

Knowledge, Attitudes, and Practices of Patients with type 2 Diabetes Mellitus with Regard to their Disease: A Cross-Sectional Study Among Palestinians of the West Bank

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Abstract

Background: In Palestine, type 2 diabetes mellitus (T2DM) is a rapidly growing health concern. This study was conducted to evaluate current knowledge, attitudes, and practices among Palestinian patients with T2DM in the West Bank and to assess association between knowledge, attitudes, and practices with sociodemographic and clinical characteristics of the patients.

Methods: This cross-sectional observational study was conducted in primary healthcare facilities frequently visited by patients with T2DM across the West Bank of Palestine. A pre-validated interviewer administered questionnaire was used to determine knowledge, attitudes and practices of patients with T2DM with regard to their disease.

Results: Data were collected from 220 patients with T2DM. Patients who were younger than 55 years old (p -value = 0.002), male (p -value = 0.038), never married (p -value = 0.001), employed (p -value = 0.003), had university degree (p -value <0.001), had higher income (p -value <0.001), diagnosed less than 7 years ago (p -value = 0.009), and had usual fasting plasma glucose of less than 140 mg/dL (p -value = 0.027) tended to score more than 50% in the knowledge items. Patients who had higher income tended to have higher positive attitudes (p -value = 0.041) toward their disease. Patients who were younger than 55 years old (p -value = 0.002), employed (p -value = 0.003), had university degree (p -value <0.001), diagnosed less than 7 years ago (p -value = 0.009), had usual fasting plasma glucose of less than 140 mg/dL (p -value = 0.027), had usual postprandial plasma glucose of less than 200 mg/dL (p -value = 0.027), had usual HbA_{1c} of less than 7% (p -value = 0.027) tended to score more than 80% in the practice items.

Conclusions: The study established correlation between knowledge, attitude, and practice scores with sociodemographic and clinical characteristics of patients with T2DM in Palestine. Findings of this study highlighted the need for appropriately designed interventions to increase knowledge of T2DM and its complications, address the negative attitudes toward the disease, and promote healthy practices with regard to the disease. Future studies are still needed to assess if such interventions could be effective in improve health outcomes and quality of life of patients with T2DM in Palestine.

Background

Type 2 diabetes mellitus (T2DM) is a major metabolic disease that is characterized by sustained high levels of blood glycemia which result from defective secretion of insulin, ineffective insulin action, or both [1, 2]. Globally, T2DM is considered a major public health epidemic with considerable number of premature deaths, disabilities, high morbidity, and mortality rates [3]. According to recent estimates, about 462 million people were affected by T2DM in 2017 which corresponded to approximately 6.3% of the world's population [4]. Today, T2DM is the 9th leading cause of mortality that claims 1 million human lives on an annual basis. In Palestine, T2DM is a rapidly growing health concern. The prevalence of T2DM in the general Palestinian population was estimated at 15.3%. The prevalence rate was forecasted to increase to 20.8% for 2020 and 23.4% for 2030 [5].

Complications of T2DM range from acute conditions such as hypoglycemia, hyperosmolar hyperglycemic state and diabetic ketoacidosis to chronic complications affecting multiple vital organs including eyes, kidneys, nerves, and heart [6, 7]. Moreover, T2DM is a major cause of and amputations of the lower limbs [8, 9]. However, complications associated with T2DM might be mitigated by adherence to proper management approaches of the disease [10, 11]. Such approaches aim to achieve optimal glycemic control which might eventually lead to decrease in both macro- and microvascular complications of T2DM [12]. Management of T2DM involves both lifestyle modifications, including healthy diet and regular exercise, and pharmacological therapy [13]. To achieve this, high levels of knowledge of the

disease, access to insulin and other oral hypoglycemic agents, and equipment to monitor blood glycemia are required [14].

