

## Attitudes on Diabetes Among Type 2 Diabetic Patients in Karbala City

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### Abstract

**Background:** Diabetes is a serious health problem that has reached an alarming scale, with over 500 million individuals affected globally. Type 2 diabetes is the most common type of diabetes, accounting for over 90% of all diabetes worldwide. The Middle East and North Africa (MENA) region has the greatest regional prevalence of diabetes (16.2%) and the second-largest expected increase (86%) in the number of people with diabetes.

**Objective:** This study aims to assess the attitude toward diabetes among type 2 diabetic patients in Karbala City and the factors associated with their attitude.

**Patients and methods:** A cross-sectional study was conducted on 252 type 2 diabetic patients in multiple health institutes in Karbala City through face-to-face interviews using a questionnaire developed by the University of Michigan Diabetes Research and Training Center (MDRTC). SPSS version 22.00 was used to perform statistical analysis. The means of the groups were compared using independent samples t-test and ANOVA. Pearson's rank correlation coefficient test was used to show relationships between diabetic attitude scores, glycated hemoglobin, fasting blood sugar, and random blood sugar.

**Results:** The mean age of the patients was  $56 \pm 9.83$  years. 64.3% of the patients were female. The mean duration of diabetes was  $10.1 \pm 6.82$  years. The mean attitude score for the patients was  $31.55 \pm 6.18$  out of 50. The majority of patients (72.6%) had a moderate attitude level.

**Conclusion:** Continuous education programs and healthcare attention are needed to enhance patients' attitudes toward the disease and its complications, especially female patients, those with low educational levels, housewives, those not working, those with lower economic status, those with longer diabetes duration, those who take insulin as treatment, and those who have complications.

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## المواقف من مرض السكري بين مرضى السكري من النوع الثاني في مدينة كربلاء

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### الخلاصة

**المقدمة:** مرض السكري هو مشكلة صحية خطيرة وصلت إلى نطاق يندر بالخطر، حيث تأثر أكثر من 500 مليون فرد على مستوى العالم. داء السكري من النوع 2 هو أكثر أنواع مرض السكري شيوعاً، حيث يمثل أكثر من 90٪ من جميع أنواع مرض السكري في جميع أنحاء العالم. تشهد منطقة الشرق الأوسط وشمال أفريقيا أكبر انتشار إقليمي لمرض السكري (16.2٪) وثاني أكبر زيادة متوقعة (86٪) في عدد المصابين بالسكري.

### الهدف:

تهدف هذه الدراسة إلى تقييم الموقف تجاه مرض السكري بين مرضى السكري من النوع 2 في مدينة كربلاء والعوامل المرتبطة بموقفهم.

### طرائق العمل:

أجريت دراسة مقطعية مستعرضة على 252 مريضاً بالسكري من النوع 2 في معاهد صحية متعددة في مدينة كربلاء من خلال مقابلات وجهاً لوجه باستخدام استبيان طوره مركز أبحاث وتدريب السكري بجامعة ميشيغان (MDRTC). تم استخدام SPSS الإصدار 22.00 لإجراء التحليل الإحصائي. تمت مقارنة وسائل المجموعات باستخدام اختبار (ت) للعينات المستقلة و ANOVA. تم استخدام اختبار معامل ارتباط الرتب لبيرسون لإظهار العلاقات بين درجات موقف مرضى السكري، والهييموجلوبين السكري، وسكر الدم الصائم، وسكر الدم العشوائي.

### النتائج:

كان متوسط عمر المرضى  $56 \pm 9.83$  سنة. 64.3٪ من المرضى كانوا من الإناث. كان متوسط مدة مرض السكري  $10.1 \pm 6.82$  سنة. كان متوسط درجة الموقف للمرضى  $31.55 \pm 6.18$  من 50. غالبية المرضى (72.6٪) لديهم مستوى موقف معتدل.

### الاستنتاجات:

هناك حاجة إلى برامج التعليم المستمر والاهتمام بالرعاية الصحية لتعزيز مواقف المرضى تجاه المرض ومضاعفاته، وخاصة المرضى الإناث، وذوي المستويات التعليمية المنخفضة، وربات البيوت، وأولئك الذين لا يعملون، وذوي الوضع الاقتصادي المنخفض، والذين يعانون من فترة أطول لمرض السكري، وأولئك الذين يتناولون الأنسولين كعلاج، وأولئك الذين يعانون من مضاعفات.

## 1. Introduction

Diabetes is a serious health problem that has reached an alarming scale, with over 500 million individuals affected globally. According to estimates from the International Diabetes Federation (IDF), the number of persons with diabetes has increased alarmingly, more than tripling from 2000 to an estimated 537 million in 2021 (International Diabetes Federation, 2021). Its prevalence increased from 108 million in 1980 to 422 million in 2014 (World Health Organization, 2022). 8.5% of persons who were 18 years of age and older had diabetes in 2014. A total of 1.5 million deaths were directly related to diabetes in 2019, and 48% of these deaths occurred among those under the age of 70. It contributed to an additional 460,000 renal disease deaths, and high blood glucose is responsible for 20% of cardiovascular fatalities (Institute for Health Metrics and Evaluation, 2019). It is a significant contributor to renal disease, heart attacks, strokes, blindness, and lower limb amputation (Al-Zubaidi and Abbas, 2017). An estimated 2 million people died in 2019 from diabetes-related renal damage (World Health Organization, 2022). The number of deaths due to this disease increased by as great as 70% in the whole world from 2000-2019 (World Health Organization, 2021).

