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ORIGINAL RESEARCH

Assessment of Diabetes Knowledge and Its Associated Risk Factors among Patients with Type 2 Diabetic in Endocrine Center in Sulaymaniyah: Cross-Sectional Study

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ABSTRACT

Background: Diabetes Mellitus (DM) is a clinical syndrome characterized by hyperglycemia due to an absolute or relative deficiency of insulin.

Objectives: The study aimed to assess the knowledge on DM and its associated risk factors among type 2 diabetic patients in endocrine center in Sulaimaniyah city.

Methodology: A descriptive cross-sectional study was carried out among 308 diabetic patients by using convenient sampling. Face to face interview was used to collect data. Data were collected from October to November 2025.

Results: The high percentages of participants were age between 41-65 years old (75%), (31.8%) female, (48.7%) illiterate, (76%) married. Most of participants were unemployed 54.9%. Good knowledge about diabetes mellitus was 32.5%, and poor knowledge about diabetes mellitus was 32.5%. The correlation between socio-demographic variables and the general knowledge of diabetic mellitus among the participants revealed that gender, educational level, occupation, and place of residence were significantly correlated. Similarly, there was a highly association between patient's overall knowledge on diabetes mellitus and heredity, smoking, alcohol consumption, and monitoring the diabetes.

Conclusion: The study concluded that the need of improving patient's awareness on diabetes mellitus in order to obtain better health outcomes. It is crucial to provide diabetic patients education, pamphlet and counseling sessions to enhance their knowledge.

Keywords: knowledge, diabetes mellitus, assessment, risk factors.

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INTRODUCTION

Diabetes mellitus (DM) is a clinical condition marked by elevated blood glucose levels resulting from either a complete or partial lack of insulin. Deficiency of insulin may increase in different methods for instance; destruction of pancreas's β–cells, by this organ insulin can be produced [1, 2]. Moreover, it is defined to be an epidemic global and a fast developed major non communicable disease threatening both society such as affluent and non-affluent [3, 4].

Diabetes mellitus (DM) prevalence has increased worldwide, particularly in the Middle East and North Africa area, with a predicted 110% increase by 2045 [5]. According to IDF reports Diabetes is a leading cause of approximately one million deaths [6]. According to the World Health Organization (WHO), diabetes was the eighth cause of death in 2019, accounting for 1.6 million deaths [7,8]. Additionally, a recent study the estimated annual diabetes mortality that is projected to reach 1.63 million deaths by 2030, particularly concerning is the projected rise in mortality among adults aged 15–49 and 50–69 years, especially in low- and middle-income countries [9].

Knowledge plays a vital role in any future disease development and its early prevention and detection. Positive knowledge is important for diabetic patients. Elements of knowledge, attitude, and practice are interrelated and dependent on each other. If the level of one element is higher, the other two factors should be affected positively. Knowledge, attitude, and practice regarding diabetes vary greatly depending on socio economic conditions, cultural beliefs and habits [10]. A study observed critical gaps in knowledge. For instance, study conducted in three teaching hospitals in Basrah, southern Iraq on 205 adult patients, they found Only half of the patients had adequate Type 2DM knowledge. Patients with a younger age, male gender, greater educational level, and longer T2DM duration had a higher level of knowledge [11]. Similarly, a study was carried out in Saudi Arabia on 363 Type 2 DM patients to assess their knowledge and dietary habits, as well as the associated factors of T2DM patients. 36.4% had inadequate knowledge, 34.4% medium knowledge, and just 29.2% high knowledge. Dietary habits were classified as 34.4% unhealthy, 33.3% slightly healthy, and 32.3% healthy. The results highlight the need for particular health education interventions that address dietary knowledge gaps and encourage healthy eating habits among Type 2 DM patients [12].

In Iraq, although research has been done to investigate the knowledge and practices of diabetic groups, there have been very few studies on the understanding of patients about their disease and the risk factors that correlate with the best understanding or the worst understanding in the Sulaimaniyah-Kurdistan region. This type of knowledge is valuable in the personalization of diabetes education interventions in the area, enhancement of self-management, minimization of complications, and resource allocation optimization.

AIMS OF THE STUDY

The aim of the current study is to assess the diabetes knowledge and its associated risk factors among type 2 diabetic patients in Endocrine center in Sulaimaniyah.

METHODOLOGY

The study employed a cross-sectional, quantitative design. The participants included adults with Type 2 diabetes mellitus (T2DM) who are visiting the Sulaimaniyah Diabetes and Endocrine center at the time of data collection from September 2025 to November 2025 and fulfilling the inclusion criteria. Study subject included: those over 18 years of age, diagnosed with type 2 diabetic and capable of understanding and completing questionnaires. Subject who was not willing to participate and unable

of understanding and completing the questionnaires were excluded from the study because of impaired cognitive status.

