

Correlation between Illness Perception and Medication Adherence among Adult Patients with Type 2 Diabetes Mellitus in Saudi Arabia

Samaher Alharbi, Aisha Alhofaian, Maryam M. Alaamri

Department of Medical Surgical Nursing, Faculty of Nursing, King Abdulaziz University, Jeddah, Saudi Arabia

Abstract

Objectives: This study aimed to assess the level of illness perception and medication adherence among adult patients with type 2 diabetes mellitus (T2DM) in Jeddah, Saudi Arabia, with a specific focus on understanding how these two factors may be related.

Materials and Methods: This descriptive correlation study included all adult patients with T2DM attending the Jeddah Care Centre for Diabetes and Hypertension at King Abdulaziz Hospital between January and April 2022. Data were collected using a questionnaire that elicited sociodemographic and clinical information, and the Arabic versions of the Brief Illness Perception Questionnaire and the Morisky Medication Adherence Scale. Descriptive statistics and Pearson's correlation analysis were used for data analysis.

Results: A total of 365 patients were included (mean age: 50.9 ± 15.9 years), with the majority being female (53.4%). Overall, the level of medication adherence was moderate (mean score: 5.36 ± 1.73). Patients with lower medication adherence perceived the consequences of T2DM as more severe, had a stronger association with the illness identity, and experienced more intense emotional responses (for all, $P < 0.001$). Conversely, patients with higher adherence had a greater sense of personal control, a stronger belief in treatment effectiveness, and a better understanding of the illness (for all, $P < 0.001$).

Conclusion: The study found a correlation between illness perception and medication adherence in patients with T2DM. Addressing patients' perceptions may enhance their ability to manage the condition more effectively.

Keywords: Glycemic control, illness behaviors, illness perception, medication adherence, type 2 diabetes mellitus, Saudi Arabia

Address for correspondence: Dr. Aisha Alhofaian, 7985 Alnsfiy Street, Alaziziyah District, Building No: 25, Jeddah 23342, Saudi Arabia.

E-mail: aalhofaian@kau.edu.sa

Submitted: 05-Nov-2023 **Revised:** 13-Dec-2023 **Accepted:** 26-Mar-2024 **Published:** 20-Jun-2024

INTRODUCTION

Diabetes mellitus (DM) is a chronic medical condition primarily characterized by elevated blood sugar levels. Among its various forms, type 2 diabetes mellitus (T2DM) is the most common, predominantly affecting adults.

T2DM can lead to a range of acute complications, including diabetic ketoacidosis and hypoglycemia, as well as chronic complications such as cardiovascular diseases and nerve damage.^[1] These complications often stem from

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Alharbi S, Alhofaian A, Alaamri MM. Correlation between illness perception and medication adherence among adult patients with type 2 diabetes mellitus in Saudi Arabia. Saudi J Med Med Sci 2024;12:244-51.

Access this article online	
Quick Response Code:	Website: https://journals.lww.com/sjmm
	DOI: 10.4103/sjmms.sjmms_511_23

prolonged high blood sugar levels and other metabolic issues. Key factors contributing to the global increase in T2DM include unhealthy diets, obesity, smoking, and lack of physical activity.^[2,3]

According to the World Health Organization (WHO), the number of adults (≥ 18 years) with diabetes has risen from approximately 108 million to 422 million between 1980 and 2014, signifying a rise in global prevalence from 4.5% to 8.5%.^[4] Concurrently, diabetes-related mortality rates have increased by 3% from 2000 to 2019.^[5] In Saudi Arabia, T2DM is becoming an epidemic, affecting a significant portion of the population.^[3] Studies have shown that patients' perception of their illness and adherence to their medication can influence their health outcomes. Illness perception refers to how a patient perceives, interprets, and understands their symptoms and condition, including its potential consequences and chronicity.^[6] It also encompasses their attitude and experiences of living with the condition, with positive or negative beliefs about their illness impacting their ability to cope with the condition.^[7,8]

The WHO defines adherence to ongoing treatment as the extent to which individuals follow healthcare provider guidelines, including medication intake, diet, and lifestyle changes.^[2] Nonadherence is a complex issue influenced by various factors such as demographic, personal, social, religious, cultural, and health condition determinants.^[9] In the context of T2DM, non-medication adherence has been identified as a critical concern. Several factors contribute to non-adherence, including inadequate healthcare integration, clinical inertia, younger age, and lower income and education levels.^[10] Furthermore, factors such as perceived inefficacy of treatment, the complexity of treatment regimens, the risk of hypoglycemia, and the burden of medical expenses have been identified as key contributors to non-adherence. Non-adherence can lead to poor glycemic control and increased healthcare costs. To address these issues, interventions have been suggested, including behavioral modifications, enhancement of drug delivery systems, and strategies to reduce the financial burden of medications. Gonzalez *et al.* highlighted the significant impact of psychosocial factors on self-management and medication adherence in individuals with T2DM.^[11] These findings underscore the critical need for improved self-management education and behavioral support in DM care.

