Knowledge, Attitude, and Practice Regarding Diabetes Mellitus among Patients with Diabetes

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Abstract

Background

Diabetes mellitus (DM) is a major global health challenge, particularly in developing countries like Iraq, where its prevalence has risen sharply due to lifestyle changes and limited access to education. Effective self-management of DM is crucial to reduce its complications, and this relies heavily on patients' knowledge, attitudes, and practices (KAP) toward the disease.

Objective

To assess the knowledge, attitudes, and practices regarding DM among diabetic patients attending hospitals in various Iraqi provinces.

Methods

A cross-sectional study was conducted from March to December 2023 in hospitals across Baghdad, Karbala, Babylon, and Salahuddin. Using a structured questionnaire, 279 diabetic patients were assessed for demographics, knowledge, attitudes, and self-care practices.

Results

Most participants were female (52.7%), the mean age was 54.22 years. The majority (67%) had average knowledge of diabetes, with significantly higher mean knowledge scores among males, urban resident, higher education, employment, and prior attending educational sessions. While 81.4% correctly defined diabetes and 63.1% knew the normal HbA1c level, only 38% reported engaging in daily physical activity. Although 83.2% adhered to medication, misconceptions were identified—such as 24% believing medication should be stopped during illness. Notably, 80.3% of respondents acknowledged the impact of diabetes on mood and behavior.

Conclusion

Despite a generally satisfactory level of knowledge among Iraqi diabetic patients, significant gaps persist in areas such as risk factor awareness, physical activity, and understanding of treatment principles. These findings underscore the need for culturally tailored educational interventions and public health strategies to enhance diabetes management and reduce associated complications.

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Abbreviations

DM: Diabetes Mellitus

T1DM: Type 1 Diabetes Mellitus

T2DM: Type 2 Diabetes Mellitus

KAP: Knowledge, Attitude, and Practice

OHD: Oral Hypoglycemic Drugs

HbA1c: Hemoglobin A1c

BMI: Body Mass Index

OGTT: Oral Glucose Tolerance Test

WHO: World Health Organization

ADA: American Diabetes Association

SPSS: Statistical Package for the Social Sciences

Introduction:

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by hyperglycemia, which can occur due to insufficient insulin production, inadequate insulin response, or a combination of both. Diabetes mellitus has two major types: type 1 diabetes (T1DM) and type 2 diabetes (T2DM). Type 1 diabetes mellitus is present in patients who have little or no endogenous insulin secretory capacity and who therefore require insulin therapy for survival. Type 2 diabetes is the most common form of DM representing more than 90 % of DM cases and is characterized by disorders of insulin secretion and insulin resistance [1-3].

Globally, diabetes mellitus is considered one of the top priorities of chronic diseases due to its prevalence and complications. Currently, more than 800 million people have diabetes mellitus. Diabetes mellitus is among the first 10 causes of death globally. It poses a major risk factor for developing cardiovascular, renal, ophthalmic, neurological and other diseases [2-4].

Diabetes mellitus is one of the fastest-growing noncommunicable diseases worldwide, threatening global public health. The alarming situation of its consistent rise is no different in Iraq. In the past few decades, several major socioeconomic changes have taken place in Iraq. Economic development has brought significant alterations in the lifestyle of the Iraqi people, such as decreased physical activity, less healthful eating habits, increased consumption of fast foods, and the dramatic increase in obesity prevalence. This has resulted in a dramatic rise in diabetes prevalence, reaching 20% within the last four decades [5-6].

Controlling blood glucose levels helps to reduce morbidity and mortality among diabetic patients, which is achieved only when patients adhere to self-management behaviors such as a healthy diet, physical activity, monitoring of blood glucose, taking medications, reducing risk factors, resolving diabetes-related problems, and healthy coping [7,8]. The management of diabetes mellitus depends broadly on patients' knowledge of their disease and their ability to self-care in their daily lives. For that reason, the most essential factor and cornerstone of DM management is patient education. Studies consistently show that improved glycemic control decreases the rate of complications and that diabetic patients who are knowledgeable about diabetes mellitus self-care have better long-term glycemic control [7,9]. However, few studies have focused on this area, and there is a paucity of knowledge, attitude, and practice (KAP) data among diabetic patients. Therefore, our study aims to assess the knowledge, attitude, and practices of diabetes care among diabetic patients.

Patients and Methods

An analytical cross-sectional study was conducted in selected hospitals across four Iraqi provinces—Baghdad, Karbala, Babylon, and Salahuddin—during the period from March 1 to December 1, 2023.

Ethical approval was obtained from the Research Ethical Committee of Al-Ameed College of Medicine prior to study initiation. Verbal informed consent was secured from all participants after providing them with a full explanation of the study objectives and procedures. Participants were

assured of the confidentiality of their responses, the voluntary nature of participation, and the anonymity of the data collected.

The study population comprised adult patients who had been diagnosed with diabetes mellitus for at least one year. Exclusion criteria included the presence of severe complications, mental health disorders, physical disabilities, or refusal to participate. A systematic random sampling approach was adopted by selecting every third patient attending internal medicine or diabetes consultation clinics at the participating hospitals. Of the 290 patients approached, 11 declined participations, resulting in a final sample size of 279 diabetic patients, yielding a response rate of 96%.

A structured questionnaire was developed specifically for this study following an extensive review of relevant literature and in-depth expert consultation [10,11]. The preliminary version of the questionnaire was evaluated through a pilot study involving 15 patients, who were not included in the final analysis. Based on the findings of the pilot test, necessary modifications were made to enhance clarity, comprehensiveness, and face validity.

