the fourth part assessed the level of knowledge pregnant women had regarding GDM. Furthermore, pregnant women were asked about GDM risk factors, signs and symptoms, control and management, and complications. Respondents answered "Yes" "No" or "I don't Know". The fifth part covered the practices regarding GDM. A three-point Likert scale was used to assess practices (i.e., 3 = frequent, 2 = not sure, and 1= less frequent) (Khan et al., 2013). The seventh part assessed the experiences of pregnant women regarding GDM, most especially, the common GDM information source. The questionnaire was pretested on 30 pregnant women to clarify the importance of various components, assess the suitability of the content, and establish the appropriate flow of questions.

For the analytical component of the cross-sectional study, the mean scores of GDM KP were calculated (Khan et al., 2013). To calculate the mean score of knowledge from respondents, those who answered "Yes" were considered as correctly answered; "No" and "I don't know" were considered as incorrectly answered. Those who scored the mean and above were classified as knowledgeable, while those who scored below the mean score of knowledge questions were classified as not knowledgeable (Khan et al., 2013). Furthermore, a three-point Likert scale was used to measure the practice levels. All pregnant women's practice answers were computed to obtain a total score and the mean score was calculated. Pregnant women who scored the mean and above were considered to have good practices; while those who scored below the mean had poor poor practices (Khan et al., 2013).

Ethics

Official approvals were obtained from the College, Babylon Health Department, Primary Health Centers and study participants.

Analysis

Data analysis was carried out using the available statistical package of IBM SPSS-25 (IBM Statistical Packages for Social Sciences- version 25, Chicago, IL, USA). The significance of differences in various percentages was tested using the Pearson Chi-square test (c2-test). Statistical significance was considered whenever the P value was equal to or less than 0.05. The relationship between knowledge and practices was examined using Spearman correlation analysis. The correlation was significant at the 0.05 level (2-tailed).

Findings and Results

The results of this study were based on the analysis of data from 345 pregnant women attending primary health care centers (PHCCs). The majority of the participants (60.6%) were aged between 21 and 30 years, while about one-fifth of the sample was aged 20 or younger. The remaining age groups accounted for less than 20% each. Regarding education level, the study found that more than half of the participants had completed secondary education, and 21.4% had attended college, with each of the other education levels representing less than 10% of the sample. In terms of occupation, most participants (70.1%) were housewives, and over a quarter were government employees. Most of the women (86.7%) lived in urban areas, while 13.3% resided in rural areas. With respect to economic status, about half of the families were categorized as having weak economic status, while 12.8% had a good and sufficient status. More than half of the families had five or more members, while the other family size categories were each less than a quarter. The majority of participants (38.8%) were experiencing their first pregnancy, and more than a quarter were on their second pregnancy, while the other categories had less than 15% each. Regarding the number of children, most participants (38.3%) did not have any children, more than a quarter had one child, and the other groups had fewer than 15% each. In terms of pregnancy stage, 45.2% were in their second trimester and 37.1% in their third trimester, while less than a quarter were in their first trimester. Concerning chronic diseases, more than 90% of the pregnant women reported not having any chronic conditions, while less than 10% had a chronic disease, as presented in Table 1.

Table 1

Distribution of studied sample according to demographic characteristics among pregnant women.

Variables		No.	%
Age groups	**<=20**	73	21.2
	21-30	209	60.6
	31-40	57	16.5
	> 40	6	1.7
Education Level	**Illiterate**	23	6.7
	Primary	17	4.9
	Secondary	192	55.7
	Technical Diploma_ Institute	26	7.5
	college	74	21.4
	Higher degree	13	3.8
Occupation Status	**House wife**	242	70.1
	Government Employee	98	28.4
	Non-Government Employee	5	1.4
Residency	**Urban**	299	86.7
	Rural	46	13.3
Economic Status	**Insufficient**	169	49.0
	Moderately sufficient	132	38.3
	Good and sufficient	44	12.8
Member of family	**two**	47	13.6
	three	76	22.0
	four	42	12.2
	fife and more	180	52.2
Number of pregnancy	**first**	134	38.8
	second	99	28.7
	third	49	14.2
	fourth	43	12.5
	fife and more	20	5.8
Number of children	**No child**	134	38.8
	one	101	29.3
	two	48	13.9
	three	42	12.3
	four	9	2.6
	fife and more	11	3.2
Age of pregnancy	**first trimester**	61	17.7
	second trimester	156	45.2
	third trimester	128	37.1
Chronic disease	**Yes**	24	7.0
	No	321	93.0
	Total	345	100.0