Recent studies that were conducted to assess knowledge, attitudes, and practices of patients with T2DM highlighted the necessity of larger awareness among patients with regard to preventing, diagnosis, mitigating risk factors, and minimizing the complications of the disease [15–18]. It has been argued that educating patients on their disease was an effective strategy to reduce complications of T2DM and achieve good control over blood glycemia by improving attitudes of patients and their practices [19, 20]. Previous studies showed that patients with better knowledge about T2DM and its associated complications were expected to adhere to proper treatment and care compared to patients with poor knowledge. It has been argued that patients with T2DM who are knowledgeable of their disease would achieve better control of their blood glycemia resulting in improvement in their health and quality of life [21]. Additionally, unfavorable attitudes were associated with poor control over blood glycemia and incidence of complications [22]. Previous studies have shown differences in knowledge, attitude, and practices among patients with T2DM in different settings [3, 15–18].

Although having good knowledge, attitudes and practices regarding T2DM would be helpful for better patient related outcomes, currently, little is known on the level of knowledge, attitudes and practices among patients with T2DM in Palestine with regard to their disease. Therefore, this study was conducted to evaluate current knowledge, attitudes, and practices among Palestinian patients with T2DM in the West Bank. The study also assessed association between knowledge, attitudes, and practices of patients with T2DM with their sociodemographic and clinical characteristics. Findings of this study could inform future decisions and interventions to improve control over blood glycemia, reduce the incidence of complications, improve care, and quality of life of Palestinians with T2DM.

Methods

Study settings and design

This study was conducted in different primary healthcare facilities frequently visited by patients with T2DM across the West Bank of Palestine. Patients were approached and invited to take part in the study by the field researchers. The sample was collected in the period of October 2018 to January 2019. After obtaining their consent, patients with T2DM were interviewed to determine their knowledge, attitudes and practices toward T2DM. This study was conducted in a cross-sectional observational design using a validated and reliable study tool. The study tool was tested for reliability in a pilot before conducting the study.

Population, Inclusion, And Exclusion Criteria

The study population was patients with T2DM who visited primary healthcare facilities in the West Bank of Palestine. Patients of both genders who were at least 18 years old and diagnosed with T2DM at least 6 months ago were invited to take part in this study. Patients were included if they provided verbal consent and were able to respond to questions in a questionnaire.

Patients who were less than 18 years old and those who were unable to respond to questions in a questionnaire were excluded.

Sample Size And Sampling Method

According to the International Diabetes Federation, there were 174,300 patients with T2DM in Palestine [23]. The sample size required for this study was calculated using an online sample size calculator (<http://www.raosoft.com/samplesize.html>). The sample size was estimated for a population of more than 20,000 with a 95% confidence interval and accepting a 5% margin of error. A convenience sampling method was followed to recruit participants in this study. Patients with T2DM were approached and recruited by field researchers from different primary healthcare facilities in the West Bank of Palestine.

Study Tool

The study was conducted using a pre-validated and reliable questionnaire to collect data relevant to knowledge, attitudes, and practices of patients with T2DM with regard to their disease. The questions included in the questionnaire were informed by relevant literature [24–26]. The study tool used in this study is shown in Additional File 1. The questionnaire collected sociodemographic characteristics of the patients like age, gender, body weight, height, marital status, employment, place of residence, educational level, and monthly income. The body weight and height were used to calculate the body mass index of the patient [27]. Patient health records were used to obtain the time elapsed since they received their diagnosis with T2DM, if they had a health insurance, if they have had attended an educational program regarding diabetes, their usual fasting plasma glucose level, their usual postprandial plasma glucose level, and their usual glycated hemoglobin (HbA_{1c}) level. Regarding knowledge, the patients were asked to answer the items regardless of their actual practice. The knowledge items included specifying the tests used to diagnose DM, what can be done to keep DM under control, how long patients should continue adherence to diet control/ treatment, and what organs would DM affect. Regarding attitudes, the patients were asked to answer the items regardless of their practice. Attitude items included whether occasional eating of sweets was alright, forgetting to take insulin or antidiabetic medications on some days was alright, whether not practicing recommended exercise was alright, and whether the patient should go for regular checkups even if their blood glycemia was under control. Regarding practice, the patients were asked to answer items relevant to their actual practice. Practice items included whether the patients: took insulin and/or other antidiabetic medications as their caring physicians recommended, followed diet schedule as recommended by their caring healthcare providers, adhered to practicing regular exercise as recommended by their caring healthcare providers, whether their blood glycemia was under control, and whether they regularly go for follow ups with their caring healthcare professionals.