Type 2 diabetes is the most common type of diabetes, accounting for over 90% of all diabetes worldwide (International Diabetes Federation, 2021). Over the past few decades, there has been a consistent rise in both the incidence and prevalence of diabetes. Over the last three decades, the prevalence of type 2 diabetes has risen substantially in countries of all income levels (Al Mousawi, 2018; Mustafa Murtadha, 2013). The vast majority of diabetics reside in low- and middle-income countries (Hasan et al., 2023). A global goal is to halt the rise in diabetes and obesity by 2025 (World Health Organization, 2023). Type 2 diabetes can be averted or delayed through regular exercise, having a healthy eating plan, keeping to the ideal weight, and being free from tobacco. Eating a proper diet, exercising, use of medications, as well as frequent screening and timely treatment for complications, will treat diabetes, delay its effects, and prevent them (World Health Organization, 2022).

Diabetes is a significant public health issue in the Eastern Mediterranean Region, where it affects around 14% of people. In this region, the burden of diabetes could affect more than 100 million people by 2045. This region has the highest rates of diabetes worldwide and it contains six of the ten nations with the highest rates of diabetes in the world (World Health Organization, 2021). The Middle East and North Africa (MENA) region has the greatest regional prevalence of diabetes (16.2%) and the second-largest expected increase (86%) in the number of people with diabetes, with an estimated 136 million individuals by 2045. One in six adults (73 million) in the MENA region has diabetes, which is the highest proportion among the International Diabetes Federation (IDF) Regions. The majority (24.5%) of deaths in adults of working age from diabetes occur in this region. Even though this region is home to 13.6% of the world's diabetics, only 32.6 billion USD, or 3.4% of the entire global budget, was spent there (International Diabetes Federation, 2023, 2021). Diabetes is one of Iraq's top ten causes of death (Iraqi Ministry of Health, 2022).

Health education is crucial in regions with limited resources like ours, where diabetes mellitus (DM) causes a significant financial burden and necessitates the immediate involvement of clinicians at all levels, particularly primary care physicians, who are typically the first to provide care and frequently encounter both newly diagnosed and known

diabetics. For diabetic patients to achieve glycemic control and avoid the onset of complications from their disease, adjustments in their attitudes are therefore essential (Chawla et al., 2019).

The study of diabetics' attitudes toward their condition is regarded as a fundamental initial step in the educational process (Khurshid and Othman, 2014). The first step of a plan that aims to promote diabetes prevention and reduce complications and expenditure is to do research that helps to identify the baseline attitude level of the target group (Karbalaefar et al., 2016). A person's attitude towards a health disorder has a direct impact on his or her motivation to adhere to the prescribed treatment plan (Wan et al., 2016). Generally, the attitude studies about type 2 diabetes bring up several important points. They are a key element in determining diabetic patients' level of attitude. Also, they can examine the patients' attitudes towards diabetes and its complications, which will contribute to the detection of any common errors or beliefs that may negatively impact self-care (Gani et al., 2023). Attitude studies also help to identify factors that impact the patients' attitude such as age, the duration of diabetes, and glycemic control (Mousavi and Shojaei, 2021). Through the process of highlighting the current gaps in patients' attitudes, stakeholders and healthcare workers can devise specific interventions and programs and thus they can improve diabetes management and ensure that complications are of minimal risk. These surveys are also useful in the design of healthcare services targeted at locally specific demographic factors that include age, educational level, and residence (Asante et al., 2023). Hence, attitude studies are one of the key elements in better diabetes management and prevention as they help healthcare workers understand the problems that their patients face. One of the values of this research is that it will uplift our understanding of patients' attitudes toward this illness. So future education programs could target the weak points, false beliefs, or practices. The aims of this study are: to assess the attitudes of diabetes among type 2 diabetic patients in Karbala city, and to assess the factors associated with their attitude.

## **2. Patients and Methods**

### **2.1. Study Design and Selection of Patients**

A cross-sectional study that was conducted on type 2 diabetic patients in Karbala City in Al-Imam Al-Hussein Medical City, Al-Imam Al-Hassan Center for Endocrinology and Diabetes (HMEDC) which is the only specialized diabetes center in the governorate, Al-Imam Al-Hassan Al-Mujtaba Teaching Hospital, two Primary Health Care Centers which included Al-Ghadeer and Al-Abbasiya Al-Gharbiya and three Medical Public Clinics that provide their medical services in the afternoon period which included Al-Ghadeer, Al-Iskan and Al-Abbasiya Al-Gharbiya on 252 patients. The sample size was calculated according to the equation,  $n = Z^2 P (1 - P)/d^2$  where  $n$  is the sample size,  $Z$  is the statistic corresponding to 95% confidence (1.96),  $P$  is the prevalence of diabetes (16.2%) according to the Middle East and North Africa (MENA) region of the International Diabetes Federation (International Diabetes Federation, 2021), and  $d$  is precision (0.05). The minimal sample size required is 209 patients.

### **2.2. Data Collection**

The data collection was conducted using convenience sampling over eight months duration from 1/2/2023 to 1/10/2023 through face-to-face interviews with the patients 5 days per week using a questionnaire as the data collection instrument.

### **2.3. Inclusion Criteria**

All patients who had type 2 diabetes, aged more than 18 years, and diagnosed with diabetes for more than 6 months were included.

### **2.4. Exclusion Criteria**

The study excluded patients who were pregnant, who had a history of mental illness or had psychiatric disorders.