The results of this study were based on the analysis of data from 345 pregnant women attending primary health care centers (PHCCs), The Majority of the studied sample (60.6%) was the age group 21-30 years, Regarding Education Level of the study results showed that more than half of the sample had secondary education. Regarding Occupation Status, most of the sample (70.1%) were housewives and more than one quarter were Government Employees. Regarding residence, most cases (86.7%) were from urban areas, and 13.3% lived in rural areas. About half of the families had weak economic status; most cases (38.8%) had first pregnancies. Regarding the number of children, the majority of the cases (38.3%) didn't have a child, while more than a quarter had one child and the others had less than (15%) of children, Regarding the age of pregnancy was the second trimester (45.2%) and concerning the subjects chronic disease the majority of pregnant women's more than (90.0%) don't have chronic disease and less than (10.0 %) had chronic disease.

Regarding the studied sample's knowledge of diabetes mellitus the majority of pregnant women more than (90%) represent monitoring blood sugar levels throughout pregnancy is essential for pregnant women. Regarding knowledge of the studied sample regarding signs and symptoms regarding diabetic mellitus, about a quarter of women represented nausea and dry mouth as the main signs and symptoms, concerning Prevention measures (32.5%) of the studied sample answered gestational diabetes can be treated with drug therapy (insulin), Regarding complication gestational diabetes about quarter of women's represented increase the risk of neonatal death and gestational diabetes increase the risk of stillbirth, while less than (10.0%) represented having gestational diabetes increases the risk of preeclampsia and gestational diabetes increases the risk of cesarean delivery, as can be seen in Table 2.

Table 2

Distribution of the studied sample according to knowledge about diabetes mellitus

Questions	Yes		Don't know		No	
	No.	%	No.	%	No.	%
knowledge questions						
Monitoring blood sugar levels throughout pregnancy is essential for pregnant women.	320	92.8	20	5.8	5	1.4
women with gestational diabetes should have their blood sugar tested regularly.	276	80.0	64	18.6	5	1.4
Women with gestational diabetes should follow a healthy diet.	256	74.2	81	23.5	8	2.3
Signs and symptoms						
Nausea	89	25.8	79	22.9	177	51.3
Dry mouth	81	23.5	76	22.0	188	54.5
Blurred vision	49	14.2	148	42.9	148	42.9
Extreme thirst	24	7.0	69	20.0	252	73.0
Fatigue	22	6.4	128	37.1	195	56.5
Frequent urination	21	6.1	44	74.2	280	81.2
Risk factors for gestational diabetes in pregnant women						
Being overweight or obese before pregnancy.	280	81.2	44	12.8	21	6.1
Having more than four previous births.	252	73.0	69	20.0	24	7.0
Less than two years between pregnancies.	195	56.5	128	37.1	22	6.4
Being over 35 years old.	188	54.5	76	22.0	81	23.5
Having a family history of chronic diabetes.	177	51.3	79	22.9	89	25.8
Not adhering to a healthy diet.	148	42.9	148	42.9	49	14.2
Prevention measures						
Gestational diabetes can be treated with drug therapy (insulin).	112	32.5	109	31.6	124	35.9
If you feel any symptoms of gestational diabetes, you should consult the health authorities.	8	2.3	14	4.1	323	93.6
Women with gestational diabetes should give birth in hospitals.	5	1.4	50	14.5	290	84.1
complication						
Gestational diabetes increases the risk of neonatal death.	94	27.2	181	92.8	70	20.3
Gestational diabetes increases the risk of stillbirth.	82	23.8	165	47.8	98	28.4
Gestational diabetes increases the risk of birth defects in newborns.	75	21.7	167	80.0	103	29.9
Gestational diabetes increases the risk of low birth weight.	55	15.9	177	51.3	113	32.8
Gestational diabetes increases the risk of premature birth.	51	14.8	175	50.7	119	34.5
Gestational diabetes increases the risk of having a high birth weight baby.	39	11.3	167	48.4	139	40.3

Having gestational diabetes increases the risk of preeclampsia.	28	8.1	219	63.5	98	28.4
Gestational diabetes increases the risk of cesarean delivery.	25	7.2	150	43.5	170	49.3

Figure 1 shows that more than (85.0%) were Family and Friends and Health Institutions as sources of information among pregnant women, while about (20.0%) of the sample curricula, books, and newspapers were the sources of information.