The data were collected into an interviewer administered questionnaire in face-to-face interviews. The interviewers were final year Doctor of Medicine (MD) candidates who were trained to administer interviews.

Pilot Testing, Reliability And Internal Consistency

The study tool was pilot tested with 25 patients to assess if the questions were readable and understandable. To test the stability of the scores over a short period of time (30 min to 1 h), the test-retest method. The 25 patients were asked to answer the items twice. Scores obtained in the two rounds were correlated using Pearson's correlation. As used in previous studies, acceptable coefficients were set *a priori* as > 80% [28–32]. Cronbach's alpha statistics were used to assess the internal consistency of the items used in the study tool. Acceptable coefficients were set *a priori* between 70% and 95%.

Data analysis

For knowledge, attitudes, and practice items, the patients were given 1 point for each correct/positive answer and 0 for each incorrect/negative answer. As in previous studies, scoring more than 50% in the knowledge items was considered

as having good knowledge (scores could range from 0–12), scoring more than 75% in the attitude items was considered as having positive attitude (scores could range from 0–4), and scoring more than 80% in the practice items was considered as having good practice with regard to T2DM (scores could range from 0–5).

The data obtained in this study were coded and entered into IBM SPSS for Windows v.21.0 0 (IBM Inc., Armonk, New York) for analysis. To determine whether the data were normally distributed or not, Shapiro–Wilk test was used. As determined by the test, the data were not normally distributed. Therefore, medians and their corresponding interquartile ranges (IQR) were used to express the data. Categorical data were compared using the Chi-square (χ^2) test. Spearman's rank correlation was used to assess correlations between variables. In this study, a *p*-value of < 0.05 was considered statistically significant.

Ethics Approval And Consent To Participate

Ethics approval was obtained from the Institutional Board Review (IRB) of An-Najah National University. Field researchers explained the study design and objectives to the potential participants and obtained their informed consent before they took part in the present study.

Results

When the scores of the patients in the two rounds were compared for the test-retest, the Pearson's correlation coefficient was 95% (95% CI = 91.2–98.7%) with a *p*-value of < 0.001. Internal consistency of the items used in the test was good as indicated by a Cronbach's alpha of 74.2%.

Characteristics Of The Patients

In this study, data were collected from 220 patients with T2DM. Of those, more 138 (62.7%) were 55 years of age and older, 118 (53.6%) were female in gender, 139 (63.2%) were unemployed, 149 (67.7%) resided in urban areas, 55 (25.0%) has university degrees, 135 (61.4%) had moderate or high income, 116 (52.7%) were diagnosed with T2DM 7 or more years ago, 45 (20.5%) did not have any health insurance, 198 (90.0%) did not attend any educational program regarding DM, 154 (70.0%) had their usual fasting plasma glucose level of more than 140 mg/dL, 177 (80.5%) had their usual postprandial plasma glucose level of more than 200 mg/dL, 167 (75.9%) had their HbA_{1c} level more than 7%, and 175 (79.5%) had a BMI of more than 25 kg/m². Details of the sociodemographic and clinical variables of the patients who took part in this study are shown in Table 1.

Table 1
Detailed sociodemographic and clinical characteristics of the patients
who took part in this study ($n = 220$)

Variable	n	%
Age (years)		
< 55	82	37.3
≥ 55	138	62.7
Gender		
Male	102	46.4
Female	118	53.6
Marital status		
Never married	32	14.5
Married/divorced/widowed	188	85.5
Employment		
Unemployed	139	63.2
Employed	81	36.8
Place of residence		
Urban	149	67.7
Country side	71	32.3
Educational level		
Some school	165	75.0
University	55	25.0
Monthly household income (Jordanian Dinar)		
< 600	85	38.6
600–1000	93	42.3
≥ 1000	42	19.1
Time elapsed since diagnosis (years)		
< 7	104	47.3
≥ 7	116	52.7
Has a health insurance		
Yes	175	79.5
No	45	20.5
Has attended educational program regarding diabetes		
HbA _{1c} : Glycated hemoglobin		