### **2.5. Instruments**

The questionnaire consisted of two parts. The first part of the questionnaire consisted of 21 questions regarding sociodemographic information and clinical data about diabetes including gender, date of birth, marital status, educational level, job type, residence, economic status, smoking, duration of diabetes, type of treatment, complications due to diabetes, family history of diabetes, source of advice about diabetes, past medical history, hemoglobin HbA1c, fasting blood sugar, and random blood sugar levels. The second part consisted of 10 questions (statements) on the attitude of the patients regarding their disease and was taken from the diabetic care profile, which was developed by the University of Michigan (Fitzgerald et al., 1996). English was the questionnaire's original language, and two bilingual translators (Google Translate and Britannica English-Arabic Translator) were used to translate English to Arabic. A pilot study was done on 20 patients in 3 weeks duration extended from 1/2/2023 to 22/2/2023 and the duration of each patient interview was about 30 minutes.

### **2.6. Assessment of Economic Status**

Two variables were used for patients' Economic Status; The first was according to the patients' own assessments and the second was according to the Crowding Index Level. The Crowding Index Level was calculated from The Crowding Index which is the proportion of all the individuals living in the house and all the house rooms apart from the kitchen and bathroom (World Health Organization, 2018). Patients with a Crowding Index of (less than 1) were considered as having a Low Crowding Index Level, whereas patients with a Crowding Index of (1-2.99) and (more than or equal to 3) were considered as having a Medium and High Crowding Index Levels respectively (Iraqi Ministry of Planning, 2014). The Low, Medium and High Crowding Indexes were converted to Good, Average and Weak Economic Statuses respectively.

### **2.7. Assessment of Attitude Scores**

Each item was assessed using one of five subscales: 1 = strongly disagree (SD), 2 = disagree (DA), 3 = neutral (NE), 4 = agree (A), and 5 = strongly agree (SA). The maximum score was 50. The scores were reversed for negatively-worded items before data analysis.

### **2.8. Assessment of Attitude Level**

Three categories were created based on the respondents' scores. The following cut-off points were used to determine the attitude scoring level: 75%–100%, 50%–74%, and 0%–49% for good, moderate, and poor levels, respectively (Al-Mutawaa et al., 2022).

## **2.9. Ethical Approval**

Ethical approval was taken from the Medical Research Bioethical Committee at the University of Kerbala – College of Medicine (Number: 13 at 6/3/2023), and approval was taken from the Karbala Health Directorate. Verbal consent was taken from the participants.

## **2.10. Statistical Analysis**

The Statistical Package for the Social Sciences (SPSS) version 22.00 and Microsoft Excel 16 were utilized to compute descriptive statistics. The significance level for all statistical tests was set at 0.05. Mean  $\pm$  standard deviation (St.D) was the interpretation used for continuous variables and frequencies and percentages were used to represent categorical data. The means of two groups were compared using an independent samples t-test and the means of three or more groups were compared using ANOVA and Tukey's post hoc tests. Using Pearson's rank correlation coefficient test, relationships between diabetic attitude scores, glycated hemoglobin, fasting blood sugar, and random blood sugar were investigated.

## **3.Results**

### **3.1. Sociodemographic Characteristics of The Patients**

The patients' sociodemographic details are shown in (Table 1). The mean age of the patients was  $56 \pm 9.83$  years. 64.3% of the patients were females. 79.0% of the patients were married. Regarding the educational level, 42.1% of the patients completed the primary level and 24.6% of them were classified as illiterate (Neither reads nor writes).

Regarding the job type, 11.9% of the patients were government employees, 16.3% of them were retired and 56.7% of them were housewives. For the males, 35.6% of them were retired, 31.1% of them were classified as free business and 26.7% as government employees. For the females, the majority of them (88.3%) were housewives.

Regarding the Residence, 91.3% of the patients lived in urban areas. 55.2% of the patients lived in Owned houses, 17.1% lived in Rented houses, 17.1% lived in houses built in Agricultural areas and 10.7% lived in houses built in Slum areas.

Regarding economic status according to the patients' assessments, 127 (50.4%) patients considered themselves as having weak economic status, 111 (44.0%) as having average economic status and 14 (5.6%) as having good economic status. Regarding economic status according to the Crowding Index Level, 64 (25.4%) patients were considered as having weak economic status, 167 (66.3%) as having average economic status and 21 (8.3%) as having good economic status. 74.2% of the patients were non-smokers.

**Table 1: Sociodemographic Characteristics of The Patients**

<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Gender	Male	90	35.7
	Female	162	64.3
Age Groups / years	Under 45	30	11.9
	45-54	87	34.5
	55-64	80	31.7
	65-74	46	18.3
	75 and older	9	3.6
Marital Status	Single	3	1.2
	Married	199	79
	Widower / Widow	46	18.3
	divorced	4	1.6
Educational level	Neither reads nor writes	62	24.6
	Primary	106	42.1
	Intermediate	34	13.5
	Preparatory	20	7.9
	University \ Institute	25	9.9
	Postgraduate	5	2
Job type	Government employee	30	11.9
	Retired	41	16.3
	Free Business	32	12.7
	Not working	6	2.4
	Housewife	143	56.7
Residence	Urban	230	91.3
	Rural	22	8.7
House type	Owned	139	55.2
	Rented	43	17.1
	Slum	27	10.7
	Agricultural	43	17.1
Economic Status according to the patients' assessments	Weak	127	50.4
	Average	111	44
	Good	14	5.6
Economic status according to Crowding Index Level	Weak	64	25.4
	Average	167	66.3
	Good	21	8.3
Smoking	Yes	31	12.3
	No	187	74.2
	Ex-smoker	34	13.5

### 3.2. Clinical Data About Diabetes Mellitus

The patients' clinical data about diabetes mellitus is shown in (Table 2).

