

Original Research Article

Impact of diabetes-related knowledge and medication adherence on quality of life among type 2 diabetes patients in a tertiary health facility in Multan, Pakistan

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Abstract

Purpose: To assess the impact of drug adherence and diabetes-related knowledge on the quality of life (QoL) of type 2 diabetes patients in a hospital in Pakistan.

Methods: A cross-sectional study was conducted in City Hospital, Multan, Pakistan between March and September 2020. A total of 151 patients diagnosed with type 2 diabetes mellitus (T2DM) were recruited. Medication adherence, diabetes-related knowledge, and QoL were assessed by Drug attitude inventory-10 (DAI-10), the Michigan Diabetes Knowledge Test (MDKT), and EQ-5D-3L tools, respectively. The association between sociodemographic data and study variables was assessed by independent t-test and one-way ANOVA.

Results: Among the 151 patients, 53 % were males. The mean MDKT score was 0.33 ± 0.18 , indicating poor knowledge of diabetes. An overall moderate level of adherence was observed among the participants (mean adherence score, 6.14 ± 1.39). Mean QoL score was 1.31 ± 0.28 , and the Visual Analog Scale score (VAS) was 59.6 ± 12.21 , indicating a good to moderate QoL among the study participants. Study participants with a longer duration of diabetes and poor adherence to their medications showed poor QoL ($p = 0.01$, $p = 0.004$ respectively).

Conclusion: Overall, the patients reported poor knowledge, moderate adherence, and good to moderate QoL. Moreover, patients with poor adherence to medication, longer duration of diabetes, and poorly controlled HbA1c showed poor QoL.

Keywords: Diabetes, Type 2 diabetes mellitus, Knowledge, Adherence, QoL

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INTRODUCTION

Diabetes is one of the fastest growing and serious threat to public health. The number of people living with diabetes has tripled over the

past 20 years. In 2010, it was estimated that there will be 438 million people living with diabetes by 2025. This prediction has already been surpassed by 25 million, with less than 5 years still to go. Moreover, International Diabetic

Federation (IDF) estimated that the projected number of adults with diabetes will be 578 million by 2030, and 700 million by 2045. Globally, 463 million adults with an age range of 20 - 79 years are living with diabetes. Among them, 79 % of adults with diabetes are living in low and middle-income countries. In 2019, the diabetes-associated deaths were 1.5 million. The latest figures show that there are over 19 million people now living with diabetes in Pakistan, and this number is continuously increasing. According to IDF, 17.1 % of the adult population in Pakistan live with diabetes [1,2].

The complications associated with diabetes mellitus can be minimized by early diagnosis and proper management. The target of diabetes management is to delay diabetes-related (macro and microvascular) complications by achieving and sustaining optimal blood glucose level. Diabetes mellitus can be managed by adopting a healthy lifestyle including regular exercise, a healthy diet, management of weight, and medication therapy [3,4].

Therefore, health literacy and disease education is an integral part of diabetes management. Patients with good knowledge of diabetes and its complication seek proper care and treatment. It has been reported that the individuals who are educated and conscientious with their self-care regarding diabetes, achieved better and more durable diabetic control. Patients' adherence to treatment is also the ultimate goal of diabetic management [4,5]. Adherence to medications is one of the pivotal dimensions of health care quality (HCQ). Adherence is the proportion of the prescribed doses by the physician or pharmacist, of medication taken by the patient over a prescribed period [8].

Non-adherence with prescribed medication has significant economic and therapeutic consequences. It has been seen that non-adherent patients are at greater risk of developing complications. This has a direct effect on the patient's health status and overall quality of life (QoL) [6,7].

Several studies have reported the impact of treatment adherence on QoL, and/or the association of diabetes-related knowledge with adherence in Pakistan. As at the time of this study, there was only one study in Pakistan that assessed the association of diabetes knowledge and treatment adherence with QoL. This current study was therefore conducted to assess the impact of diabetes knowledge and treatment adherence on quality of life in type 2 diabetes mellitus [8-11].