Variable	n	%
Yes	22	10.0
No	198	90.0
Fasting plasma glucose (mg/dL)		
< 140	66	30.0
≥ 140	154	70.0
Postprandial plasma glucose (mg/dL)		
< 200	43	19.5
≥ 200	177	80.5
HbA_{1c} (%)		
< 7	53	24.1
≥ 7	167	75.9
Body mass index (kg/m²)		
< 25	45	20.5
≥ 25	175	79.5
HbA _{1c} : Glycated hemoglobin		

Knowledge Of Diabetes

Knowledge of the patients with regard to their DM was measured using the knowledge items. The median score of the patients in the knowledge items was 6 with an IQR of 3. Of the patients, 115 (52.2%) scored more than 50% in the knowledge items. When asked to identify the organs affected by DM, 129 (58.6%) could identify that DM could affect the eyes and 124 (56.4%) could identify that DM could affect the kidneys. Of the patients, only 82 (37.3%) could identify that DM could affect the heart. Details of the answers of the study patients with regard to the damaging effects of DM on the body organs are shown in Table 2. Detailed distribution of patient answers on the knowledge items are shown in Additional File 2.

Table 2
Knowledge of the patients on the damaging effects of diabetes on major body organs

Organ affected	n	%
Kidneys	124	56.4
Feet	98	44.5
Eyes	129	58.6
Nerves	102	46.4
Heart	82	37.3

When asked about how diabetes could be kept under control, the vast majority (90.9%) of the patients could identify medications including insulin. Diet was identified by 174 (79.1%) patients. However, going for regular checkups was identified by only 25 (11.4%) patients. Details of the answers of the patients with regards to ways to control DM are shown in Table 3.

Table 3
Knowledge of the patients with regard to ways to control diabetes

Way to control diabetes	n	%
Medications including insulin	200	90.9
Diet	174	79.1
Exercise	101	45.9
Weight reduction	48	21.8
Going for regular checkups	25	11.4

In this study, χ^2 and Spearman's correlations showed that patients who were younger than 55 years old (p -value = 0.002), male in gender (p -value = 0.038), never married (p -value = 0.001), employed (p -value = 0.003), having university degree (p -value < 0.001), earning higher income (p -value < 0.001), diagnosed with T2DM since less than 7 years ago (p -value = 0.009), and having usual fasting plasma glucose level of less than 140 mg/dL (p -value = 0.027) tended to score more than 50% in the knowledge items. Details of association between knowledge and sociodemographic and clinical characteristics of the patients are shown in Table 4.

Table 4
Association between knowledge and sociodemographic and clinical characteristics of the patients

Variable	< 50%		≥ 50%		χ^2	p-value	Correlation	p-value		
	n	%	n	%						
Age (years)										
< 55	82	37.3	28	12.7	54	24.5	9.66	0.002	-0.21	0.002
≥ 55	138	62.7	77	35.0	61	27.7				
Gender										
Male	102	46.4	41	18.6	61	27.7	4.32	0.043	-0.14	0.038
Female	118	53.6	64	29.1	54	24.5				
Marital status										
Never married	32	14.5	7	3.2	25	11.4	10.03	0.002	-0.21	0.001
Married/divorced/widowed	188	85.5	98	44.5	90	40.9				
Employment										
Unemployed	139	63.2	77	35.0	62	28.2	8.90	0.003	0.20	0.003
Employed	81	36.8	28	12.7	53	24.1				
Place of residence										
Urban	149	67.7	68	30.9	81	36.8	0.81	0.389	-0.06	0.371
Country side	71	32.3	37	16.8	34	15.5				
Educational level										
Some school	165	75.0	90	40.9	75	34.1	12.30	0.001	0.24	< 0.001
University	55	25.0	15	6.8	40	18.2				
Monthly household income (Jordanian Dinar)										
< 600	85	38.6	54	24.5	31	14.1	13.97	0.001	0.24	< 0.001
600–1000	93	42.3	36	16.4	57	25.9				
≥ 1000	42	19.1	15	6.8	27	12.3				
Time elapsed since diagnosis (years)										
< 7	104	47.3	40	18.2	64	29.1	6.79	0.010	-0.18	0.009
≥ 7	116	52.7	65	29.5	51	23.2				
Has a health insurance										
Yes	175	79.5	87	39.5	88	40.0	1.35	0.315	0.08	0.247
No	45	20.5	18	8.2	27	12.3				