The sample size was initially estimated using the single population proportion formula with a 95% confidence level and 5% margin of error, assuming a proportion of 50%, which yielded a required sample size of 384 participants. However, due to feasibility and resource limitations, a total of 308 participants were recruited using a convenience sampling technique. This sample size is considered acceptable for cross-sectional analysis and is comparable to similar studies. The study population included people diagnosed with diabetes living in Sulaimaniyah and its surrounding. Data was collected using standardized structure questionnaire. The researchers were collected via face-to-face interview using structured questionnaires, it contains two parts: first part was about socio demographic data, family history of diabetes and collect clinical status data of the study subjects. Second part included: DKQ-24 (Diabetes Knowledge Questionnaire) which was used to measure the patient's knowledge to diabetes. The DKQ which is a 24-item test developed by the Starr County Texas, Diabetes Education Study [13]. Diabetes knowledge was assessed with the 24-item version of the Diabetes Knowledge Questionnaire (DKQ-24) developed for use with people living with type 2 diabetes and is a shortened version of the original 60- item survey from Villagomez et al [14,15]. The DKQ-24 is a tool designed to use measure of general knowledge related to diabetes. Participants' answers (yes/no/don't know). The items were scored with one point given for a correct answer and zero points given for "I don't know" response or incorrect answer (1 correct, 0 incorrect) [16]. The total number of correct or incorrect scores is calculated, providing a total percentage score.

Total scores of DKQ-24 need to be summed up to attain diabetes knowledge scores of each subject with diabetes. To assess the level of diabetes knowledge scores were used. Maximum score attainable is 24 and the minimum score is 0. Scores of (> 12) considered as satisfactory and scores of (≤ 12) considered as a poor knowledge scores or unsatisfactory for the purpose of this present study. Greater score indicates better diabetes knowledge [17, 18]. There are many questionnaires have been developed for assessing diabetes patient's knowledge related to DM and its management. The DKQ-24 is a reliable and valid tool that assesses the knowledge related to diabetes that is relatively easy to administer (1-24). The aspects to assess include (10 items) basic information (7 items) is a glycemic control and (7 items) is about prevention of complications. Informal oral consent was taken from the participants before data collection and the researchers have promised to keep the information confidential and used these data only for the aims of this study.

The Diabetes Knowledge Questionnaire (DKQ-24) was used to measure patients' knowledge. A score of 1 was assigned to each correct answer and 0 to each incorrect or "don't know" answer. The scale is from 0 to 24. The average knowledge was calculated and knowledge levels were classified as either good or poor based on a cut-off value. A score of >12 was defined as good (satisfactory) knowledge level and a score of ≤12 was defined as poor (unsatisfactory) knowledge level.

Ethical Consideration

Ethical approval was obtained from Sulaimani Polytechnic University, College of Health and Medical Technology.

Statically analysis

The data were entered and analyzed via using SPSS software for statistical analysis Version 26, for calculating descriptive (Frequency and Percentage) and inferential (Chi-square and Fishers exact tests) to determine association between socio-demographic characteristics and overall levels of knowledge of the study sample. P value is > 0.05, is considered to be significant.

RESULTS

In this study, we studied 308 diabetic patients, the majority of them were in the age group 41-65 years old (75%), while the minority of the study sample were between 18-40 years (9.7%). The highest percentages of the participants were female (68.2%), most of them belonged to the illiterate group (48.7%).

Regarding marital status, most of them were married (76.0%), with 13.3% widowed, 7.1% single and divorced. With regard to occupation, the majority of the respondents were unemployed (54.9%), there were employees (20.5%), self-employed (13.3%), and retirees (11.4%). The majority of the participants lived within the city (83.1%), but only 16.9% lived outside the city, see table (1).

The majority of the study sample were heredity (81.5%) and had a family history of diabetes mellitus such as their mother (31.8%). The highest proportions of participants were taken medication (82.1%). The highest percentages of study sample were not smoking (70.1%) and did not drinking alcohol (87.3%). The majority of diabetic patients had not monitoring their blood sugar (52.3%) table (2).

Of the 308 T2DM patients, the majority of study sample had poor knowledge regarding diabetes mellitus 67.5%. However, the lowest percentages of participants had good regarding diabetes 32.5% table (3).

The correlation between socio-demographic variables and the general knowledge of diabetic mellitus among the participants revealed that gender educational level, occupation, and place of residence were significantly correlated. The knowledge level of the female participants was poorer compared to the male participants ($p < 0.001$). On the contrary, we found no statistically significant relationships between knowledge levels and age group and marital status ($p = 0.09$ and $p = 0.1$, respectively) table (4).