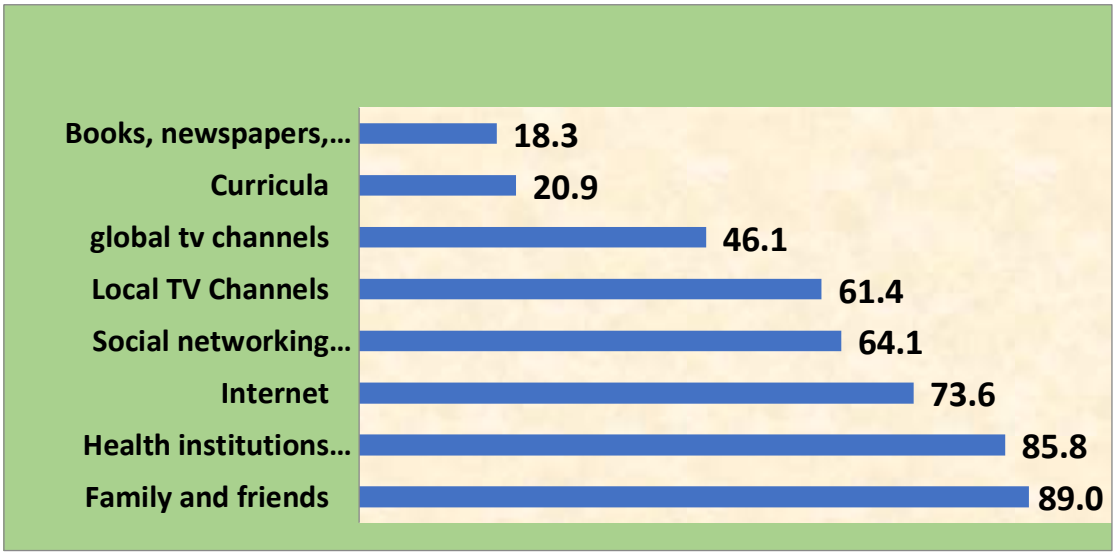

Figure 1.
Source Of Knowledge For Pregnant Women About Gestational Diabetes

Sources of Information on Diabetes Mellitus Among Pregnant Women In examining the relationship between the demographic characteristics of the studied sample and their knowledge about diabetes mellitus, statistically significant associations were found with the following factors: age groups, education level, economic status, occupation status, and age at pregnancy, all with a p-value of less than 0.05. However, no statistically significant association was found with Body Mass Index (BMI).

Table 3

Relationship Between Demographic Characteristics and Knowledge of Diabetes Mellitus in the Studied Sample

Demographic Characteristics		Knowledge						p.value
		Bad		Fair		Good		
		No.	%	No.	%	No.	%	
Age groups	≤ 20	37	10.7	36	10.4	0	0.0	0.000
	21- 30	50	14.5	122	35.4	37	10.7	
	31- 40	10	2.9	38	11.0	9	2.6	
	> 40	1	0.3	5	1.4	0	0.0	
Education Level	Illiterate	12	3.5	7	2.0	4	1.2	0.000
	Primary	6	1.7	14	4.1	0	0.0	
	Secondary	71	20.6	111	32.2	10	2.9	
	Technical Diploma	4	1.2	20	5.8	9	2.6	
	College	16	4.6	47	13.6	24	7.0	
	Higher degree	1	0.3	9	2.6	3	0.9	
Economic Status	Insufficient	57	16.5	104	30.1	8	2.3	0.000
	Moderately sufficient	31	9.0	75	21.7	26	7.5	
	Good and sufficient	10	2.9	22	6.4	12	3.5	
Occupation Status	House wife	80	23.2	142	41.2	20	5.8	0.000
	Government Employee	17	4.9	55	15.9	26	7.5	

	Non-Government Employee	1	0.3	4	1.2	0	0.0	
Age of pregnancy	First trimester	27	7.8	25	7.2	9	2.6	0.004*
	Second trimester	47	13.6	92	26.7	17	4.9	
	Third trimester	24	7.0	84	24.3	20	5.8	
BMI	low Weight	3	0.9	7	2.0	1	0.3	0.668
	Normal Weight	37	10.7	82	23.8	17	4.9	
	Over Weight	35	10.1	72	20.9	23	6.7	
	obese 1	16	4.6	29	8.4	2	0.6	
	obese 2	6	1.7	10	2.9	2	0.6	
	obese 3	1	0.3	1	0.3	1	0.3	