In the literature, the specific examination of illness perceptions and medication adherence in the Saudi Arabian context, particularly in Jeddah, has been less explored. This study aims to fill this gap by determining medication

adherence and illness perceptions among adult patients with T2DM in Jeddah, Saudi Arabia.

MATERIALS AND METHODS

This study adopted a descriptive, correlational, cross-sectional design.

Sampling and sample size

The study included all adult patients with T2DM attending the Jeddah Care Centre for Diabetes and Hypertension at King Abdulaziz Hospital, Jeddah, Saudi Arabia, from January to April 2022. Convenience sampling was used to select a diverse sample of both male and female patients. Participants were included if they were aged ≥ 18 years, had been diagnosed with T2DM for a minimum of 1 year, were under medication for T2DM, able to understand Arabic, and willing to participate in the study. Exclusion criteria were individuals with other forms of diabetes such as prediabetes, type 1 diabetes, or gestational diabetes, and patients with a mental illness diagnosis.

The sample size was calculated using the G*Power software. We established an alpha level at 0.05, aimed for a power of 0.80, and assumed a moderately small effect size of 0.25. Based on these parameters, the sample size was calculated as 120 subjects.

Research instrument

Sociodemographic data and clinical information

Patients provided sociodemographic data, including their age, gender, educational level, employment status, marital status, and monthly income. Patients also provided clinical information, such as the number of medications they were currently taking for T2DM and whether they had previously received education about diabetes management. In addition, patients disclosed the primary source from which they obtained their antihyperglycemic medications. To complement this, data regarding their patterns of follow-up visits and interactions with physicians were extracted from medical files for a more comprehensive understanding of their clinical background.

Brief Illness Perception Questionnaire

The Brief Illness Perception Questionnaire (B-IPQ), developed by Broadbent *et al.*^[12] and translated into Arabic by Saarti *et al.*,^[13] is a tool designed to evaluate various dimensions of illness perceptions. This questionnaire comprises nine items, each scored on a scale ranging from 0 (the lowest) to 10 (the highest). The initial five items evaluate cognitive perceptions, encompassing the illness's impact on life (first item), its anticipated duration (second item), the individual's control over the illness (third

item), beliefs regarding treatment efficacy (fourth item), and symptom experience (fifth item). Items six and eight are dedicated to the emotional aspects, examining the level of concern regarding the illness and various mood-related aspects, respectively. The seventh item probes the individual's understanding of their illness. The questionnaire concludes with an open-ended item, where respondents list the top three factors that they believe to be the causes of their illness. In this study, the Arabic version was used, which has a good internal consistency (Cronbach's alpha: 0.72).^[13]

Morisky Medication Adherence Scale

The Morisky Medication Adherence Scale (MMAS-8) was developed by Morisky *et al.*^[14] and translated into Arabic by Ashur *et al.*^[15] The MMAS-8 is a self-reported measure that assesses patient adherence to medications. The Arabic MMAS-8 contains eight items, seven of which have two possible responses (yes/no), and the last question is rated using a 5-point Likert scale. The total score ranges between 0 and 8, and a high score means good adherence. The scoring system is divided into three categories (high = 8), (moderate = 6 to <8), and (low = <6). The Arabic MMAS-8 was found to be a reliable and valid tool for diabetes research in Arab-speaking populations. It exhibited good psychometric properties, with adequate internal consistency (Cronbach's alpha: 0.70). The scale can also effectively differentiate between patient groups in terms of medication adherence.^[15]

Ethical consideration

The study received approval from the Institutional Review Board of the Directorate of Health Affairs, Jeddah. Informed consent was obtained from all participants, who had been informed of the study's purpose and procedures and agreed to volunteer. The participants were also assured of anonymity and data confidentiality, and that the data collected would exclusively be used for the purposes of this study. Finally, the participants were informed of their rights to withdraw from the study at any time without any adverse consequences.

Data collection process

After receiving ethical approval, the primary investigator conducted daily visits to the Jeddah Care Centre for Diabetes. During these visits, a total of 500 patients were approached in the screening room prior to their appointments. The researcher introduced herself, provided a clear explanation of the study's objectives, and invited the patients to participate in the study. Patients who met the inclusion criteria and agreed to participate were provided a Google Forms link of the survey through WhatsApp

or text. Participants completed the questionnaires in specially arranged areas designed for comfort and privacy. For those unable to read or write, the primary researcher read the survey items aloud and recorded their responses. The data collection phase lasted 4 months, from January to April 2022.

Data analysis

The data from the questionnaires were encoded and converted to a Microsoft Excel spreadsheet. Then, the data were loaded into SPSS version 26 for analysis. The analysis involved descriptive statistics such as mean \pm standard deviation (SD) for all demographic and study variables. The relationship between the study's variables was examined using Pearson's correlation coefficients. The differences in the scores of the B-IPQ and MMAS-8 were assessed using the Mann-Whitney Z test and the Kruskal-Wallis H test. *P* values <0.05 were considered statistically significant.