METHODS

Study design and participants

A cross-sectional approach was utilized for the current study and was carried out between March and September 2020. The study was conducted in City Hospital, Multan Pakistan. The study participants were patients diagnosed with type 2 diabetes mellitus. The data was collected from the patient via validated questionnaires, and permission was obtained from the developer prior to data collection. A simple random sampling technique was utilized for the patients' recruitment.

Sample size

A prevalence-based sampling method was utilized to calculate the minimum required sample for this study. In Pakistan, the prevalence of type 2 diabetes mellitus varies from 7.6 to 11 % [12-14]. To minimize the reported variation, a prevalence of 11 % was taken. The sample size was calculated using Eq 1.

$$n = Z^2 \times p (1-p)/d^2 \dots\dots\dots (1)$$

where n = sample size, Z^2 = confidence interval, p = prevalence of type 2 diabetes mellitus, d^2 = margin of error.

Assessment of medication adherence

The Drug Attitude Inventory (DAI-10) Urdu version was used for the assessment of medication adherence. The instrument comprised of 10 items with responses in Yes and No. the scoring was calculated as per the developer instructions [14,15].

Assessment of diabetes-related knowledge

The Michigan Diabetes Knowledge Test (MDKT) Urdu version was used for the assessment of patient knowledge related to diabetes. The MDKT is comprised of 14 questions with one correct option. A zero-value was assigned to incorrect responses and 1 to correct responses. The scale measured knowledge from maximum 14 to minimum 0. The cut-off point for knowledge was: score of less than 7 represented poor, 7 - 11 average, and greater than 11 indicates good knowledge of diabetes. The scoring was calculated as per developer criteria [16].

Assessment of QoL

The EQ-5D-3L instrument was used for the QoL assessment. This instrument was developed by

the EuroQol group. It comprised five domains (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression), and each domain consists of three levels of severity (no problem, moderate and extreme). The visual analogue scale (VAS) is the 20 cm health thermometer with two distinct endpoints (0 – worst health, 100 – best health) [15].

Ethics

The study was reviewed and approved by the Department of Pharmacy Practice, Faculty of Pharmacy, BZU Multan (approval ref no. 173-A/Pharmacy Practice 02/20). The study was conducted as per the guidelines of the Declaration of Helsinki and reported according to “The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)” guidelines.

Statistical analysis

The statistical package for social sciences (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0 Armonk, NY: IBM Corp.) was used for statistical analysis. Descriptive statistics were used to describe the demographic characteristics of the study participants. Frequencies and percentages were calculated for categorical variables, while the continuous variables were presented as a mean and standard deviation. The association between sociodemographic data and study variables was assessed by using the independent t-test and one-way ANOVA. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 151 patients were recruited in the study, amongst which 53 % were male and 47 % were female. Majority of the patients were married {n = 146 (96.7 %)}, and have primary level education {n = 58 (38.4 %)}. Most of the participants had urban living status {n = 124 (82.1 %)}, and almost half of the participants had diabetes for 5 to 10 years {n = 71 (47 %)}. The demographic details can be seen in Table 1.

The knowledge of diabetes was assessed by MDKT. The mean MDKT score was 0.33 ± 0.18 , indicating poor knowledge regarding diabetes (Table 2). More than three-quarters of the participants were within the poor knowledge category {n = 120 (79.4 %)}, as shown in Figure 1.