The mean duration of diabetes was  $10.1 \pm 6.82$  years. 250 patients (99.2% of the patients) took treatment, including any one or more of these types (diet-only, oral pills-only, insulin-only, oral pills and insulin, herbals-only). 71.0% of the patients had their treatment included oral pills-only, 70.6% included diet-only, 15.1% included oral pills and insulin, 15.1% included herbals-only and 9.9% included insulin-only. 2 patients (0.8%) didn't take any kind of treatment, not even diet-only treatment. 40.9% of the patients reported that their disease was not under control and 34.5% reported that it was somewhat under control. 96.0% of the patients had complications due to diabetes. The percentage of complications among type 2 diabetic patients is shown in (Fig.1). 217 (86.1%) of the patients reported that they suffer from diabetic neuropathy, 122 (48.4%) from hypoglycemia, 92 (36.5%) from cataract, 70 (27.8%) from sexual dysfunction (all were males), 60 (23.8%) from diabetic retinopathy, 54 (21.4%) from coronary heart disease, 37 (14.7%) from diabetic foot, 11 (4.4%) from peripheral vascular disease, 10 (4.0%) from stroke, 8 (3.2%) from diabetic nephropathy and 59 (23.4%) reported that they suffer from other complications. Concerning other complications that were mentioned by the patients, 17 (29%) of them reported they suffered from weight loss, 15 (25%) from non-alcoholic fatty liver disease, 12 (20%) from glaucoma, 5 (8%) from recurrent urinary tract infection, 4 (7%) from joint pain, 2 (3%) from amputation in the foot and gingivitis, weight gain, dry eye and paronychia with abscess formation were reported by one patient (2%) for each of them.

77.0% of them reported that they had a first-degree family member with type 2 diabetes (father, mother, brother, sister, son, daughter). The sources of information about diabetes are shown in (Fig.2). 231 patients (91.7%) took their information from doctors, 190 (75.4%) from family members, 168 (66.7%) from social media, 147 (58.3%) from relatives and friends, 111 (44.0%) from nurses, 101 (40.1%) from TV, radio and newspapers and 2 (0.8%) from other source which was from pharmacists. 90.9% of them said that they had other diseases besides type 2 diabetes. 180 (71.4%) of them had dyslipidemia, 152 (60.3%) had hypertension, 71 (28.2%) had heart diseases, 28 (11.1%) had thyroid diseases, 11 (4.4%) had stroke, 7 (2.8%) had kidney diseases and 46 (18.3%) had other types of diseases.

The glycemic control values of the patients are shown in (Table 3). The Hemoglobin HbA1c was recorded for 147 patients (58.3%) and the mean was  $9.44 \pm 2.10\%$ . The Fasting Blood Sugar (FBS) was recorded for 120 patients (47.6%) and the mean was  $176.11 \pm 65.26$  mg/dL. The Random Blood Sugar (RBS) was recorded for 97 patients (38.5%) and the mean was  $257.15 \pm 87.37$  mg/dL.