The final questionnaire comprised sections assessing (1) knowledge of diabetes, including risk factors, complications, and preventive measures; (2) attitudes and self-care practices; and (3) family involvement, community awareness, and social support for individuals with diabetes. Data were collected through direct, face-to-face interviews conducted by trained researchers. Each interview required approximately 15–25 minutes to complete.

To calculate the knowledge score, each correct answer was assigned a value of 1, while incorrect and "don't know" responses were coded as 0. The total knowledge score was then obtained by summing the responses across 40 questions, yielding a maximum possible score of 40. For easier interpretation, the mean score was converted into a percentage. In addition, the 95% confidence interval (CI) of the mean knowledge score was calculated. Participants who scored below 50% were categorized as having weak knowledge, those with scores between 50% and 69.99% were classified as having average knowledge, and those scoring 70% or above were considered to have good knowledge. The internal consistency of the knowledge items was acceptable, with a Cronbach's alpha coefficient of 0.705.

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), version 25, and Microsoft Excel for Windows. Categorical variables were summarized using frequencies (N) and percentages (%), whereas continuous variables were described by minimum, maximum, mean, and standard deviation (SD) values. Comparisons of mean scores were performed using Student's t-test and one-way analysis of variance (ANOVA), as appropriate. A p-value < 0.05 was considered statistically significant.


Results:

Two hundred seventy-nine patients with DM were enrolled in the study. The mean age and SD of patients was 54.22 ± 13.73 years ranging from 19 to 90 years. Among them, a female (52.7%) preponderance was observed. Most of them (27.6%) with graduate level education. Slightly less than half of the respondents were unemployed (49.8%) majority of the patients (82.4%) were

married. The mean and SD of the BMI of the patients was 28.56 ± 5.18 Kg/m2 and 71 % of the sample were overweight or obese. Approximately 22%, 42%, and 83% of the patients were smokers, diagnosed for 10 years or more and live in Urban areas respectively as shown in Table 1. Whereas, 74.19% haven't attended an educational session as shown in Figure 1. In addition, 81% of patients indicate that the main source for their knowledge about DM are the physicians as shown in figure 2.

Table 1: Distribution of the patients according to socio-demographic characteristics

		Frequency	Percent
Sex	Male	132	47.3
	Female	147	52.7
Level of education	Illiterate	64	22.9
	Read/write	29	10.4
	Primary	63	22.6
	Secondary	46	16.5
	College and above	77	27.6
Occupation	Self employed	69	24.7
	Unemployed	139	49.8
	Governmental employee	71	25.5
Marital status	Married	230	82.4
	Divorced	7	2.5
	Single	13	4.7
	Widowed	29	10.4
BMI Groups	Under weight	3	1.0
	Normal	78	28.0
	Overweight	97	34.8
	Obese	101	36.2
Smoking status	Smoker	63	22.6
	Ex smoker	33	11.8
	Not smoker	183	65.6
Duration of diagnosis	1-5 years	95	34.1
	6-9 years	67	24.0
	≥ 10 years	117	41.9
Address	Rural	48	17.2
	Urban	231	82.8
	Total	279	100.0
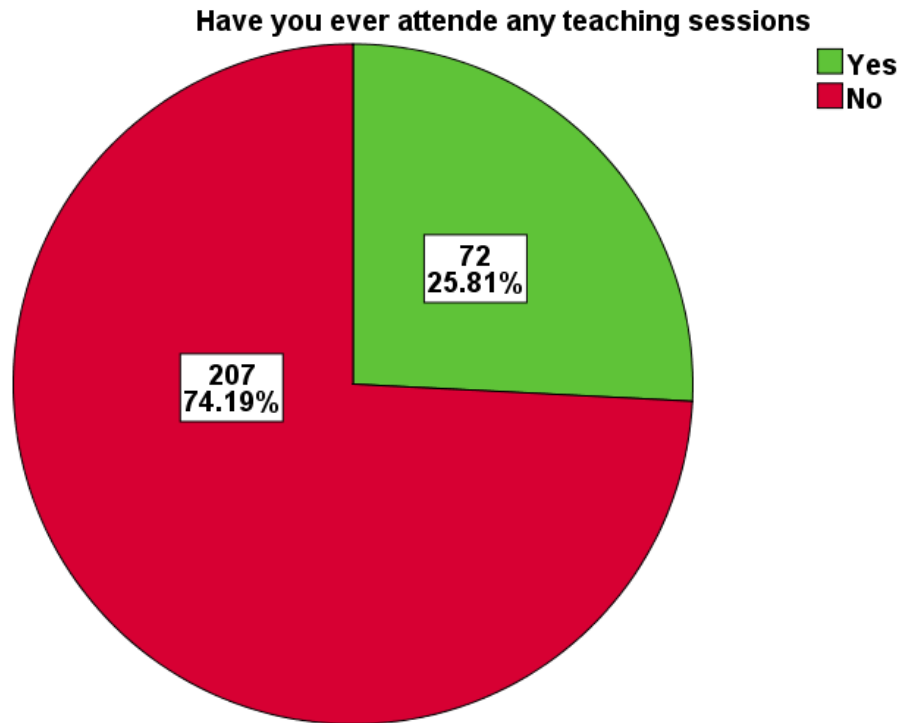
Figure 1: Frequency of ever attending an educational session among patients
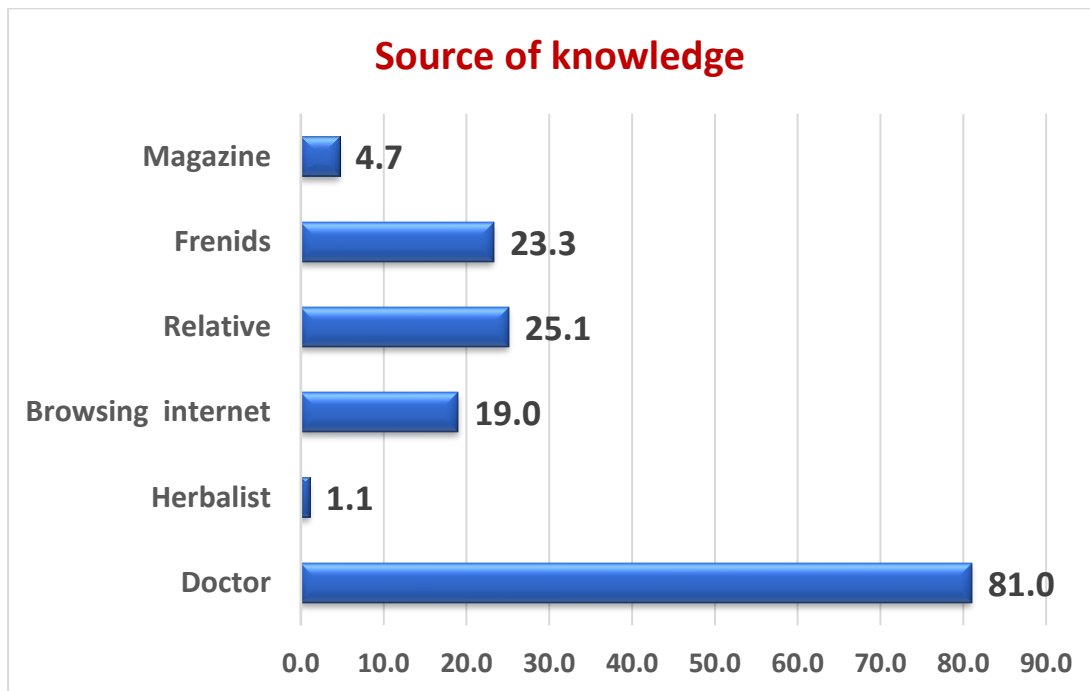
Figure 2: Source of knowledge regarding diabetes (participant can identify multiple sources)