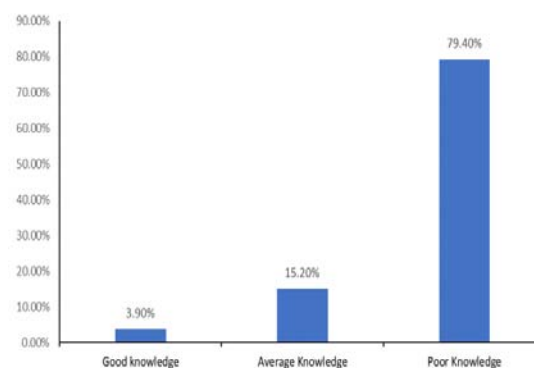


Figure 1: Diabetes-related knowledge of the study participants

Table 1: Demographic characteristics of the study participants

Parameter		Frequency	Percentage
Gender	Male	80	53.0
	Female	71	47.0
Marital status	Single	5	3.3
	Married	146	96.7
Education	Primary	58	38.4
	Secondary	41	27.2
	Graduation	35	23.2
	Masters	16	10.6
	Illiterate	1	0.7
Living status	Urban	124	82.1
	Rural	27	17.9
Duration of diabetes (Years)	1 to 5	64	42.4
	5 to 10	71	47.0
	>10	15	9.9
HbA1c (%)	<6.6	3	2.0
	6.6-8.0	23	15.2
	8.1-9.0	33	21.9
	9.1-11.0	65	43.0
	>11.0	27	17.9

Table 2: Diabetes-related knowledge of the study participants

Item (correct answer)	Response	Frequency	Percentage
The suitable diet for a diabetic is: (a healthy diet for most People)	Incorrect	95	62.9
	Correct	56	37.1
Which of the following is highest in carbohydrate? (Baked potato)	Incorrect	105	69.5
	Correct	46	30.5
Which of the following is highest in fat? (Low fat (2 %) milk)	Incorrect	99	65.6
	Correct	52	34.4
Which of the following is “free food”? (Any food that has less than 20 calories per serving)	Incorrect	94	62.3
	Correct	57	37.7
Glycosylated hemoglobin (Hemoglobin A1c) is a test that is a measure of your average blood glucose level for the past: (6-10 weeks)	Incorrect	105	69.5
	Correct	46	30.5
Which is the best method for home glucose testing? (Blood testing)	Incorrect	107	70.9
	Correct	44	29.1
What effect does unsweetened fruit juice have on blood glucose? (Raises it)	Incorrect	98	64.9
	Correct	53	35.1
Which should not be used to treat low blood glucose? (1 cup diet soft drink)	Incorrect	101	66.9
	Correct	50	33.1
For a person in good control, what effect does exercise have on blood glucose? (Raises it)	Incorrect	105	69.5
	Correct	46	30.5
Infection is likely to cause: (a decrease in blood glucose)	Incorrect	99	65.6
	Correct	52	34.4
The best way to take care of your feet is to: (look at and wash them each day)	Incorrect	105	69.5
	Correct	46	30.5
Eating food lower in fat decrease your risk for: (heart diseases)	Incorrect	103	68.2
	Correct	48	31.8
Numbness and tingling may be symptoms of: (Nerve diseases)	Incorrect	99	65.6
	Correct	52	34.4
Which of the following is usually not associated with diabetes? (Lung problem)	Incorrect	97	64.2
	Correct	54	35.8

Mean knowledge score was 0.33 ± 0.18

The adherence of the patients toward their medication is shown in Table 3. The mean adherence score of 6.14 ± 1.39 shows a moderate level of adherence of the participants toward their medications. The majority of the participants showed good adherence {n = 90 (59.6 %)} as can be seen in Figure 2.

The mean QoL score was 1.31 ± 0.28 and the VAS score 59.6 ± 12.21 , indicating good to moderate QoL of the study participants. The patient's responses to the Eq-5D are shown in Table 4.