HbA_{1c}: Glycated hemoglobin

	< 50%		≥ 50%							
Has attended educational program regarding diabetes										
Yes	22	10.0	12	5.5	10	4.5	0.05	1.000	-0.02	0.823
No	198	90.0	103	46.8	95	43.2				
Fasting plasma glucose (mg/dL)										
< 140	66	30.0	24	10.9	42	19.1	4.88	0.039	-0.15	0.027
≥ 140	154	70.0	81	36.8	73	33.2				
Postprandial plasma glucose (mg/dL)										
< 200	43	19.5	20	9.1	23	10.5	0.03	0.867	-0.01	0.860
≥ 200	177	80.5	85	38.6	92	41.8				
HbA_{1c} (%)										
< 7	53	24.1	20	9.1	33	15.0	2.79	0.115	-0.11	0.095
≥ 7	167	75.9	85	38.6	82	37.3				
Body Mass Index (kg/m²)										
< 25	45	20.5	16	7.3	29	13.2	3.36	0.094	-0.12	0.067
≥ 25	175	79.5	89	40.5	86	39.1				
HbA _{1c} : Glycated hemoglobin										

Attitudes With Regards To Diabetes

Attitudes of patients with regard to their DM were measured using attitude items. Of the patients, 129 (58.7%) scored more than 75% in the attitude items. The median score of the patient attitudes was 3 with an IQR of 2. Of the patients, about 36% of patients believed that eating sweets occasionally was alright, about 29% of the patients stated that it was alright if they forgot to take their medicines on some days, around 30% of the patients believed that it was not necessary to go for regular checkups if their sugar level was under control, and close to 44% believed that they got enough exercise when doing their daily activity. In this study, χ^2 and Spearman's correlations showed that patients who had higher income tended to have higher positive attitudes (p -value = 0.041) toward their DM. Details of association between attitudes and sociodemographic and clinical characteristics of the patients are shown in Table 5. Detailed distribution of patient answers on the attitude items are shown in Additional File 3.

Table 5
Association between attitudes and sociodemographic and clinical characteristics of the patients

Variable	< 75%		≥ 75%		χ^2	p-value	Correlation	p-value		
	n	%	n	%						
Age (years)										
< 55	82	37.3	33	15.0	49	22.3	0.07	0.888	0.02	0.796
≥ 55	138	62.7	58	26.4	80	36.4				
Gender										
Male	102	46.4	37	16.8	65	29.5	2.03	0.171	-0.10	0.156
Female	118	53.6	54	24.5	64	29.1				
Marital status										
Never married	32	14.5	16	7.3	16	7.3	1.15	0.333	0.07	0.285
Married/divorced/widowed	188	85.5	75	34.1	113	51.4				
Employment										
Unemployed	139	63.2	60	27.3	79	35.9	0.51	0.483	0.05	0.479
Employed	81	36.8	31	14.1	50	22.7				
Place of residence										
Urban	149	67.7	59	26.8	90	40.9	0.59	0.467	-0.05	0.443
Country side	71	32.3	32	14.5	39	17.7				
Educational level										
Some school	165	75.0	72	32.7	93	42.3	1.41	0.270	0.08	0.238
University	55	25.0	19	8.6	36	16.4				
Monthly household income (Jordanian Dinar)										
< 600	85	38.6	44	20.0	41	18.6	6.45	0.009	0.14	0.041
600–1000	93	42.3	31	14.1	62	28.2				
≥ 1000	42	19.1	16	7.3	26	11.8				
Time elapsed since diagnosis (years)										
< 7	104	47.3	42	19.1	62	28.2	0.08	0.786	-0.02	0.781
≥ 7	116	52.7	49	22.3	67	30.5				
Has a health insurance										
Yes	175	79.5	73	33.2	102	46.4	0.04	0.867	0.01	0.836
No	45	20.5	18	8.2	27	12.3				