In a study on diabetes mellitus practices among pregnant women, it was found that the majority (90.1%) followed doctors' recommendations for a healthy diet. Approximately three-quarters of the participants regularly checked their blood sugar levels, and more than half visited healthcare institutions consistently to manage their blood sugar. Furthermore, over one-third of the pregnant women engaged in physical activities, such as walking, regardless of their family history of diabetes. However, less than a quarter of the participants responded to other survey questions. When examining the relationship between the demographic characteristics of the sample and their practices regarding diabetes mellitus, no statistically significant associations were identified with age groups, education level, economic status, occupation status, pregnancy age, or BMI, as all p-values were greater than 0.05 (Table 4).

Table 4

Relationship Between Demographic Characteristics and Diabetes Mellitus Practices Among the Studied Sample.

Demographic Characteristics		**Assessment Practices**						**p.value**
		Bad		Fair		Good		
		No.	%	No.	%	No.	%	
Age groups	≤ 20	11	3.2	32	9.3	30	8.7	0.917
	21-30	23	6.7	102	29.6	84	24.3	
	31- 40	6	1.7	28	8.1	23	6.7	
	> 40	0	0.0	3	0.9	3	0.9	
Education Level	Illiterate	12	3.5	7	2.0	4	1.2	0.451
	Primary	3	0.9	5	1.4	12	3.5	
	Secondary	22	6.4	93	27.0	77	22.3	
	Technical Diploma	3	0.9	15	4.3	15	4.3	
	College	12	3.5	45	13.0	30	8.7	
	Higher Degree	0	0.0	7	2.0	6	1.7	
Economic Status	Insufficient	21	6.1	76	22.0	72	20.9	0.687
	Moderately Sufficient	14	4.1	64	18.6	54	15.7	
	Good And Sufficient	5	1.4	25	7.2	14	4.1	0.535
Occupation Status	House Wife	31	9.0	116	33.6	95	27.5	
	Government Employee	8	2.3	48	13.9	42	12.2	
	Non-Government Employee	1	0.3	1	0.3	3	0.9	
Age Of Pregnancy	First trimester	4	1.2	31	9.0	26	7.5	0.361
	Second trimester	24	7.0	72	20.9	60	17.4	
	Third trimester	12	3.5	62	18.0	54	15.7	
BMI	low Weight	1	0.3	4	1.2	6	1.7	0.862
	Normal Weight	17	4.9	62	18.0	57	16.5	
	Over Weight	18	5.2	63	18.3	49	14.2	
	obese 1	3	0.9	23	6.7	21	6.1	
	obese 2	1	0.3	11	3.2	6	1.7	
	obese 3	0	0.0	2	0.6	1	0.3	

Table 5 shows an overall assessment of the studied sample regarding gestational diabetes mellitus according to Knowledge and Practices (71.6%) and (88.4%), respectively.

Table 5

Overall Assessment of the studied sample regarding gestational diabetes mellitus according to Knowledge and Practices

Assessment	Bad		Fair		Good	
	No.	%	No.	%	No.	%
Knowledge	98	28.4	201	58.3	46	13.3
Practices	40	11.6	165	47.8	140	40.6

Discussion and Conclusion

The aim of this study was to assess the knowledge and practices of pregnant women diagnosed with gestational diabetes mellitus (GDM). To the best of our knowledge, this is the first study conducted in Al-Hilla City that evaluates the understanding and behaviors of women with GDM. Our findings offer new insights that could guide the development and implementation of targeted interventions to enhance the self-management of GDM among pregnant women. Increasing evidence suggests that GDM care can be improved and its complications minimized through education and awareness campaigns conducted at Primary Health Centers, coupled with greater commitment from patients to their own well-being. Our study included 345 participants, most of whom were aged between 20 and 40 years, which is consistent with findings from a study in Karachi, Pakistan (Morsy et al., 2024), This similarity may be attributed to the demographic composition of the country, along with various factors such as social customs and cultural differences.