The majority, 205 (73.5%), reported using oral hypoglycemic drugs (OHD), while, 82 (29.4%), reported using insulin, whereas 15 participants (5.4%) reporting the use of herbal therapy as shown in Table 2

Table 2: Type of Medications Used by Participants

Type of medications used *			
		Frequency	Percent
Oral hypoglycemic drugs	Yes	205	73.5
	No	74	26.5
Insulin	Yes	82	29.0
	No	197	71.0
Herbal therapy	Yes	15	5.4
	No	264	94.6
	Total	279	100.0

* Patient might use more than one type of medication

In this study, 227 patients (81.4%) were able to correctly define diabetes mellitus (DM). Additionally, 182 (65.2%) and 176 (63.1%) were the percentages of the patients who could define the normal ranges of blood sugar level and HbA1c, respectively as expressed in Table 3.

Table 3: Patients' Ability to Provide Correct Definitions About Diabetes Mellitus (DM).

		Frequency	Percent
Definition of DM	Correct	227	81.4
	Incorrect	52	18.6
What type of DM you had	Type 1	45	16.1
	Type 2	116	41.6
	I don't know	118	42.3
Normal range of blood glucose levels	Correct	182	65.2
	Incorrect	44	15.8
	I don't know	53	19.0
What is normal HbA1c level	Correct	176	63.1
	Incorrect	37	13.3
	I don't know	66	23.7
	Total	279	100.0

Regarding hypoglycemia management (86.7%) of the patients think that the best treatment for hypoglycemia take juices or any source of sugars, while (5.7%) think taking diabetes medications can be beneficial. Nevertheless, 121 patients (43.4%) reported that diabetes could be identified by measuring elevated blood sugar levels, while 116 patients (41%) believed it could be detected through symptoms. While, 39 patients (14%) recognized both elevated blood sugar levels and symptoms as indicators of diabetes as shown in Table 4.

Table 4: Patients' Knowledge about the management of hypoglycemic attacks and diagnosis of DM

|		Frequency	Percent
What to do when you become hypoglycemic	Take juices or any source of sugar	242	86.7
	Take diabetes medications	16	5.7
	I Don't Know	21	7.6
How can DM be detected	Symptoms	116	41.6
	Raised blood sugar	121	43.4
	both	39	14.0
	Other	3	1.1
	Total	279	100.0

The most commonly identified signs were frequent urination, reported by 152 patients (54.5%), followed by increased thirst, noted by 128 patients (45.9%). On the other hand, certain symptoms were minorly identified by the patients. For instance, skin problems were reported by only 19 patients (6.8%), as shown in Table 5.

Table 5 : Patients' Knowledge about the High Blood Glucose Signs

Most common signs of high blood glucose		Frequency	Percent
Frequent urination	Mentioned	152	54.5
	Not mentioned	127	45.5
Excess hunger	Mentioned	39	14.0
	Not mentioned	240	86.0
Thirsty	Mentioned	128	45.9
	Not mentioned	151	54.1
Skin problems	Mentioned	19	6.8
	Not mentioned	260	93.2
Numbness of limbs	Mentioned	91	32.6
	Not mentioned	188	67.4
Nausea	Mentioned	37	13.3
	Not mentioned	242	86.7
Tiredness	Mentioned	75	26.9
	Not mentioned	204	73.1
Headache	Mentioned	52	18.6
	Not mentioned	227	81.4
Blurred vision	Mentioned	47	16.8
	Not mentioned	232	83.2
Other	Mentioned	51	18.3
	Not mentioned	228	81.7
	Total	279	100.0