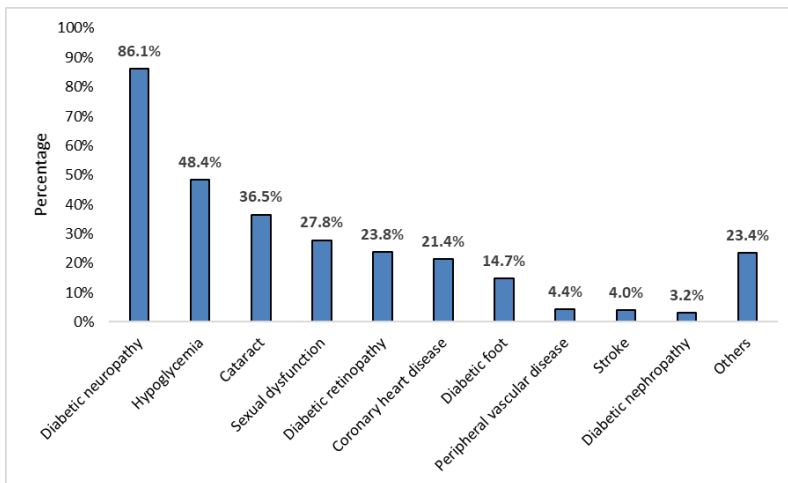


**Table 2:** Clinical Data About Diabetes Mellitus

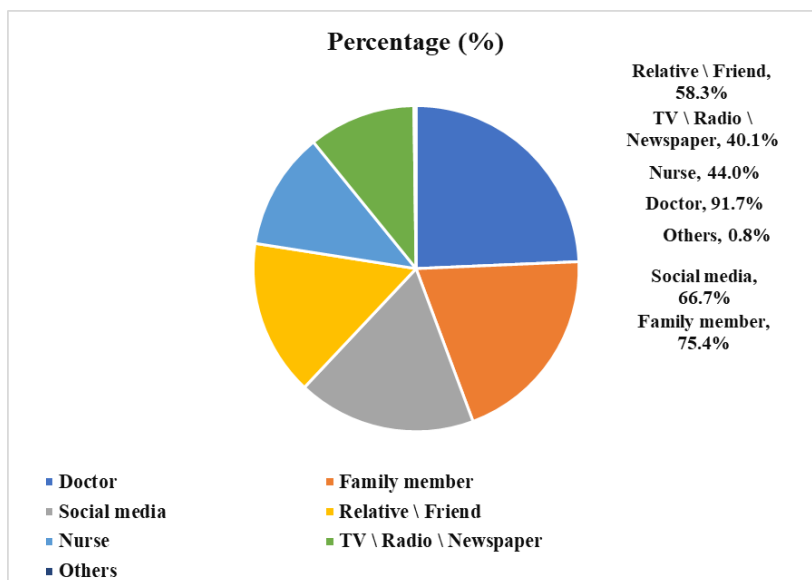
Variables	Categories	Frequency	Percentage (%)
Diabetes duration groups	5 years or less	79	31.3
	6-10 years	74	29.4
	11-15 years	50	19.8
	16-20 years	32	12.7
	More than 20 years	17	6.7
Take treatment	Yes	250	99.2
	No	2	0.8
Type of treatment	Diet only	178	70.6
	Oral pills only	179	71
	Insulin only	25	9.9
	Oral pills and insulin	38	15.1
	Herbals only	38	15.1
Disease under control	Yes	62	24.6
	Somewhat	87	34.5
	No	103	40.9
Complication	Yes	242	96
	No	10	4
Family history	Yes	194	77
	No	58	23
Other chronic diseases	Yes	229	90.9
	No	23	9.1

**Table 3:** Glycemic Control Values of The Patients (N = 252)

Glycemic control values	Mean $\pm$ St.D	Frequency	Percentage (%)
Hemoglobin HbA1c in %	9.44 $\pm$ 2.10	147	58.3
Fasting Blood Sugar in mg/dL	176.11 $\pm$ 65.26	120	47.6
Random Blood Sugar in mg/dL	257.15 $\pm$ 87.37	97	38.5
St.D = Standard Deviation			



**Figure 1:** Percentage of Complications Among Type 2 Diabetic Patients



**Figure 2:** Sources of Information About Diabetes

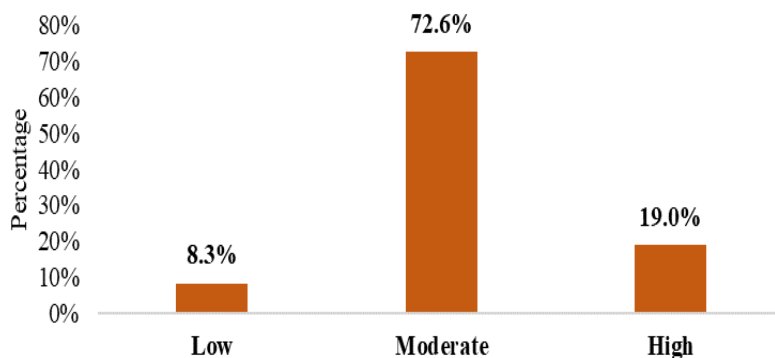
### 3.3. Attitude Assessment

The mean score, mean score percentage, and its 95% Confidence Interval of the attitudes of the patients are shown in (Table 4). About three-quarters of the patients (72.6%) had a moderate attitude level. The attitude levels are shown in (Fig.3). The number and percentage of patients who expressed positive or negative attitudes toward each item in the attitude questionnaire are shown in (Table 5). The choices strongly disagree (SD) and disagree (DA) for items 1, 2, 3 and 9 and the choices agree (A) and strongly agree (SA) for items 4, 5, 6, 7, 8 and 10 both corresponded to a positive attitude. The neutral choices (NE) were included in the negative attitudes.

221 (87.7%) of the patients found it hard to believe that they really had diabetes. 190 (75.4%) felt unhappy and depressed because of their diabetes. 191 (75.9%) felt they were not as good as others because of their diabetes. 103 (40.8%) could do just about anything they set out to do. 244 (96.8%) said they should control their weight to control diabetes. Only 74 (29.3%) thought that things were going very well for them right now. 247 (98.0%) said they should monitor their blood glucose at home. 39 (15.4%) thought that diabetes did not affect their life at all. Only 22 (8.8%) said that eating restrictions were no longer required once diabetes was controlled. 250 (99.2%) thought regular exercise helped keep diabetes under control.

**Table 4:** The Patients' Mean Scores, Mean Score Percentages, And Their 95% Confidence Intervals of Attitude (N = 252)

Scores	Minimum	Maximum	Mean	Mean percentage %	95% Confidence Interval of Mean percentage %
Attitude score	19	48	31.55	63.10	61.64 - 64.69