HbA_{1c}: Glycated hemoglobin

	< 75%		≥ 75%							
Has attended educational program regarding diabetes										
Yes	22	10.0	9	4.1	13	5.9	0.00	1.000	0.00	0.964
No	198	90.0	82	37.3	116	52.7				
Fasting plasma glucose (mg/dL)										
< 140	66	30.0	21	9.5	45	20.5	3.54	0.073	-0.13	0.060
≥ 140	154	70.0	70	31.8	84	38.2				
Postprandial plasma glucose (mg/dL)										
< 200	43	19.5	13	5.9	30	13.6	2.73	0.121	-0.11	0.099
≥ 200	177	80.5	78	35.5	99	45.0				
HbA_{1c} (%)										
< 7	53	24.1	19	8.6	34	15.5	0.88	0.424	-0.06	0.352
≥ 7	167	75.9	72	32.7	95	43.2				
Body mass index (kg/m²)										
< 25	45	20.5	17	7.7	28	12.7	0.30	0.615	-0.04	0.586
≥ 25	175	79.5	74	33.6	101	45.9				
HbA _{1c} : Glycated hemoglobin										

Practices Of Patients With Regard To Their Diabetes

Practices of patients with regard to their DM were measured using practice items. Of the patients, 80 (36.4%) scored more than 80% in the practice items. The median score of the patient practices was 3 with an IQR of 3. Of the patients, about 71% stated that they regularly took their insulin and/or antidiabetic medications as advised by their physicians, about 39% followed the diet program as advised by their healthcare providers, approximately 37% stated that they adhered to regular exercises as advised by their healthcare providers, and around 65% stated that they regularly go for follow ups. In this study, χ^2 and Spearman's correlations showed that patients who were younger than 55 years old (p -value = 0.002), employed (p -value = 0.003), having university degree (p -value < 0.001), diagnosed with T2DM since less than 7 years ago (p -value = 0.009), having usual fasting plasma glucose level of less than 140 mg/dL (p -value = 0.027), having usual postprandial plasma glucose level of less than 200 mg/dL (p -value = 0.027), having usual HbA_{1c} level of less than 7% (p -value = 0.027) tended to score more than 80% in the practice items. Details of association between practices and sociodemographic and clinical characteristics of the patients are shown in Table 6. Detailed distribution of patient answers on the practice items are shown in Additional File 4.

Table 6
Association between practices and sociodemographic and clinical characteristics of the patients

Variable	< 80%		≥ 80%		χ ²	p-value	Correlation	p-value		
	n	%	n	%						
Age (years)										
< 55	82	37.30	40	18.20	42	19.10	12.47	0.001	-0.24	< 0.001
≥ 55	138	62.70	100	45.50	38	17.30				
Gender										
Male	102	46.40	63	28.60	39	17.70	0.29	0.674	-0.04	0.594
Female	118	53.60	77	35.00	41	18.60				
Marital status										
Never married	32	14.50	20	9.10	12	5.50	0.02	1.000	-0.01	0.886
Married/divorced/widowed	188	85.50	120	54.50	68	30.90				
Employment										
Unemployed	139	63.20	96	43.60	43	19.50	4.81	0.030	0.15	0.028
Employed	81	36.80	44	20.00	37	16.80				
Place of residence										
Urban	149	67.70	90	40.90	59	26.80	2.09	0.178	-0.10	0.150
Country side	71	32.30	50	22.70	21	9.50				
Educational level										
Some school	165	75.00	113	51.40	52	23.60	6.45	0.042	0.17	0.009
University	55	25.00	27	12.30	28	12.70				
Monthly household income (Jordanian Dinar)										
< 600	85	38.60	58	26.40	27	12.30	3.11	0.213	0.11	0.113
600–1000	93	42.30	60	27.30	33	15.00				
≥ 1000	42	19.10	22	10.00	20	9.10				
Time elapsed since diagnosis (years)										
< 7	104	47.30	51	23.20	53	24.10	18.16	0.000	-0.29	< 0.001
≥ 7	116	52.70	89	40.50	27	12.30				
Has a health insurance										
Yes	175	79.50	115	52.30	60	27.30	1.60	0.226	0.09	0.208
No	45	20.50	25	11.40	20	9.10				
HbA _{1c} : Glycated hemoglobin										