In the comprehensive evaluation of 81 patients (29.03%) using insulin injections, we assessed their knowledge of proper injection techniques, including injection sites and preparation. The results revealed that 65 patients (81.25%) demonstrated sufficient expertise in administering insulin correctly. However, 16 patients (19.75%) were found to have errors or misinformation in their injection technique as shown in figure 3.
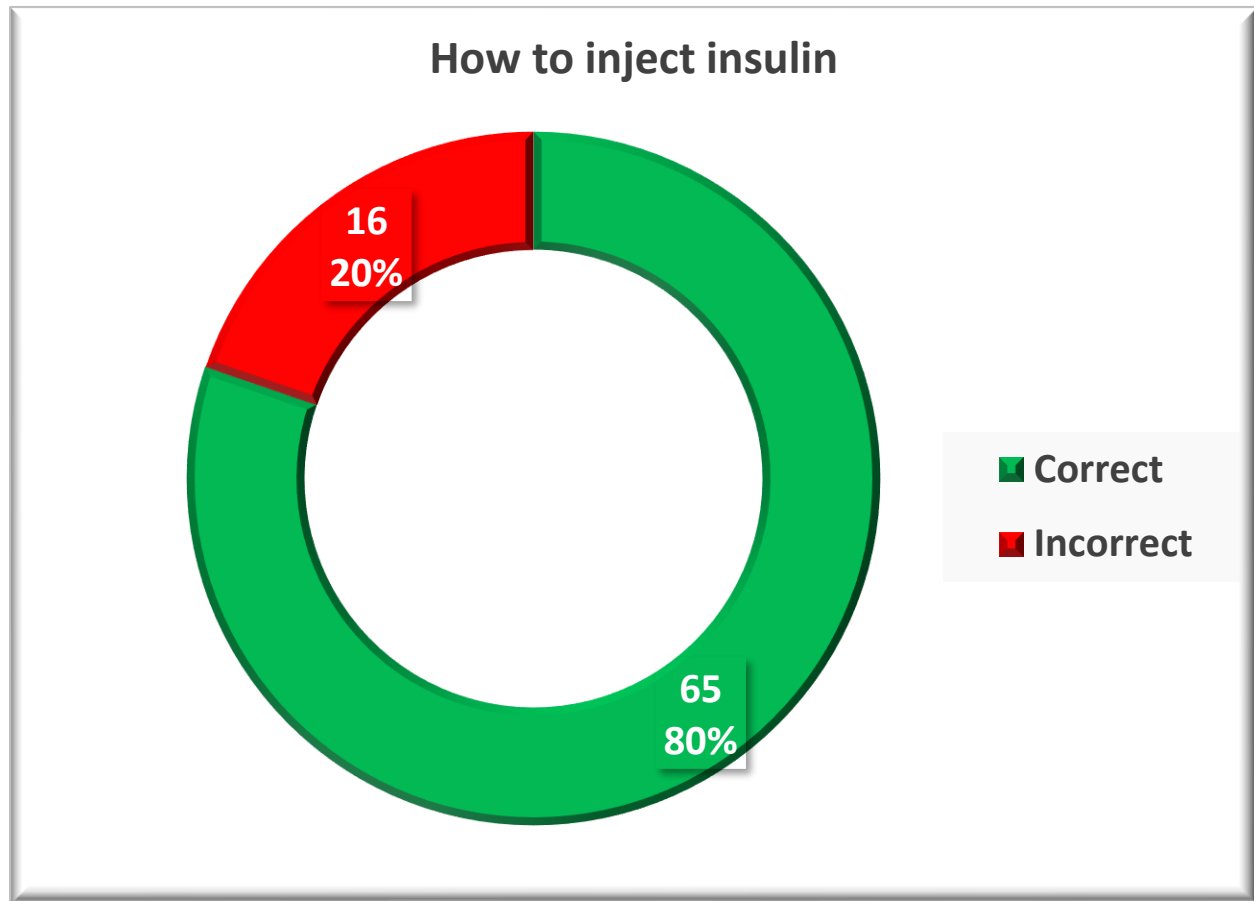
Figure 3: Patients' Knowledge about How to Inject Insulin (N 81)

The most commonly identified risk factor for DM was emotional stress, reported by 136 patients (48.7%). Family history followed, noted by 128 patients (45.9%), While dietary factors were mentioned by 118 patients (42.3%). Contrariwise, smoking was identified as risk factor by only 21 (7.5%) as shown in table 6.

Table 6: Patients' Knowledge about the Risk Factors of Diabetes Mellitus

Risk factors of DM		Frequency	Percent
Family history	Mentioned	128	45.9
	Not mentioned	151	54.1
Lifestyle	Mentioned	90	32.3
	Not mentioned	189	67.7
Diet-related factors	Mentioned	118	42.3
	Not mentioned	161	57.7
Emotional triggers	Mentioned	136	48.7
	Not mentioned	143	51.3
Obesity	Mentioned	62	22.2
	Not mentioned	217	77.8
Smoking	Mentioned	21	7.5
	Not mentioned	258	92.5
Muscular effort	Mentioned	24	8.6
	Not mentioned	255	91.4
Old age	Mentioned	48	17.2
	Not mentioned	231	82.8
Bad psychological state	Mentioned	107	38.4
	Not mentioned	172	61.6
	Total	279	100.0

In regard to general knowledge about diabetes. 263 (94%) were aware that diabetes mellitus can impact other body organs. Additionally, 238 (85%) believed that regular exercise has a positive effect on managing diabetes mellitus. Conversely, 64 (22.9%) thought that consuming extra sugar could be beneficial for diabetics. Notably, 186 (66.7%) did not perceive smoking as having a negative impact on diabetes mellitus.