The traditions of the environment in which the participants live significantly influence their choices. In many cases, girls marry at an early age, resulting in early pregnancies. Conversely, the older age group in our study aligns with findings from research conducted in Saudi Arabia and at the Hangzhou Women's Hospital in China (Sattar et al., 2025; Wafa et al., 2023). This suggests that some individuals prefer to marry later due to reasons such as work, education, health, or personal choices, as well as various economic, social, and cultural factors. Our study revealed that more than half of the participants had completed secondary education, which is consistent with findings from a study in Mufulira, Zambia (Tan et al., 2023). Due to social and economic conditions, most girls are not employed, and the prevailing environment and traditions contribute to early marriage, leading to early pregnancies and school dropouts. Regarding occupation, the majority of participants were housewives, which is in agreement with studies conducted in Masjed-Soleyman, Iran and Lebanon (Khanpaye et al., 2019; Yizukanji & Mwanakasale, 2018). Social and cultural factors play a significant role in this, as many families discourage girls from working, prioritizing early marriage and family responsibilities. Economic conditions further exacerbate the situation by failing to provide suitable job opportunities for women or offering them low-paying jobs that do not meet their financial needs. Additionally, there is a lack of support for women, such as childcare facilities. Concerning the timing of pregnancies, most participants reported being in their second trimester. This contrasts with findings from a study in Lebanon (Khanpaye et al., 2019), where early pregnancies were more common. The increase in visits for check-ups during the second trimester allows for better monitoring of pregnancy development, making it an opportune time to evaluate health risks such as gestational diabetes and overall stability compared to the first trimester.

More than half of the participants agree that women with gestational diabetes should follow a healthy diet. This finding aligns with studies conducted in Lebanon and at Hangzhou Women's Hospital in China (Wafa et al., 2023). The high level of awareness regarding the dangers of gestational diabetes and its effects can be attributed to the role of healthcare workers and the availability of various educational resources. In terms of recognizing the signs and symptoms of gestational diabetes, this study differs from findings in Lebanon (Khanpaye et al., 2019), as awareness sources can vary based on age and education level. Additionally, gestational diabetes is known to increase the risk of neonatal death. However, the perception that it raises the likelihood of cesarean delivery received less agreement, which contrasts with the studies in Lebanon and Warri, Delta State, Nigeria (Ibrahim et al., 2023; Khanpaye et al., 2019). This discrepancy may depend on

the participants' understanding and awareness of these risks, personal experiences or the experiences of those around them, and the varying quality of information sources available, which can be influenced by access to healthcare centers and the professionalism of the staff. Regarding the distribution of the studied sample according to sources of information, more than half of the participants identified family, friends, and health institutions as their main sources of knowledge. In contrast, less than a quarter of the sample relied on curricula, books, and newspapers. This finding is consistent with a study conducted in Warri, Delta State, Nigeria (Ibrahim et al., 2023). Additionally, a study at Kinango District Hospital in Kwale County, Kenya (Offomiyor & Rehal, 2023), found that the health facility is more effective. In contrast, studies in Masjed-Soleyman City in southwestern Iran indicated a greater reliance on radio and television for information (Yizukanji & Mwanakasale, 2018). The differences in the sources of knowledge can be attributed to variations in the age of the participants, as well as differences in educational background, cultural context, living conditions, interests, and personal preferences.

According to our study, pregnant women have a strong understanding and high levels of practice regarding gestational diabetes mellitus (GDM). This finding is consistent with a study conducted in Masjed-Soleyman city, located in southwest Iran (Yizukanji & Mwanakasale, 2018), which also reported good knowledge and performance relating to GDM. Similar results were observed in various locations, such as Tabuk City in Saudi Arabia and the North Shewa zone in the Oromia region of Ethiopia, where participants demonstrated adequate knowledge about GDM (Khanpaye et al., 2019; Zhang & Yuan, 2023). Additionally, a study in the Gombak area of Selangor indicated a high level of knowledge and practice concerning GDM (Ibrahim et al., 2023). The similarities in these findings can be attributed to the cultural proximity among these countries, which may include shared customs, knowledge, and attitudes, as well as similarities in standard of living and culture. Furthermore, the close-knit nature of families and friends, along with comparable economic conditions, may also play a role. However, there are noticeable differences when compared to other regions, such as Tabuk City in Saudi Arabia (Sattar et al., 2025), In addition to economic conditions, there are significant differences in knowledge and practices regarding Gestational Diabetes Mellitus (GDM) among various countries. For instance, compared to areas like Tabuk City in Saudi Arabia and Lebanon (Khanpaye et al., 2019; Sattar et al., 2025), there is a notable lack of understanding and inadequate practices related to GDM. In Karachi, Pakistan, research indicates that there is considerable room for improvement in both knowledge and practices among participants (Morsy et al., 2024). A study conducted at Hangzhou Women's Hospital in China found that awareness and practice levels concerning GDM were moderate (Wafa et al., 2023). Conversely, research from Warri, Delta State in Nigeria revealed a low level of awareness about GDM (Ibrahim et al., 2023). At Kinango District Hospital in Kwale County, Kenya, more than half of the participants demonstrated a lack of knowledge about GDM (Offomiyor & Rehal, 2023), although they exhibited good practices. Similarly, a study in Mufulira Town, Zambia, indicated low knowledge levels and inadequate practices regarding GDM (Tan et al., 2023). These discrepancies can be attributed to various factors, including differences in sources of information, participant ages, educational levels, cultural backgrounds, living conditions, personal interests, and psychological support from family and friends. Additionally, the accessibility of healthcare centers and the availability of care for pregnant women play crucial roles in shaping knowledge and practices surrounding GDM.