	< 80%		≥ 80%							
Has attended educational program regarding diabetes										
Yes	22	10.00	11	5.00	11	5.00	1.96	0.242	-0.09	0.163
No	198	90.00	129	58.60	69	31.40				
Fasting plasma glucose (mg/dL)										
< 140	66	30.00	32	14.50	34	15.50	9.35	0.003	-0.21	0.002
≥ 140	154	70.00	108	49.10	46	20.90				
Postprandial plasma glucose (mg/dL)										
< 200	43	19.50	19	8.60	24	10.90	8.74	0.004	-0.20	0.003
≥ 200	177	80.50	121	55.00	56	25.50				
HbA_{1c} (%)										
< 7	53	24.10	26	11.80	27	12.30	6.41	0.014	-0.17	0.011
≥ 7	167	75.90	114	51.80	53	24.10				
Body mass index (kg/m²)										
< 25	45	20.50	21	9.50	24	10.90	7.04	0.010	-0.18	0.008
≥ 25	175	79.50	119	54.10	56	25.50				
HbA _{1c} : Glycated hemoglobin										

Spearman's correlations showed that knowledge scores correlated moderately with attitudes scores (Spearman's rho = 0.27, *p*-value < 0.001) and practice scores (Spearman's rho = 0.34, *p*-value < 0.001). Similarly, attitudes and practice scores correlated moderately (Spearman's rho = 0.29, *p*-value < 0.001).

Discussion

In this cross-sectional study, knowledge, attitudes, and practices of patients with T2DM with regard to their disease were assessed for the first time among Palestinian patients. Patients who took part in this study were recruited from different primary healthcare facilities in the West Bank of Palestine. In this study, more than half (52.2%) had good knowledge and 58.7% has positive attitudes with regard to their disease. On the other hand, only 36.4% had good practices. Findings of this study highlighted gaps in knowledge, attitudes, and practices with regard to T2DM among patients. In this study, correlations were established between knowledge, attitudes, and practices with the sociodemographic and clinical characteristics of the patients with T2DM. Additionally, knowledge, attitudes, and practices of patients who took part in this study correlated moderately. Findings of this study could be useful for policy makers, decision makers, healthcare providers, and patient advocacy groups who might need to design interventions to improve health outcomes of patients with T2DM.

In this study, the tool used to measure knowledge, attitudes, and practices was adopted from previous studies [24–26]. The tool was piloted for clarity and comprehension. Additional testing of stability of scores over a short period of time and internal consistency between the items included was performed. The test-retest method and Cronbach's alpha ensured that the tool used in this study was reliable and internally consistent [28–32]. These measures might have

added strength and rigor to methods used in this study. The data were collected using an interviewer administered questionnaire. Additionally, the interviewers in this study were final year MD candidates who were familiar with conducting interviews and taking patient history. This should have minimized occasions of mis- or lack of understanding associated with self-administered questionnaires [33].

Our findings indicated that almost half of the patients (52.2%) had good knowledge of T2DM and its associated complications. In a pilot study conducted in Sri Lanka, Hearth et al showed that 77% of patients with T2DM has moderate or above moderate knowledge of their disease [3]. Studies in different settings have reported variable level of knowledge among patients with T2DM in Mongolia, Sri Lanka, Bangladesh, India, Jordan, and Lebanon [34–40]. Not surprisingly, knowledge of T2DM was significantly higher among younger, male, never married, employed, educated, earning higher income, diagnosed with T2DM since less than 7 years ago, and having usual fasting plasma glucose level of less than 140 mg/dL. This could be explained simply because patients with higher education are expected to be more aware of their disease, its complications, and the ways to keep their blood glycemia under control. Additionally, it has been argued that younger patients are more interested in learning about their disease compared to older patients who could have other comorbidities and less interest in learning about their disease. Taken together, our findings might suggest that older and less educated patients need greater motivation and support from their healthcare providers and families. Our findings were consistent with those reported in some related studies that were conducted elsewhere. For example, Hearth et al showed that education was positively associated with higher knowledge of T2DM among patients in Sri Lanka [3]. Similarly, Karaoui et al showed that higher level of education was positively correlated with higher knowledge of T2DM among patients in Lebanon [36]. In Bangladesh, Fatema et al showed that male patients with T2DM had significantly higher knowledge of their disease compared to female patients [35].