This table also shows that 201 (72%) did not believe diabetes medications can cure diabetes, while 207 (74%) opined that they should be taken lifelong. Interestingly, 67 (24%) felt that diabetes medication should be discontinued when feeling ill. Furthermore, 202 (72.4%) recognized that sore feet are common among individuals with diabetes, and 246 (88.2%) acknowledged that being overweight can exacerbate diabetes. As shown in table 7.

Table 7: General knowledge about diabetes mellitus assessment

		Frequency	Percent
Is that DM hereditary	Yes	206	73.8
	No	46	16.5
	Don't know	27	9.7
Could DM affect other organs	Yes	263	94.3
	No	5	1.8
	Don't know	11	3.9

Can complications occur due to DM	Yes	268	96.1
	No	4	1.4
	Don't know	7	2.5
Can regular exercise positively affect DM	Yes	238	85.3
	No	22	7.9
	Don't know	19	6.8
# Can extra salt intake positively affect DM	Yes	42	15.1
	No	177	63.4
	Don't know	60	21.5
#Can extra sugar intake positively affect DM	Yes	64	22.9
	No	211	75.6
	Don't know	4	1.4
#Can smoking positively affect DM	Yes	51	18.3
	No	186	66.7
	Don't know	42	15.1
#Diabetes medication can cure diabetes	Yes	59	21.1
	No	201	72.0
	Don't know	19	6.8
Diabetes medication should be taken for life	Yes	209	74.9
	No	42	15.1
	Don't know	28	10.0
#You should stop taking your diabetes medication when you feel sick	Yes	67	24.0
	No	181	64.9
	Don't know	31	11.1
Poor control of diabetes could result in a greater change of complications	Yes	264	94.6
	No	10	3.6
	Don't know	5	1.8
Eating less bread will make me lose weight	Yes	233	83.5
	No	32	11.5
	Don't know	14	5.0
Sore feet are common in people with diabetes	Yes	202	72.4
	No	34	12.2
	Don't know	43	15.4
People with diabetes have poor circulation of blood in the feet	Yes	190	68.1
	No	32	11.5
	Don't know	57	20.4
Physical exercise is important for people with diabetes	Yes	252	90.3
	No	11	3.9
	Don't know	16	5.7
Physical work or regular exercise helps with: Blood glucose control	Yes	254	91.0
	No	13	4.7
	Don't know	12	4.3

Physical work or regular exercise helps with: Painful feet	Yes	217	77.8
	No	32	11.5
	Don't know	30	10.8
Physical work or regular exercise helps with: Weight loss	Yes	260	93.2
	No	8	2.9
	Don't know	11	3.9
Factors worsening diabetes: High blood pressure	Yes	225	80.6
	No	24	8.6
	Don't know	30	10.8
Factors worsening diabetes: Epilepsy	Yes	154	55.2
	No	36	12.9
	Don't know	89	31.9
Factors worsening diabetes: Overweight	Yes	246	88.2
	No	14	5.0
	Don't know	19	6.8
	Total	279	100.0

\# The correct answer is "No"

By assessing the overall knowledge, which covered 40 questions, covering knowledge about DM definition, diagnosis, risk factors, and treatment. The overall knowledge mean score % and SD was 58.07 ± 11.48 and the 95% confidence interval (CI) is 56.72 – 59.43 as shown in table 8. Further, majority of patients 187 (67%) showed average level of knowledge, and nearly 25% had week knowledge as shown in figure 4.

Table 8: Overall mean knowledge score (40 questions)

	N	Min	Max	Mean	SD	95% Confidence Interval
Knowledge score	279	7.00	36.00	23.23	4.59	22.69 -23.77
Knowledge score precentage	279	17.50	90.00	58.07	11.48	56.72 – 59.43
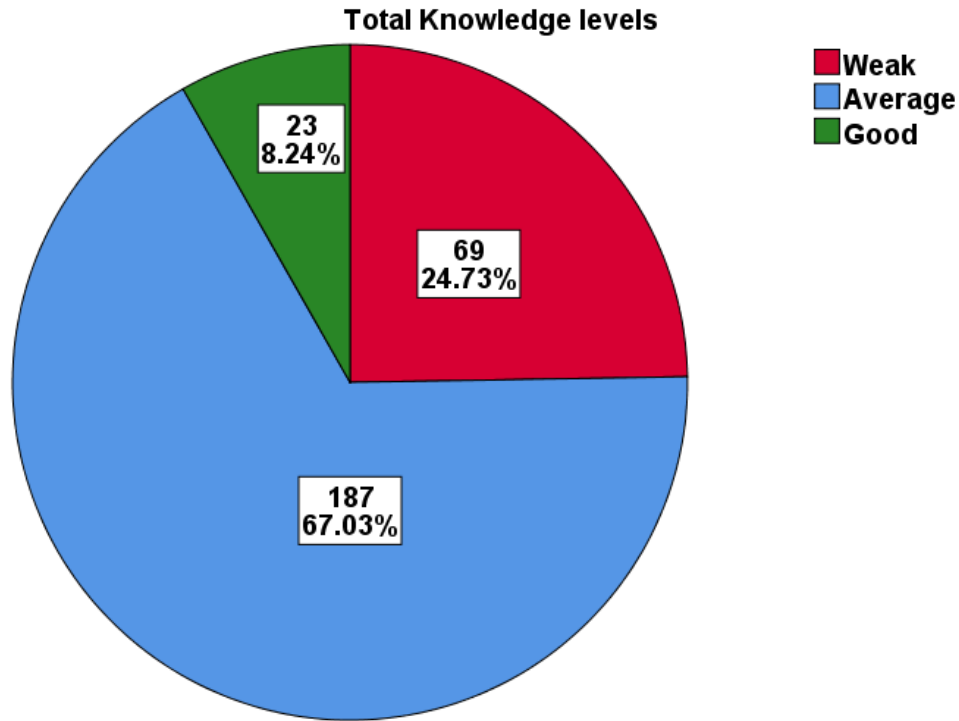
Figure 4: the distribution of level of knowledge regarding DM

The mean knowledge score demonstrates statistically significant higher means of knowledge among Males, urban residents, those with higher education levels, government employed or self-employed individuals, and those who attended teaching sessions. However, no statistically significant differences were found in relation to marital statuses, body weights, smoking statuses , and durations of disease as shown in table 9.