The study in Hangzhou Women's Hospital, China, had moderate knowledge levels about GDM and moderate levels of practice (Wafa et al., 2023). The study in Warri, Delta State, Nigeria showed that the level of awareness of GDM is low (Ibrahim et al., 2023). In the study at Kinango District Hospital, located in Kwale County, Kenya more than half were not knowledgeable, had good practices regarding GDM (Offomiyor & Rehal, 2023). Mufulira Town, Zambia had a low knowledge and inadequate practices. Due to the difference in sources of knowledge, the difference in ages of the participants, the difference in educational, cultural, and living levels, interests, and personal preferences, the difference in countries, the psychological support of the pregnant woman from family and friends, the health condition, how to reach health care centers quickly or difficult to reach, and the extent of the availability of care places for pregnant

women, all of this has led to a difference in knowledge and practices.

The strength of this study lies in its focus on an area with limited existing literature. To the best of our knowledge, the knowledge, and practices (KP) regarding gestational diabetes mellitus (GDM) among pregnant women in Hillah City have not been previously examined. Furthermore, no studies have explored the factors associated with GDM KAP in this population. The findings of our study could stimulate further research and contribute to the evidence base, ultimately assisting policymakers in evaluating the effectiveness of current GDM policies in Iraq. A major limitation of our study was the inability to collect blood glucose samples due to constraints related to ethical clearance. As a result, we could not determine the prevalence of GDM in Hillah City. Additionally, this study was conducted at primary health care centers (PHCCs) in Hillah City, which means that the results may not be representative of all pregnant women in the area. Moreover, the use of convenient sampling may have introduced selection bias into our study.

Due to existing limitations, a follow-up study is needed in Hillah City to collect blood glucose data and determine the prevalence of gestational diabetes mellitus (GDM). Additionally, implementing a community-based random recruitment strategy for this follow-up study could enhance the generalizability of the results. It is also highly recommended that current healthcare workers who provide care to pregnant women during both Antenatal Care (Sandu et al.) and Postnatal Care (PNC) receive in-service training on current guidelines. Furthermore, relevant authorities should consider integrating specific GDM prevention activities into existing health promotion initiatives that target pregnant women in Hillah City

Overall, pregnant women in Hillah City displayed a high level of knowledge regarding gestational diabetes mellitus (GDM) and practiced good habits related to it. This can be attributed to daily health talks conducted by healthcare workers at the facility during both antenatal care (Sandu et al.) and postnatal care (PNC) services, as well as the indigenous knowledge shared among pregnant women. To further enhance GDM awareness, it would be beneficial to incorporate GDM information into local health promotion programs. This approach could improve knowledge and practices concerning GDM among pregnant women, contributing to its prevention and ultimately reducing the risk of non-communicable diseases such as diabetes mellitus. Additionally, the study found no statistically significant associations between demographic characteristics—such as age groups, education level, economic status, occupation, age of pregnancy, and BMI—and practices related to diabetes mellitus, with p-values exceeding 0.05. Furthermore, most pregnant women rely on family, friends, health institutions, and healthcare workers as their primary sources of information

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

References

Alduayji, M. M., & Selim, M. (2023). Risk factors of gestational diabetes mellitus among women attending an antenatal care clinic in prince sultan military medical city (PSMMC), Riyadh, kingdom of Saudi Arabia: A case-control study. *Cureus*, *15*(8). https://doi.org/10.7759/cureus.44200

Baxtiyarovich, A. R. (2025). THE RELATIONSHIP BETWEEN OBESITY AND DIABETES. *YANGI O 'ZBEKISTON, YANGI TADQIQOTLAR JURNALI*, *3*(5), 621-624.