Findings of this study showed that 58.7% of the patients had positive attitudes toward their disease. Our results were comparable to those reported by Belsti et al in Ethiopia in which [26]. However, in this study attitude scores were not significantly associated with educational level of the patients as was shown in Belsti's study. Our findings showed significant association between attitude scores and higher income. Our findings were consistent with those reported among patients with T2DM in Bangladesh [35]. Probably, patients with higher income could have better access to healthcare services, ability to go to regular checkups, and practice physical activity compared to patients with less income [25].

Regarding practice, our study showed that 36.4% of the patients with T2DM had good practices with regard to their disease. In Ethiopia, less than half of patients with T2DM had good practices regarding T2DM and its complications [26]. Similarly, our findings were consistent with those reported in Sri Lanka and Lebanon [3, 36]. Our findings showed that younger, employed, educated, diagnosed since less than 7 years ago, and having controlled blood glycemia as indicated by fasting plasma glucose level, postprandial plasma glucose level, and HbA_{1c} level were significantly associated with good practices. Our results were consistent with those reported in different settings in Mongolia, Sri Lanka, Bangladesh, and Lebanon [34–36].

Strengths And Limitations

Results of this study might be carefully interpreted taking into consideration the following strengths and limitations. First, this pilot study was the first to assess knowledge, attitudes, and practices of Palestinians with T2DM with regard to their disease. Second, this study was also to establish association between knowledge, attitudes, and practices with various sociodemographic and clinical characteristics of the patients. Third, the study tool used in this study was piloted and evaluated for reliability and internal consistency. Fourth, the study tool was administered by interviewers who were

final year MD candidates who were familiar with interviewing patients and taking medical history. This should have reduced the occasions of mis- or lack of understanding that could be associated with self-administered questionnaires.

On the other hand, this study has a number of limitations. First, this study was a cross-sectional observational study. An interventional design should have permitted enhancing knowledge, improved positive attitudes, and promoted good practices among patients with T2DM with regard to their disease. Second, the sample size used in this study was relatively small. However, the sample size used in this study was comparable to those used in other studies [3, 36]. Third, a convenience sampling method was followed to recruit the sample needed for this study. It is noteworthy mentioning that the sample recruited was diversified by inclusion of patients from both genders, different educational levels, income levels, and geographic locations. Finally, the number of items relevant to knowledge, attitudes, and practices was relatively small. Despite the small number of items, we were able to expose the level of knowledge, attitudes, and practices of patients with T2DM with regard to their disease.

Conclusion

In conclusion, this study provided insights into current knowledge, attitudes, and practices of Palestinians with T2DM. The study established correlation between knowledge, attitude, and practice scores with sociodemographic and clinical characteristics of patients with T2DM in Palestine. Findings of this study highlighted the need for appropriately designed interventions to increase knowledge of T2DM and its complications, address the negative attitudes toward the disease, and promote healthy practices with regard to the disease. Future studies are still needed to assess if such interventions could be effective in improve health outcomes and quality of life of patients with T2DM in Palestine.

Abbreviations

T2DM
Type 2 diabetes mellitus
HbA_{1c}
Glycated hemoglobin
IQR
Interquartile ranges
IRB
Institutional Board Review
MD
Doctor of Medicine
 χ^2
Chi-square

Declarations

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Contributions

RS was involved in the conception and design of the work, analysis and interpretation of data, drafting and final approval the manuscript. SS and AZ were involved in the data acquisition, analysis, drafting the work and final approval of the version to be published.

Ethics declarations

Ethics approval and consent to participate

Ethics approval was obtained from the Institutional Board Review (IRB) of An-Najah National University. Field researchers explained the study design and objectives to the potential participants and obtained their informed consent before they took part in the present study.

Consent for publication

Not applicable.

Competing interests

All authors report no conflict of interest.

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