Table 9: The relation of mean knowledge Scores with Socioeconomic and Health-Related Factors

		N	Mean	SD	P value
Sex	Male	132	59.60	11.17	0.035*
	Female	147	56.70	11.62	
Adress	Rural	48	51.46	12.75	< 0.001*
	Urban	231	59.45	10.73	
Education	Illiterate	64	51.21	12.35	< 0.001**
	Able to read/write	29	57.50	10.02	
	Primary	63	57.22	9.70	
	Secondary	46	60.27	8.44	
	College and above	77	63.38	11.30	
Employment	Self employed	69	59.67	9.98	< 0.001**
	Unemployed	139	55.18	11.28	

	Governmental Employed	71	62.18	11.81	
Marital status	Married	230	57.96	11.82	0.206**
	Divorced	7	64.64	9.40	
	Single	13	61.54	9.76	
	Widowed	29	55.86	9.14	
Weight category	Under weight	3	60.00	10.90	0.119**
	Normal	78	56.12	14.05	
	Overweight	97	57.45	9.34	
	Obese	101	60.12	10.97	
Smoking	Smoker	63	58.10	10.63	0.054**
	Ex smoker	33	53.64	12.17	
	Not smoker	183	58.87	11.51	
Duration of DM	1-5 years	95	56.92	11.05	0.386**
	6-9 years	67	57.91	13.01	
	≥ 10 years	117	59.10	10.88	
Ever attended any teaching sessions	Yes	72	60.66	9.82	0.026*
	No	207	57.17	11.89	
	Total	279	58.07	11.48	

 * t test used **Anova (F) test used

Patients reveal a mix of attitudes toward diabetes management. Nearly all participants (276, 98.9%) agree on the importance of glycemic control, and most respondents (261, 93.5%) view exercise as beneficial for managing diabetes. Additionally, 68.1% agree on the impact of smoking on blood sugar levels, though a notable 19% are unsure. A majority (224, 80.3%) recognize the link between blood pressure and diabetes control. Opinions are divided on whether diet alone is sufficient, with 148 participants (53%) agreeing and 124 (44.4%) disagreeing. Concerns about medication safety are expressed by 154 participants (55.2%). Furthermore, a large majority (224, 80.3%) report that their diabetes is affected by their mood, behavior, or personality. Finally, most patients (248, 88.9%) trust their doctor. As shown in table 10.

Table 10: Assessment of Attitudes Toward Diabetes Self-Management

		Frequency	Percent
Glycemic control is necessary for DM or believing good blood sugar control is important for DM	Yes	276	98.9
	No	2	0.7
	Don't know	1	0.4
Do you think regular exercise can help to control DM	Yes	261	93.5
	No	4	1.4
	Don't know	14	5.0

Do you think smoking causes poor glycemic control	Yes	190	68.1
	No	36	12.9
	Don't know	53	19.0
Do you think blood pressure control is necessary for glycemic control	Yes	224	80.3
	No	25	9.0
	Don't know	30	10.8
Do you think that alternative treatments are good	Yes	99	35.5
	No	134	48.0
	Don't know	46	16.5
Do you think diet alone glycemic control is better than medication with diet glycemic control	Yes	148	53.0
	No	124	44.4
	Don't know	7	2.5
Do you believe fruits and vegetables are good for glycemic control	Yes	217	77.8
	No	50	17.9
	Don't know	12	4.3
Do you think alcohol can increase the complication of DM	Yes	182	65.2
	No	27	9.7
	Don't know	70	25.1
#* Do you think insulin (metformin) drug has harmful effects to the organs of the body	Yes	154	55.2
	No	80	28.7
	Don't know	45	16.1
Do you think traditional treatments are better than modern medicines for DM	Yes	79	28.3
	No	166	59.5
	Don't know	34	12.2
Do you think diabetes affect your mood, behavior, personality	Yes	224	80.3
	No	48	17.2
	Don't know	7	2.5
#I dislike being referred to as 'a diabetic'	Yes	96	34.4
	No	178	63.8
	Don't know	5	1.8
#Diabetes is the worst thing that has ever happened to me	Yes	170	60.9
	No	105	37.6
	Don't know	4	1.4
#Most people will find it difficult to adjust to having diabetes	Yes	176	63.1
	No	98	35.1
	Don't know	5	1.8
#There is little hope of leading a normal life with diabetes	Yes	107	38.4
	No	164	58.8
	Don't know	8	2.9
The proper control of diabetes involves a lot of sacrifice and inconvenience	Yes	201	72.0
	No	73	26.2
	Don't know	5	1.8
# I avoid telling people I have diabetes	Yes	65	23.3

		Frequency	Percent
	No	211	75.6
	Don't know	3	1.1
# There is really nothing you can do if you have diabetes	Yes	71	25.4
	No	204	73.1
	Don't know	4	1.4
# I often think it is unfair that I should have diabetes when other people are so healthy	Yes	31	11.1
	No	244	87.5
	Don't know	4	1.4
Do you think the family support can help to control your diabetes	Yes	253	90.7
	No	24	8.6
	Don't know	2	0.7
Do you trust your doctor	Yes	248	88.9
	No	30	10.8
	Don't know	1	0.4
	Total	279	100.0

The correct answer is "No"

By assessing some practices by DM patients, 48.0% of participants measured their HbA1c every three months, while 67.4% reported regular blood sugar checkups. Medication by their opinion at 83.2%, and 81.4% ate meals on time. However, only 38.0% engaged in daily exercise. Notably, 79.6% practiced good foot care. As shown in table 11.