**Figure 3:** Distribution of Attitude Levels of The Patients (N = 252)

**Table 5:** The Responses of the Patients Regarding Their Attitudes Towards Diabetes

<b>Attitudes</b>	<b>SD N(%)</b>	<b>DA N(%)</b>	<b>NE N(%)</b>	<b>A N(%)</b>	<b>SA N(%)</b>	<b>Positive N(%)</b>	<b>Negative N(%)</b>
I find it hard to believe that I really have diabetes	9(3.6)	22(8.7)	4(1.6)	63(25.0)	154(61.1)	31(12.3)	221(87.7)
I feel unhappy and depressed because of my diabetes	15(6.0)	47(18.7)	8(3.2)	39(15.5)	143(56.7)	62(24.7)	190(75.4)
I feel I am not as good as others are because of my diabetes	15(6.0)	46(18.3)	10(4.0)	77(30.6)	104(41.3)	61(24.3)	191(75.9)
I can do just about anything I set out to do	68(27.0)	78(31.0)	3(1.2)	54(21.4)	49(19.4)	103(40.8)	149(59.2)
People with diabetes should control their weight	1(0.4)	1(0.4)	6(2.4)	53(21.0)	191(75.8)	244(96.8)	8(3.2)
Things are going very well for me right now	57(22.6)	80(31.7)	41(16.3)	57(22.6)	17(6.7)	74(29.3)	178(70.6)
People with diabetes should monitor their own blood glucose at home	0(0)	2(0.8)	3(1.2)	17(6.7)	230(91.3)	247(98.0)	5(2.0)
Diabetes does not affect my life at all	153(60.7)	53(21.0)	7(2.8)	23(9.1)	16(6.3)	39(15.4)	213(84.5)
Once diabetes is controlled, eating restrictions are no longer required	66(26.2)	164 (65.1)	3(1.2)	13(5.2)	6(2.4)	230(91.3)	22(8.8)
Regular exercise helps in keeping diabetes under control	0(0)	0(0)	2(0.8)	30(11.9)	220(87.3)	250(99.2)	2(0.8)

### 3.4. Attitudes and Sociodemographic Characteristics

The relationship between the attitude scores and the sociodemographic characteristics of the patients is displayed in (Table 6). There was a significant relationship between the attitude scores and the gender of the patients ( $P = 0.01$ ), where the male patients had higher attitude scores than the female patients ( $32.89 \pm 6.668$  vs.  $30.81 \pm 5.790$ ).

There was a highly significant relationship between attitude scores and the educational level of the patients ( $P < 0.001$ ), where the attitude score increased as the educational level increased, where the mean attitude score for neither reads nor writes versus preparatory, university \ institute and postgraduate educational levels was ( $29.55 \pm 6.535$  vs.  $35.55$

$\pm 5.176$ ,  $34.56 \pm 6.609$  and  $37.4 \pm 7.301$ ) respectively. There was a highly significant relationship between attitude scores and job type ( $P < 0.001$ ), where the government employee had higher attitude scores than the housewives ( $34.43 \pm 6.372$  vs.  $30.39 \pm 5.684$ ) and the retired patients had higher attitude scores than the housewives ( $34.1 \pm 6.629$  vs.  $30.39 \pm 5.684$ ). There was a highly significant relationship between attitude scores and economic status (according to the patients' assessments) ( $P < 0.001$ ), where the attitude scores increased as the economic status increased, where the mean attitude score for good economic status versus average and weak economic status was ( $37.64 \pm 5.969$  vs.  $32.58 \pm 6.036$  and  $29.98 \pm 5.764$ ) respectively.

**Table 6:** Sociodemographic Characteristics of the Patients with Differences in Attitude Scores

Variables	Categories	No.	Attitude score			
			Mean	$\pm$	St.D	P
Gender	Male	90	32.89	$\pm$	6.668	0.010*
	Female	162	30.81	$\pm$	5.79	
Age Groups / years	Under 45	30	32.27	$\pm$	7.46	0.605
	45-54	87	31.14	$\pm$	5.587	
	55-64	80	31.7	$\pm$	6.327	
	65-74	46	32.11	$\pm$	6.287	
	75 and older	9	29	$\pm$	5.701	
Marital Status	Single	3	27.33	$\pm$	4.933	0.435
	Married	199	31.78	$\pm$	6.23	
	Widower / Widow	46	31.09	$\pm$	6.099	
	divorced	4	28.75	$\pm$	5.56	
Educational level	Neither reads nor writes	62	29.55	$\pm$	6.535	<0.001*
	Primary	106	30.52	$\pm$	4.925	
	Intermediate	34	33	$\pm$	6.814	
	Preparatory	20	35.55	$\pm$	5.176	
	University \ Institute	25	34.56	$\pm$	6.609	
	Postgraduate	5	37.4	$\pm$	7.301	
Job type	Government employee	30	34.43	$\pm$	6.372	<0.001*
	Retired	41	34.1	$\pm$	6.629	
	Free Business	32	31.47	$\pm$	6.278	
	Not working	6	27.83	$\pm$	3.71	
	Housewife	143	30.39	$\pm$	5.684	
Residence	Urban	230	31.67	$\pm$	6.324	0.311
	Rural	22	30.27	$\pm$	4.399	
House type	Owned	139	32.15	$\pm$	6.138	0.173
	Rented	43	31.51	$\pm$	6.84	
	Slum	27	29.37	$\pm$	6.488	
	Agricultural	43	31.02	$\pm$	5.244	

Economic Status according to the patients' assessments	Weak	127	29.98	± 5.764	<0.001*
	Average	111	32.58	± 6.036	
	Good	14	37.64	± 5.969	
Economic status according to Crowding Index Level	Weak	64	30.11	± 5.538	0.096
	Average	167	32.02	± 6.373	
	Good	21	32.19	± 6.129	
Smoking	Yes	31	30.97	± 5.32	0.531
	No	187	31.46	± 6.137	
	Ex-smoker	34	32.59	± 7.182	
St.D = Standard Deviation					

### 3.5. Attitudes and Clinical Data About Diabetes Mellitus

The relationship between the attitude scores and the clinical data about diabetes mellitus is displayed in (Table 7).