Byrne, J., Ranaei-Zamani, N., Hutchinson, J. C., & Hillman, S. (2025). A retrospective analysis of placental histopathological findings in gestational diabetes mellitus (GDM). *Placenta*, *162*, 20-26. https://doi.org/10.1016/j.placenta.2025.02.008

Chu, A. H., & Godfrey, K. M. (2021). Gestational diabetes mellitus and developmental programming. *Annals of Nutrition and Metabolism*, *76*(Suppl. 3), 4-15. https://doi.org/10.1159/000509902

Daniel, W. W., & Cross, C. L. (2018). *Biostatistics: a foundation for analysis in the health sciences*. John Wiley & Sons.

Dissassa, H. D., Tufa, D. G., Geleta, L. A., Dabalo, Y. A., & Oyato, B. T. (2023). Knowledge on gestational diabetes mellitus and associated factors among pregnant women attending antenatal care clinics of North Shewa zone public hospitals, Oromia region, Central Ethiopia: a cross-sectional study. *BMJ open*, *13*(9), e073339. https://doi.org/10.1136/bmjopen-2023-073339

Ibrahim, R., Al-hajje, A., Khachman, D., & Zein, S. (2023). Comprehensive assessment of knowledge, attitudes, and practices, alongside predictive factors, affecting optimal management of gestational diabetes in pregnant women across multicenter sites in Lebanon. *Dr. Sulaiman Al Habib Medical Journal*, *5*(4), 138-144. https://doi.org/10.1007/s44229-023-00038-x

Jazli, N. M., Chong, M. C., & Shujuan, L. (2021). Association between Knowledge, Attitude and Practice on Gestational Diabetes Mellitus among Antenatal Women in Community Health Clinics in Selangor. *Environment-Behaviour Proceedings Journal*, *6*(18), 101-106. https://doi.org/10.21834/ebpj.v6i18.3088

Khan, R., Ali, K., & Khan, Z. (2013). Socio-demographic risk factors of gestational diabetes mellitus. *Pakistan journal of medical sciences*, *29*(3), 843. https://doi.org/10.12669/pjms.293.3629

Khanpaye, A., Madmoli, Y., Riahipour, B., Mohebifar, M., Madmoli, M., Mahmoodi, R., & Shirmardi, S. (2019). Evaluation of knowledge, attitude and performance regarding gestational diabetes mellitus in Southwest of Iran. *Journal of Pharmaceutical Research International*, *28*(4), 1-6. https://doi.org/10.9734/jpri/2019/v28i430207

Madan, S., Kurian, N., & Nagpal, N. (2023). Gestational Diabetes-An endocrinologist's perspective. *Series Endo Diab*, *5*(1), 22-24. https://doi.org/10.54178/jsedmv5i1004

Maghalian, M., Alizadeh-Dibazari, Z., & Mirghafourvand, M. (2025). Impact of fetal sex on neonatal outcomes in women with gestational diabetes mellitus: a systematic review and meta-analysis. *BMC pregnancy and childbirth*, *25*(1), 110. https://doi.org/10.1186/s12884-025-07250-7

Modzelewski, R., Stefanowicz-Rutkowska, M. M., Matuszewski, W., & Bandurska-Stankiewicz, E. M. (2022). Gestational diabetes mellitus—recent literature review. *Journal of clinical medicine*, *11*(19), 5736. https://doi.org/10.3390/jcm11195736

Morsy, S. A., Tawfik, A. M., Badayyan, S. Y., Shaikh, L. K., AzizKhan, S., Zakari, A. A., Morsy, S., Shaikh, L. K., & AzizKhan, S. Z. (2024). Assessment of the Level of Knowledge About Risk Factors, Prevention, and Treatment of Gestational Diabetes Mellitus in a Community Sample From Saudi Arabia. *Cureus*, *16*(4). https://doi.org/10.7759/cureus.58435

Offomiyor, F. A., & Rehal, S. (2023). Exploring the knowledge, attitude, and practices of healthy pregnant women towards gestational diabetes mellitus in Nigeria. *Qualitative health research*, *33*(1-2), 39-52. https://doi.org/10.1177/10497323221139105

Organization, W. H. (2024). Respiratory virus surveillance in the WHO African Region Epidemiological Week 41, October 7 to 13 2024.