Table 11: Assessment of Practices in Diabetes Management

		Frequency	Percent
Frequency of measuring HBA1C	Monthly	21	7.5
	Every 3 months	134	48.0
	Every 6 months	42	15.1
	Yearly	82	29.4
Regular blood sugar checkup	Yes	188	67.4
	No	91	32.6
Frequency of consulting the doctor about diabetes	Monthly	29	10.4
	Every 3 months	53	19.0
	Every 6 months	44	15.8
	When feeling tired	119	42.7
	Irregularly	34	12.2
Daily physical exercise	Yes	106	38.0
	No	173	62.0
Control/maintain body weight	Yes	177	63.4
	No	102	36.6
Medication/treatment adherence	Yes	232	83.2
	No	47	16.8
Eat food on time	Yes	227	81.4

	No	52	18.6
Eat vegetables frequency	Daily	196	70.3
	2-3 times/week	38	13.6
	Weekly	2	0.7
	Irregular	43	15.4
# Extra sugar/salt on your regular diet	Yes	74	26.5
	No	205	73.5
# Cigarette smoking	Yes	57	20.4
	No	222	79.6
# Drink alcohol	Yes	6	2.2
	No	273	97.8
Eye care	Yes	187	67.0
	No	92	33.0
Foot care	Yes	222	79.6
	No	57	20.4
Oral care	Yes	189	67.7
	No	90	32.3
	Total	279	100.0

Discussion

Diabetic Mellitus is one of the common chronic diseases, and patients complaining of chronic diseases like DM need to have good knowledge about their condition to deal perfectly with the treatment and to prevent further complications [8,12].

The majority of respondents in this study were female rather than male, which may be a reflection of the sex ratio of patients in diabetic clinics were female patients in Iraq attend health facilities more than males. Further, the mean age was 54.22 years, these results close to a study conducted in Karbala/ Iraq [13].

Additionally, only quarter of patients in this study had attended a diabetic education session such as attending meetings with health professionals which indicates less percentage than study conducted in Ethiopia in Adama Hospital Medical College.[14]. So, patients should be encouraged to participate in more education courses.

Most of the patients were overweight and obese, where weight is important for better glycemic control and prevention of complications. And this issue needs to be targeted by health care providers in Iraq as obesity as well as sedentary life is major risk factors DM, other NCDs and aggravate complications [5,6].

The highest percentage of the respondents have good knowledge about the management of hypoglycemic attacks. Though low percentage of patients might deal with hypoglycemic attacks in the wrong way or don't know how to deal with it, but hypoglycemia is a significant serios concern among patients with DM. So, we need to increase information of diabetic patients about hypoglycemic attacks [7].

The majority of patients in our study use OHD This result is similar to studies conducted in Al-Kut and Karbala cities [13,15]. However, nearly 5% of patients use herbal therapy, which is lower than the study done in Karbala, where about 15% of patients reported the use of herbal therapy [13].

Approximately, 4 out of 5 of participants reported that the main source of knowledge regarding DM, was from doctors. This agrees with the findings reported in two other studies in Iraq, were doctors where the main knowledge providers [13,15].

Most participants in the present study accurately defined diabetes mellitus and demonstrated awareness of the normal ranges for blood glucose and HbA1c, indicating an overall satisfactory level of disease-specific knowledge. Nevertheless, participants exhibited limited awareness of the clinical manifestations of hyperglycemia, as a considerable proportion lacked adequate knowledge of these common and early warning signs of diabetes. In comparison, studies conducted in the United Arab Emirates and Jordan reveal a better level of knowledge about diabetes symptoms. In the UAE, the awareness percentages are significantly higher. Similarly, in Jordan, the awareness levels are also high [11,16]. The observed variations in knowledge levels may be attributed to several contributing factors, including educational attainment, limited government-led health education initiatives, inadequate healthcare infrastructure, and insufficient patient–physician communication regarding diabetes education and counseling. Additional influencing factors are discussed in subsequent sections of this paper.

Assessment of patients' knowledge regarding insulin administration focused on injection sites, techniques, and storage methods. The results were encouraging, suggesting that most patients possessed adequate understanding of these fundamental aspects. We found that 81.25% of patients in our study possess adequate knowledge about how to take insulin injection. This result highlights a significant improvement in awareness and knowledge among insulin users compared to previous studies conducted in Baghdad and Basra [17, 18]. However, it is worth noting that one-fifth of patients still lack sufficient knowledge, which is a significant proportion and could lead to avoidable complications.

Approximately 41% of patients believed that diabetes could be diagnosed based on symptoms alone, reflecting a common misconception. While symptoms may suggest hyperglycemia, they are insufficient for diagnosis, as similar manifestations may occur in other conditions. In contrast, 43.4% correctly recognized laboratory testing as the primary diagnostic method; however, confirmation may require repeat or complementary tests, such as the Oral Glucose Tolerance Test (OGTT), to ensure diagnostic accuracy [12].