There was a significant relationship between the attitude scores and diabetes duration groups ( $P = 0.011$ ), where the attitude scores increased as the diabetes duration decreased, where the mean attitude score for those patients who had diabetes for 5 years or less was higher than that for those patients who had diabetes for 6-10 years ( $33.58 \pm 7.185$  vs.  $30.85 \pm 5.804$ ) and also was higher than that for those patients who had diabetes for 11-15 years ( $33.58 \pm 7.185$  vs.  $30.52 \pm 4.892$ ). There was a significant relationship between the attitude scores and the type of treatment ( $P = 0.005$ ), where the patients who took oral pills-only had higher attitude scores than those who took insulin-only ( $32.25 \pm 6.47$  vs.  $28.84 \pm 5.86$ ). There was a highly significant relationship between attitude scores and the patients' perceptions that their disease was under control ( $P < 0.001$ ), where the patients who responded yes had higher attitude scores than both those who responded somewhat and no ( $35.65 \pm 7.70$  vs.  $31.75 \pm 5.43$  and  $28.92 \pm 4.09$ ) respectively.

There was a highly significant relationship between attitude scores and the presence of complications ( $P < 0.001$ ), where the patients who didn't have complications had higher attitude scores than those who had complications ( $39.40 \pm 4.88$  vs.  $31.23 \pm 6.02$ ).

**Table 7:** Clinical Data About Diabetes Mellitus with Differences in Attitude Scores

Variables	Categories	No.	Attitude score			
			Mean	±	St.D	P
Diabetes duration groups	5 years or less	79	33.58	±	7.185	0.011*
	6-10 years	74	30.85	±	5.804	
	11-15 years	50	30.52	±	4.892	
	16-20 years	32	30.69	±	5.337	
	More than 20 years	17	29.82	±	5.982	
Take treatment	Yes	250	31.58	±	6.204	0.485
	No	2	28.5	±	0.707	
Type of treatment	Oral pills only	179	32.25	±	6.466	0.005*
	Insulin only	25	28.84	±	5.857	
	Oral pills and insulin	38	29.47	±	4.065	
Disease under control	Yes	62	35.65	±	7.691	<0.001*
	Somewhat	87	31.75	±	5.429	
	No	103	28.92	±	4.091	
Complication	Yes	242	31.23	±	6.025	<0.001*
	No	10	39.4	±	4.881	
Family history	Yes	194	31.41	±	5.916	0.499
	No	58	32.03	±	7.049	
Other chronic diseases	Yes	229	31.41	±	6.044	0.269
	No	23	32.91	±	7.471	
St.D = Standard Deviation						

### 3.6. Correlations of Attitude Scores

Attitude score had a moderate significant negative correlation with both HbA1c and FBS at the 0.01 level with a P value of high significance (<0.001) as shown in Table 8.

**Table 8:** Correlations of the Patients' Hemoglobin HbA1c, Fasting Blood Sugar, and Random Blood Sugar with Their Attitude Scores

Variables		Attitude score
<b>Hemoglobin HbA1c</b>	Pearson Correlation	<b>-.410**</b>
	Sig. (2-tailed)	<b>&lt;0.001</b>
	N	<b>147</b>
<b>Fasting Blood Sugar</b>	Pearson Correlation	<b>-.375**</b>
	Sig. (2-tailed)	<b>&lt;0.001</b>
	N	<b>120</b>
<b>Random Blood Sugar</b>	Pearson Correlation	-0.017
	Sig. (2-tailed)	0.866
	n	97
**. Correlation is significant at the 0.01 level (2-tailed).		

## **4. Discussion**

### **4.1. Attitude Assessment**

In this study, the patients' level of attitude was found to be moderate in the majority (72.6%). This finding is similar to a study carried out in Iran (Mohammadi et al., 2015) which reported that most participants have a moderate attitude level, and differs from the findings of a study conducted in Baghdad, Iraq (Abbas et al., 2016) which stated that a large number of patients had a poor attitude level and from a study conducted in Iran (Niroomand et al., 2016) in which majority had good attitude level. The variations in the outcomes of these studies can be attributed to numerous factors that include the level of education, socioeconomic level, duration of diabetes, and glycemic control. The majority of patients (87.7%) reported a negative attitude of finding it hard to believe that they have diabetes, which is similar to the finding from a study conducted in the United Arab Emirates (Al-Maskari et al., 2013) and differs from a study conducted in Saudi Arabia (Al-Aboudi et al., 2016). The majority of patients reported a positive attitude toward the importance of DM care through controlling their weight (96.8%), monitoring their blood glucose at home (98.0%), and keeping diabetes under control through regular exercise (99.2%). This finding is similar to (Al-Maskari et al., 2013) and differs from (Mohammadi et al., 2015). 75.4% of the patients reported that they feel unhappy and depressed because of their diabetes and 75.9% of them reported that they feel they are not as good as others are because of their diabetes. The previous two statements are negative attitudes and their percentages are higher than those of (Al-Aboudi et al., 2016). 8.8% of the patients agreed with the statement that once diabetes is controlled, eating restrictions are no longer required which is a negative attitude. This finding is similar to a study conducted in India (Mukhopadhyay et al., 2010) and differs from (Mohammadi et al., 2015). 40.8% of the patients reported that they can do just about anything they set out to do; 29.3% reported that things are going very well for them right now and 15.4% reported that diabetes does not affect their lives at all. The previous statements are positive attitudes and their percentages are lower than those of (Al-Aboudi et al., 2016). This study's mean attitude score is 31.55 out of 50, which is positive. This finding is similar to the finding from (Al-Aboudi et al., 2016) and differs from the finding from (Al-Maskari et al., 2013) which showed a negative average attitude. This indicates that the patients are willing to change their lifestyles to manage their disease.