Table 3: Adherence of the study participants to medication

Item	Response	Frequency	Percentage
For me, the good things about medication outweigh the bad.	True	126	83.4
	False	25	16.6
I feel weird, like a “zombie”, on medication	True	7	4.6
	False	144	95.4
I take medications of my own free choice	True	82	54.3
	False	69	46.0
Medications make me feel more relaxed	True	117	78.0
	False	34	22.0
Medication makes me feel tired and sluggish	True	56	37.1
	False	95	62.9
I take medication only when I am sick	True	103	68.2
	False	48	31.8
I feel more normal on medication.	True	126	83.4
	False	25	16.6
It is unnatural for my mind and body to be controlled by medications.	True	39	25.8
	False	112	74.2
My thoughts are clearer on medication.	True	137	90.7
	False	14	9.3
By staying on medications, I can prevent getting sick.	True	133	88.1
	False	18	11.9

Mean Adherence score was 6.14 ± 1.39

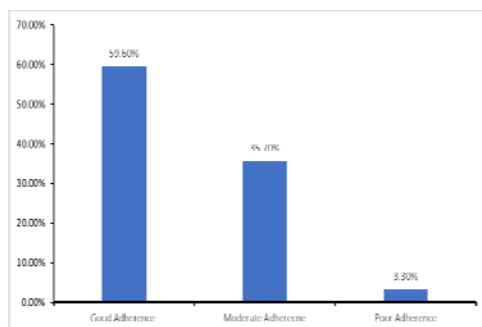


Figure 2: Adherence of the study participants to medication

The association of demographic variables with the study variables is shown in Table 5. The female participants showed poor QoL as compared to their male counterparts ($p = 0.04$). Also, the study participants with a longer duration of diabetes and poor medication adherence showed poor QoL ($p = 0.01$, $p = 0.004$ respectively). Patients with higher HbA1c value reported poor QoL ($p = 0.012$).

DISCUSSION

The current study assessed the QoL in T2DM patients and the contributing factors to it.

Table 4: QoL of the study participants

Item		Frequency	Percentage
<i>Mobility</i>	I have no problems in walking about	121	80.1
	I have some problems in walking about	29	19.2
	I am confined to bed	1	0.7
<i>Self-care</i>	I have no problems with self-care	89	58.9
	I have some problems washing or dressing myself	62	41.1
	I am unable to wash or dress myself	0	0.0
<i>Usual activities</i>	I have no problems with performing my usual activities	109	72.2
	I have some problems with performing my usual activities	40	26.5
	I am unable to perform usual activities	2	1.3
<i>Pain/ discomfort</i>	I have no pain or discomfort	90	59.6
	I have moderate pain or discomfort	56	37.1
	I have severe pain or discomfort	5	3.3
<i>Anxiety/ depression</i>	I am not anxious or depressed	121	80.1
	I am moderate anxious or depressed	28	18.5
	I am severe anxious or depressed	2	1.3

Mean QoL score was 1.31 ± 0.28 and VAS mean score was 59.6 ± 12.21

Table 5: Association of demographic variables with study variable

Parameter		Quality of life			
		Mean	Standard deviation	F-value	P-value
Gender	Male	6.35	1.19	3.94	0.04
	Female	6.79	1.62		
Marital status	Single	5.40	0.55	2.40	0.12
	Married	6.60	1.43		
Education	Primary	6.64	1.65	0.86	0.48
	Secondary	6.63	1.44		
	Graduation	6.60	1.01		
	Masters	5.94	1.24		
	Illiterate	6.91	0.26		
Duration of diabetes (years)	1 to 5	6.42	1.23	3.57	0.016
	5 to 10	6.44	1.34		
	>10	7.60	2.10		
	11.00	7.98	1.32		
Drug adherence	Poor	6.80	1.48	5.84	0.004
	Moderate	6.54	1.33		
	Good	6.56	1.49		
Diabetes related knowledge	Poor	6.00	.82	0.47	0.62
	Average	6.61	1.42		
	Good	6.46	1.48		
HbA1c	<6.6	5.33	.58	3.34	0.012
	6.6-8.0	5.83	.94		
	8.1-9.0	6.67	1.55		
	9.1-11.0	6.89	1.51		
	>11.0	6.37	1.15		