In this study, over half of the diabetic participants were unable to identify any risk factors associated with diabetes. Approximately 48.7% emotional stress as a potential risk factor, 45.9% mentioned family history, while 42.3% identified dietary factors. Other risk factors were mentioned less frequently, indicating a significant lack of awareness in this area. These findings align with other study conducted in Kirkuk [19].

In contrast, a study conducted in Saudi Arabia showed significantly better awareness. In those studies, 83.3% of participants recognized family history as a risk factor, 85% identified obesity,

84.7% cited dietary factors (such as excessive sugar intake), and 71% stress. 4% of patients in the study [20].

The overall knowledge score was average and majority of participants showed average level of knowledge. While nearly 25% had weak knowledge. These findings align with prior research conducted in Iraq and the Middle East. The study in Kut showed that 21% of participant had low knowledge [15], whereas, the study in Kirkuk reported that 36% of participants had little knowledge of diabetes, its causes, and management strategies, highlighting widespread educational gaps [19]. However different tools had been used for assessing knowledge in each of these studies. Similarly, A study done in Dubai found that while patients had adequate knowledge and a positive attitude towards insulin therapy, there were still gaps in specific areas, such as the indications for insulin therapy and the importance of adherence [21].

These patterns underline a pressing need for targeted educational initiatives and regional public health strategies to address misconceptions and improve diabetes management. Enhanced efforts focusing on the importance of medication adherence, lifestyle modifications, and the risks of poor control could bridge these critical gaps in diabetes care and prevention.

The mean knowledge scores appeared to be significantly higher among male participants, urban residents, those with higher education levels, and employed or self-employed individuals, individuals who attended teaching sessions. These findings are consistent with several studies conducted in Iraq and the broader Middle East region [19-21]. In Iraq, a study assessing diabetic patients' knowledge in Al-Kut City found that better education correlated with higher knowledge scores, emphasizing the role of educational attainment in disease awareness [15]. Similarly, research in Iran reported that urban residents had higher diabetes knowledge compared to rural counterparts, highlighting the urban-rural disparity in health information access [22].

Educational interventions positively influence diabetes knowledge, as shown in Baghdad Teaching Hospital, where program attendees had higher knowledge levels [23]. Employment also impacts awareness, with employed individuals demonstrating better practices, likely due to greater access to health resources [16]. Our survey highlights that Iraqi patients generally understand the importance of glycemic control and exercise, consistent with previous local studies [24].

Despite some knowledge among patients, significant gaps remain, particularly regarding insulin use, medications, and the sufficiency of diet alone, highlighting the need for targeted educational interventions. Similar findings in the Kurdistan region of Iraq reported widespread misconceptions about diabetes, emphasizing the importance of effective education programs [25]. The high level of trust in healthcare providers (88.9%) presents an opportunity to improve adherence to evidence-based treatments, though efforts must also address reliance on alternative remedies and correct prevalent false beliefs [25].

The survey also reveals the psychological and emotional burden of diabetes, with many patients reporting mood disturbances and disliking the label "diabetic," emphasizing the importance of integrating mental health support into diabetes care. A study in Al-Najaf Governorate, Iraq, found that about a quarter (24.71%) of patients are potentially suffering from a relevant stigma, which negatively impacts their quality of life and metabolic control [26].

Family support was highly valued by participants (90.7%), indicating that family-centered education programs could improve self-management and adherence. Consistent with findings from Saudi Arabia, family involvement alongside healthcare provider support enhances adherence and overall diabetes management [27]. However, belief in traditional or alternative treatments may delay effective care, highlighting the need for culturally sensitive education. Similar misconceptions in the Kurdistan region suggest that reliance on traditional remedies can hinder proper disease management [25].

The majority of participants reported regular HbA1c monitoring, typically every three months. Nonetheless, awareness of the importance of ongoing monitoring remains crucial, as uncontrolled diabetes can cause irreversible organ damage [28]. Patients should be reminded of the value of regular check-ups to maintain optimal health. Low adherence to daily exercise (38.0%) underscores the need for targeted education and interventions promoting physical activity and a healthy diet, both of which are essential for effective diabetes management and improved patient outcomes [7,8].

The study revealed a high level of medication adherence, with 83.2% of participants following prescribed treatments, suggesting a general understanding of the importance of therapy. However, this rate is based on self-reported adherence, and previous studies in Iraq reported lower compliance [29,30]. Regarding self-care, gaps were observed in adherence to foot, eye, and dental care. While participants showed considerable attention to foot care—likely due to awareness of diabetic foot complications and fear of amputation—eye and oral care received less attention, indicating insufficient awareness of retinopathy and oral infection risks. These findings underscore the need for comprehensive education programs emphasizing eye and oral health to prevent complications.

This study identified key gaps in knowledge, attitudes, and practices related to diabetes and its management. However, it has some limitations, including those inherent to cross-sectional study designs, and the use of a questionnaire that, although carefully designed, has not yet undergone full validation.

Conclusion

This study provides important insights into the knowledge, attitudes, and practices (KAP) of diabetic patients in Iraq. While most participants demonstrated a satisfactory understanding of diabetes and its management, notable gaps were observed in areas such as regular physical activity, insulin use, and awareness of risk factors. These findings underscore the need for targeted education programs tailored to the cultural and socioeconomic context. Low participation in formal diabetes education sessions, along with misconceptions about relying solely on diet or discontinuing medication during illness, further highlight the importance of enhanced patient education and active healthcare provider engagement.

Addressing these gaps through targeted education, community awareness campaigns, and culturally sensitive, family-centered interventions—especially for high-risk groups such as females, rural residents, and the unemployed—can enhance self-care, correct false beliefs, and reduce complications. These findings provide important guidance for public health policies and patient-centered strategies aimed at improving diabetes management and outcomes in the region.

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