The results have shown that there were strong relationships between diabetes-related risk factors and the overall knowledge of the patients on diabetes mellitus. Participants having a hereditary history of diabetes were much better informed than those they do not have it ($p = 0.003$).

Similarly, there was a highly association between patient's overall knowledge on diabetes mellitus risk factors, including smoking, alcohol consumption, and monitoring the diabetes. In addition, a significant association was found between family history of diabetes and knowledge level ($p = 0.02$), as presented in Table 5.

DISCUSSION:

The current study examined diabetes-related knowledge, patterns, and associated variables among Type 2 DM patients in Sulaimaniyah city. The responses provided to knowledge-related questions indicate that the individuals enrolled had varying degrees of knowledge, the majority of the study samples have insufficient knowledge regarding diabetes mellitus in Sulaimaniyah city, the result of the study is incompatible with study which was carried out in Ethiopia, it represented that participants had good knowledge regarding diabetes mellitus [19] However, the result of the present study is similarly to study conducted in U.A.E, Nepela, Los Angeles County Hospital [20]. In addition to that similar results were reported from the research carried out in Urban area of South India, Karachi, United Arab Emirates and Kuwait by the same Diabetic Knowledge Questionnaires (DKQ) [21,22, and 23]. In recent study performed among 613 Bahraini population, they found that awareness among the Bahraini population was low and in need to implementing education programs [24].

Participants' knowledge of the present study was similar to study which is done in Duhok - Kurdistan region of Iraq indicted that showed inadequate levels of knowledge and interventions are required [25].

These studies generally represented that the Middle East population have poor knowledge regarding diabetes mellitus, as it mentions the main

cause of disabling and amputation of the legs and kidney, heart and eyes problem. In contrast to the present study's result, studies were done in Andhra Pradesh (India), Sri Lanka and Malaysia illustrates adequate diabetes knowledge in diabetic patients [26,27].

The present study revealed that overall diabetic patient's knowledge about diabetes mellitus had a significant association with gender, level of education, occupation, age, and location of the setting. While, there was not significant with the marital status. In contrast, opposite results were found in study conducted from Nepale, Kuwait, and Bangladesh, reported that there was not significant association between overall knowledge of diabetic patients and gender, however it was significant with occupation, age, residency, and level of education, especially graduate [12,28].

Our results support a previously conducted studies that found lower education and rural residence were linked to poor awareness regarding diabetes [24,29].

The results showed the association between poor knowledge of diabetic patients regarding diabetes mellitus and the following medical problems for instance; heredity, drinking alcohol, smoking, taking diabetic medications, and monitoring diabetes was more significant (P=0.001). In contrast to the present study that; a study done in Ethiopia, reported that the associations between knowledge and diabetes-related characteristics accordingly no significant differences were detected in respondents' diabetes' knowledge with one exception which is reporting family history of diabetes was significantly associated with knowledge [19].

The result of the present study showed that there was no significant correlation between poor knowledge of diabetic patients and family history, similar kind of the study result were found that carried out from Nepal and Kuwati [13].

On the contrary, a study in Saudi Arabia found that family history of diabetes significantly associated with the level of knowledge [30].

There were several limitations observed in this research, it was conducted only in Sulaimaniyah city, therefore, it cannot be generalized to the whole Kurdistan or Iraq, the sample size was small, a big sample size will be important to empower and to know significant relationships between participant's socio-demographic data and knowledge regarding diabetes mellitus. Relating self-reported data to certain variables, such as alcohol consumption, smoking, monitoring, and the potential confounding factors, such as the duration of diabetes, and prior diabetes education, were not fully controlled.

CONCLUSIONS:

It can be concluded that the majority of the participants are in the age group (41-65), female, illiterate, married, unemployed and were living in city. Participants had poor knowledge regarding diabetes mellitus. There a significant correlation between patient's poor knowledge and gender, level of education, and occupation.

RECOMMENDATIONS:

It is recommended that this title should be conducted among large sample size in each diabetic center in province of Kurdistan region. The findings of the study highlight the need of improving T2D patients' disease awareness in order to obtain better health outcomes. It is crucial to provide diabetic patients education, pamphlet and counseling sessions available to enhance their knowledge. Such an increase in knowledge will help patients better cope with their disease, embrace healthy lifestyles, comply with treatment, and eventually avoid complications related to diabetes.