Pourhoseingholi, M. A., Fazeli, Z., Ashtari, S., & Bavand-Pour, F. S. F. (2013). Mortality trends of gastrointestinal cancers in Iranian population. *Gastroenterology and hepatology from bed to bench*, *6*(Suppl 1), S52.

Ramadhan, N. N., & Zangana, J. M. S. (2022). Perinatal outcome among women with gestational diabetes mellitus. *AMJ (Advanced Medical Journal)*, *7*(2), 59-65. https://doi.org/10.56056/amj.2022.179

Saad, M. I., hussein Mansour, N., & Sharif, A. A. A. (2025). Prevalence, Risk Factors, and Complications of Gestational Diabetes Mellitus: A Study from Tobruk, Libya (2020–2024). *Bani Waleed University Journal of Humanities and Applied Sciences*, *10*(1), 350-355. https://doi.org/10.58916/jhas.v10i1.686

Sandu, C., Bica, C., Salmen, T., Stoica, R., Bohiltea, R., Gherghiceanu, F., Pacu, I., Stefan, S., Serafinceanu, C., & Stoian, A. P. (2021). Gestational diabetes-modern management and therapeutic approach. *Experimental and therapeutic medicine*, *21*(1), 81. https://doi.org/10.3892/etm.2020.9512

Sattar, S., Khan, M., Ejaz, A., Rehman, M. U., Asif, Z., Yousaf, A., ur Rehman, M., & Shaikh, A. S. (2025). CROSS-SECTIONAL STUDY ON THE PREVALENCE OF GESTATIONAL DIABETES AND ITS MANAGEMENT PRACTICES. *Insights-Journal of Life and Social Sciences*, *3*(1), 1-7. https://doi.org/10.71000/g6y5bf86

Sheeza, A. (2022). *Knowledge, attitude and practice wards management of Gestational Diabetes Mellitus (GDM) among antenatal women visiting for antenatal care at reproductive health center, Indira Gandhi Memorial Hospital* MALDIVES NATIONAL UNIVERSITY].

Siuluta, N., Sato, M., Linh, L. K., Wanjihia, V., Changoma, M. S., Huy, N. T., & Kaneko, S. (2024). Assessment of gestational diabetes mellitus knowledge, attitudes, and practices and associated factors among pregnant women at a district hospital in Coastal Kenya. *Tropical Medicine and Health*, *52*(1), 74. https://doi.org/10.1186/s41182-024-00630-3

Tan, J., Chen, L., Wu, Y., Zhu, X., & Fei, H. (2023). Knowledge, attitude and practice of patients with gestational diabetes mellitus regarding gestational diabetes mellitus: a cross-sectional study. *International Journal of General Medicine*, 4365-4376. https://doi.org/10.2147/IJGM.S423565

Valgeirsdóttir, I. R., Hanson, U., Schwarcz, E., Simmons, D., & Backman, H. (2022). Diet-treated gestational diabetes mellitus is an underestimated risk factor for adverse pregnancy outcomes: A Swedish population-based cohort study. *Nutrients*, *14*(16), 3364. https://doi.org/10.3390/nu14163364

Wafa, M. H., Ayoub, A. I., Bukhari, T. A., Bugnah, A. A. A., Alabawy, A. A. H., Alsaiari, A. H., Aljondi, H. M., Alhusseini, S. H., Alenazi, F. A., & Refai, H. M. (2023). Knowledge and attitude regarding gestational diabetes mellitus among pregnant women in Tabuk City, Saudi Arabia: an exploratory study. *Cureus*, *15*(11). https://doi.org/10.7759/cureus.48151

Wang, H., Li, N., Chivese, T., Werfalli, M., Sun, H., Yuen, L., Hoegfeldt, C. A., Powe, C. E., Immanuel, J., & Karuranga, S. (2022). IDF diabetes atlas: estimation of global and regional gestational diabetes mellitus prevalence for 2021 by international association of diabetes in pregnancy study group's criteria. *Diabetes research and clinical practice*, *183*, 109050. https://doi.org/10.1016/j.diabres.2021.109050

Yizukanji, S., & Mwanakasale, V. (2018). Knowledge, attitude and practices among women attending antenatal clinic towards gestational diabetes mellitus in Mufulira town, Zambia. *International Journal of Current Innovations in Advanced Research*, *1*(7), 1-8.

Zhang, Z., & Yuan, N. (2023). Gestational Diabetes Mellitus: Treatment Progress. *International Journal of Frontiers in Medicine*, *5*(4). https://doi.org/10.25236/IJFM.2023.050409