### **4.2. Attitudes and Sociodemographic Characteristics**

The male patients had higher attitude scores than the female patients which is similar to the findings from Iraq (Abbas et al., 2016) and Tanzania (Joho et al., 2023), and differs from a study conducted in Malaysia (Abbasi et al., 2018). It is noted that males with diabetes manage their condition better, experiencing less anxiety and depression. They feel less anxious about society and are pleased with how they are handling their health (Siddiqui et al., 2013). This may explain this finding. The attitude score increased as the educational level increased. This finding is similar to the findings of studies from Iraq (Abbas et al., 2016), Egypt (Lotfy et al., 2022), Saudi Arabia (Mahzari et al., 2022), and Malaysia (Abbasi et al., 2018) and differs from that conducted in the United Arab Emirates (Al-Maskari et al., 2013) which didn't show a significant association. Higher-educated people might have a more positive attitude toward their



disease because they have a greater understanding of it and how to treat it, which could account for this finding. Also, Education is seen to provide people with the information and the skills needed to manage their diabetes properly. This in turn provides the person with a more positive outlook about life. Furthermore, higher education can increase a person's ability to obtain healthcare resources and knowledge, giving the person the capability to participate in the management of their diabetes and be the one making informed decisions about its treatment.

The government employees and the retired patients had higher attitude scores than the housewives. This result is similar to the other studies conducted in Iraq (Abbas et al., 2016), and Malaysia (Abbasi et al., 2018) but in contrast with the finding from Iran (Karbalaeifar et al., 2016) which didn't show a significant association. This evidence may be explained by the fact that employment is known to be linked with better educational achievement, which has a positive effect on attitude. Hence, the patients who are employed or retired, who are more likely to be educated, have higher attitude scores than housewives, who may be less educated. The attitude scores increased as the economic status (according to the patients' assessments) increased. This finding is similar to (Abbasi et al., 2018), but varies from (Al-Maskari et al., 2013) which reported no relationship between attitude scores and economic status. This might be due to the fact that those with higher socioeconomic status have better access to healthcare resources, education, and information, which contribute to a more positive attitude adopted in diabetes management.

#### **4.3. Attitudes and Clinical Data About Diabetes Mellitus**

The attitude scores increased as the diabetes duration decreased. This finding is in line with studies from Palestine (Thultheen et al., 2021), and Egypt (El-Khawaga and Abdel-Wahab, 2015), while (Abbasi et al., 2018) reflected an upgrade in the attitude scores as the diabetes duration increased, and (Al-Maskari et al., 2013) didn't show a significant association. Such findings may result from the idea that individuals with a short duration of diabetes are less likely to have complications from their disease, thereby having a more positive attitude toward it, while those with a longer duration are more likely to have complications as a result of it, hence having a more negative attitude.

The patients who took solely oral pills got higher attitude scores than those who used only insulin. This finding correlates well with what was observed in (Al-Maskari et al., 2013). It is different from (Niroomand et al., 2016), where the patients who took oral pills-only had lower attitude scores than those who took insulin-only, and from (Al-Aboudi et al., 2016) which did not show a substantial relationship. This result could be due to the fact that people who are on oral diabetes medication only believe their condition is not as serious as compared to patients taking insulin, which may result in a more positive attitude. Moreover, individuals taking oral medication only may be favorable in their attitude regarding the disease because of their better understanding of the disease and how to manage it. Besides, those taking only oral medicine may have fewer complications and shorter-term diabetes than those relying on insulin treatment, which might enhance their optimistic outlook. Switching from oral antihyperglycemic medications to insulin therapy may elicit negative attitudes among these patients due to fears of hypoglycemia, uncomfortable injections, and storage, which could be associated with the lower attitude scores observed among these individuals. Therefore, patients taking tablets-only treatment for type 2 diabetes may have higher attitude scores due to the mixture of lower-risk beliefs and reluctance to take insulin.

The patients who didn't have complications had higher attitude scores than the ones who had complications. The result is like the finding from the study conducted in India (Aswathi et al., 2019), while it is different from that in the study from Eritrea (Adgoy et al., 2021). This result could be due to the fact that patients with no complications are more informed about their condition and experience a better quality of life. In addition to that, their view may be more supportive, and they might perceive their ability to manage diabetes or carry out self-care more positively. Moreover, due to the obstacles and limitations imposed by their disease, patients who have complications tend to get negative about life more easily.

#### **4.4. Correlations of Attitude Scores**

Attitude scores had a moderate, highly significant negative correlation with both hemoglobin A1c and fasting blood sugar. This is contrary to the studies conducted in India (Solanki et al., 2017), and Iran (Karbalaefar et al., 2016) where no significant correlations were reported. Outcomes might be caused by the fact that patients can have more negative emotions or behaviors in case they are thinking wrongly and the way they see their illness is distorted. Posing negative attitudes to people living with diabetes can hinder beneficial self-management behaviors, for instance, medicine compliance, food control, and doing physical activities frequently, which in turn may cause poor glycemic control, as evidenced by high HbA1c and fasting blood sugar levels.

#### **5. Conclusions**

Most patients exhibited a moderate level of attitude, with an overall positive outlook on their condition, suggesting openness to diabetes self-management education programs and a willingness to take responsibility for their care. Doctors, family members, and social media were identified as the most common sources of information for diabetics, with social media platforms playing an increasingly important role in providing guidance. Despite this, patients generally had inadequate blood glucose control, as indicated by their mean hemoglobin A1c, fasting blood sugar, and random blood sugar levels. Attitudes toward type 2 diabetes were significantly correlated with hemoglobin A1c and fasting blood sugar, underscoring the relationship between attitude and glycemic control.

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