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TABLES:

Table (1): Socio-demographic characteristic of participants (308):

Socio-demographic data		Frequency (F)	Percentages (%)
Age group	18 - 40 years	30	9.7
	41 - 65 years	231	75.0
	More than 65 years	47	15.3
Gender	Male	98	31.8
	Female	210	68.2
Level of education	Illiterate	150	48.7
	Primary	73	23.7
	Secondary	45	14.6
	Preparatory	23	7.5
	University	16	5.2
	Master	1	.3
Marital status	Married	234	76.0
	Single	22	7.1
	Divorced	11	3.6
	Widowed	41	13.3
Occupation	Un-employee	169	54.9
	Employee	63	20.5
	Self -employee	41	13.3
	Retire	35	11.4
Residency	Inside city	256	83.1
	Outside city	52	16.9

Table (2): Distribution of diabetes-related risk factors among participants (308):

Medical problem		Frequency	Percentage (%)
Heredity	Yes	251	81.5
	No	57	18.5
Family history	0	50	16.2
	Mother	98	31.8
	Father	33	10.7
	Sister	75	24.4
	Uncle	29	9.4
	All	23	7.5
Medication	Yes	253	82.1
	No	55	17.9
Smoking	Yes	60	19.5
	No	216	70.1
	Former smoker	32	10.4

Alcohol	Yes	39	12.7
	No	269	87.3
Monitoring	Yes	147	47.7

Table (3): Overall knowledge of participants (308) regarding diabetes mellitus

Level of knowledge	Frequency	Percentage %
Good	100	32.5
Poor	208	67.5
Total	**308**	**100.0**

The DKQ-24 questionnaire (range 0-24) was used to measure knowledge. All correct answers = 1 point. Knowledge is good when score is >12 and poor when is ≤12. The average knowledge score was (11.8 ± 31).

Table (4): Relationship between socio-demographic characteristic and overall knowledge of patients regarding diabetes mellitus (308)

Knowledge level		Good		Poor		Total		P value	Chi square
		F	%	F	%	F	%		
Socio-demographic data									
Age group	18-40	15	15%	15	7.2%	30	97%	0.09	4.67
	41-65	71	71%	160	76.9%	231	75%		
	Over 65	14	14%	33	59.9%	47	53%		
Gender	Male	46	46%	52	25%	98	31.8%	<0.001	13.72
	Female	54	54.0%	156	75%	210	68.2%		
Marital status	Single	73	73%	161	77.4%	234	76%	0.1	5.3
	Married	12	12%	10	4.8%	22	7.1%		
	Divorced	3	3%	8	3.8%	11	3.6%		
	Widowed	12	12%	29	13.9%	41	13.3%		
Level of education	Illiterate	15	15%	135	64.9%	150	48.7	<0.001	119.61
	Primary	20	20.0%	53	25.5%	73	23.7%		
	Secondary	28	28.0%	17	8.2%	45	14.6%		
	Institute	22	22.0%	1	0.5%	23	7.5%		
	University	14	14.0%	2	1.0%	16	5.2%		
	Master	1	1.0%	0	0.0%	1	0.3%		
Occupation	Unemployed	29	29.0%	140	67.3%	169	54.9%	<0.001	63.55
	Employee	44	44.0%	19	9.1%	63	20.5%		
	Self-employee	10	10%	31	14.9%	41	13.3%		
	Retire	17	17%	18	8.7%	35	11.4%		
Residency	Inside city	91	91.0%	165	79.3%	256	83.1%	<0.01	6.56
	Outside city	9	9%	43	20.7%	52	16.9%		

Table (5): Association between diabetes-related risk factors and patients' knowledge level

Overall knowledge		Good		Poor		Total		P value	Chi square
Medical problem		F	%	F	%	F	%		
Heredity	Yes	91	91%	160	76.9%	251	81.5%	0.003	8.87
	No	9	9%	48	23.1%	57	18.5%		
Family history	0	6	6.0%	44	21.2%	50	16.2%	0.02	13.34
	Mother	38	38.0%	60	28.8%	98	31.8%		
	Father	12	12%	21	10.1%	33	10.7%		
	Sister	23	23%	52	25%	75	24.4%		
	Uncle	11	11%	18	8.7%	29	9.4%		
	All	10	10%	13	6.3%	23	7.5%		
Medication	Yes	95	95%	158	76%	253	82.1%	<0.001	16.69
	No	5	5%	50	24%	55	17.9%		
Smoking	Yes	32	32%	28	13.5%	60	19.5%	<0.001	16.49
	No	56	56%	160	76.9%	216	70.1%		
	Former smoker	12	12%	20	9.6%	32	10.4%		
Alcohol	Yes	25	25%	14	6.7%	39	12.7%	<0.001	20.38
	No	75	75%	194	93.3%	269	87.3%		
Monitoring	Yes	61	61%	86	41.3%	147	47.7%	<0.01	10.45
	No	39	39%	122	58.7%	161	52.3%		