Bold – significant at $p \leq 0.05$

Findings in the current study showed that the QoL of the patients was good to moderate, but the knowledge was poor regarding diabetes. Furthermore, the overall adherence of the patients to their medication was good to moderate. The female patients and participants having a longer duration of diabetes and poor drug adherence showed poor QoL. Moreover, the patients with higher values of HbA1c also reported a poor QoL. The current study demonstrated that patients with type 2 diabetes reported good to moderate QoL (mean QoL score – 1.31 ± 0.28 , VAS mean score – 59.6 ± 12.21). A study conducted in Pakistan reported poor QoL in patients with type 2 diabetes, which was also not in line with our study finding [17]. Moreover, our findings were not consistent with a reported study from Romania and Gaza, where the respondents with type 2 diabetes reported poor QoL. Most patients enrolled in this study had diabetes for the last 1 to 5 years (42.4 %). This may have an effect on the QoL of the patients reported in this study [18,19]. The knowledge regarding diabetes among patients with type 2 diabetes has a significant impact on their management. The participants reported poor knowledge regarding diabetes in the current study (79.4 %). This result was comparable with the reported study from Pakistan, where 70 % of the participant showed poor knowledge regarding diabetes [17]. While 44.9 % of the Ethiopian diabetes population reported poor knowledge related to diabetes, which was low as compared to the current study. The level of education may be affected by this comparison, as most of the participants had primary and secondary level of education [20].

In the current study, diabetes patients moderately adhered to their medications (mean adherence score – 6.14 ± 1.39), and a total of 59.6 % of the participants showed good adherence. A comparative result was reported from Ethiopia, where 68.8 % of the participants adhered to their antidiabetic medications. While another study from Ethiopia reported poor adherence (24.9 %) as compared to our results [20,21]. The adherence to the antidiabetic medication was significantly associated with a good QoL in the current study ($p = 0.004$). Similar results were seen in previous reports, where a significant association was observed between adherence and QoL in diabetes patients. However, patients with poorly controlled HbA1c showed poor QoL ($p = 0.012$). This association was not observed in previous reports [9-11,22,23].

The current study has some limitations. First, the study participants were from one province of

Pakistan, which limits generalizability to the whole population. Secondly, the study may also be associated with self-reporting bias even though the respondents participated voluntarily.

CONCLUSION

Patients reported poor knowledge, moderate adherence, and good to moderate QoL. Moreover, patients with poor adherence to medication, longer duration of diabetes, and poorly controlled HbA1c showed poor QoL. From the current findings, it is suggested that patient adherence to antidiabetic medication and glycemic control would benefit from patient education. A pharmacist will play a better role in this regard as a diabetes educator. Incorporation of a pharmacist as a diabetes educator in the healthcare system will improve the patients' QoL by providing counselling for better management of diabetes.

DECLARATIONS

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Conflict of interest

No conflict of interest is associated with this work.

Contribution of authors

The authors declare that this work was done by them and all liabilities pertaining to claims relating to the content of this article will be borne by them. Conceptualization: Basit Ramzan, Azmi Hassali, Shahnawaz Gardezi, Methodology: Basit Ramzan, Fahad Saleem, Furqan Hashmi, Iltaf Hussain, Muhammad Daoud Butt, Software: Basit Ramzan, Iltaf Hussain, Muhammad Daoud Butt Formal analysis: Muhammad Fawad Rasool, Fahad Saleem, Azmi Hassali, Furqan Hashmi Data curation: Shahnawaz Gardezi, Fahad Saleem, Basit Ramzan writing - original draft preparation: Azmi Hassali, Furqan Hashmi, Fahad Saleem, Iltaf Hussain, Muhammad Fawad Rasool, writing - review and editing: Azmi Hassali, Furqan Hashmi, Fahad Saleem, Iltaf Hussain, Muhammad Fawad Rasool, Shahnawaz Gardezi, Iltaf Hussain, Basit Ramzan, Muhammad Daoud Butt. All authors have read and agreed to the published version of the manuscript.

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