RESULTS

Sociodemographic characteristics and clinical information

Of the 500 patients approached, 365 (73%) agreed to participate and completed the survey; participants who declined stated lack of interest, time constraints, concerns about privacy, and discomfort with technology or the electronic format of the survey. The average age of the respondents was 50.9 years (range: 18–81 years), and the majority were female (195; 53.4%) [Table 1]. The majority (58.4%) were taking three to five medications for diabetes. Notably, 74.5% of the respondents had never used medication reminders. Most patients (91%) received their prescribed medications free of charge from the clinic, whereas 9% purchased their medications from community pharmacies. Regular follow-up visits were adhered to by 89.6% of the patients, 78.4% had easy access to their physician, and 81.1% had received education about diabetes management [Table 2].

Illness perception level

Our findings revealed that participants perceived T2DM as a chronic, long-term condition, as indicated by the high mean score of 7.45 ± 3.17 for the timeline dimension. However, there was a notable gap in their understanding of the illness, with a mean score of 2.73 ± 2.38 [Table 3].

Furthermore, the sense of personal control over the illness was relatively low (mean: 4.04 ± 2.72). This was compounded by skepticism about the effectiveness of medical treatments, as evidenced by the low mean score of 2.27 ± 2.52 for treatment control. Illness perception was

Table 1: Sociodemographic characteristics of the patients (N=365)

Study variables	n (%)
Age group (years)	
≤50	162 (44.4)
>50	203 (55.6)
Mean±SD	50.90±15.87
Gender	
Male	170 (46.6)
Female	195 (53.4)
Level of education	
Illiterate	71 (19.5)
Primary	89 (24.4)
Secondary	48 (13.2)
University degree	157 (43.0)
Marital status	
Single	45 (12.3)
Married	253 (69.3)
Divorced	38 (10.4)
Widowed	29 (7.9)
Employment status	
Employed	120 (32.9)
Retired	87 (23.8)
Unemployed	158 (43.3)
Monthly income (SAR)	
<1500	97 (26.6)
1500–<5000	149 (40.8)
≥5000	119 (32.6)

SD – Standard deviation

Table 2: Clinical information of the patients (N=365)

Questions	n (%)
Duration of T2DM (years)	
<15	190 (52.1)
≥15	175 (47.9)
Number of medicines taken by the patient	
1–2	152 (41.6)
3–5	213 (58.4)
Do you use medication reminders?	
Yes	42 (11.5)
No	272 (74.5)
Sometimes	51 (14.0)
How do you get prescribed medication (s)?	
Free from the clinic	332 (91.0)
Buying from community pharmacies	33 (9.0)
Pattern of follow-up in the clinic	
Regular follow-up	327 (89.6)
Irregular follow-up	38 (10.4)
Having easy access to a physician	
Yes	286 (78.4)
No	79 (21.6)
Received DM education	
Yes	296 (81.1)
No	69 (18.9)

DM – Diabetes mellitus; T2DM – Type 2 DM

moderate (mean: 5.78 ± 2.79), indicating some recognition of the symptoms and nature of T2DM [Table 3].

Interestingly, participants perceived diabetes as a condition with moderately severe consequences, as indicated by a mean score of 5.36 ± 2.98 . The overall level of concern about their illness among the group was moderate, with a mean score of 5.26 ± 3.18 . Furthermore, the emotional

response to the illness across the participant group varied (mean: 5.79 ± 3.09), suggesting a somewhat detached attitude toward the illness. Regarding the perceived causes of T2DM, stress was the most frequently cited cause of T2DM (42.2%), followed by hereditary factors (21.4%) and considering it as fate (12.9%) [Table 3].

Medication adherence level

The overall mean score on the MMAS-8 was 5.36 ± 1.73 , suggesting a moderate level of medication adherence among the participants. About half of the patients (50.4%) occasionally forgot to take their hypoglycemic medication. Interestingly, 24.7% missed their medication for reasons other than forgetfulness in the fortnight before the study. Notably, 26.3% of the patients stopped taking their medication without consulting their physician when experiencing adverse effects. When traveling or away from home, most respondents (59.7%) did not consistently take their medication. However, the majority (91.8%) had adhered to their medication regimen the day before the interview. A smaller yet considerable proportion of the respondents (18.4%) stopped medication when feeling that their diabetes was under control, and about half of the participants expressed annoyance with their treatment plan.

In terms of remembering to take medication, 35.3% of patients reported occasional difficulties, 28.5% sometimes faced challenges, and 3.6% usually found it difficult, though none reported constant difficulties. About 32.6% of the patients rarely experienced difficulty in taking their medication on time [Table 4].

Association of illness perception and medication adherence score with socio-demographic and clinical information

Table 5 highlights the associations between patients' sociodemographic characteristics, clinical information, and their scores on the B-IPQ and the MMAS-8. A significant correlation was found between patients aged >50 years and higher MMAS-8 scores ($Z = 2.343$; $P = 0.019$). In addition, patients with a monthly income of >5000 SAR and those diagnosed with T2DM for 15 years or more also demonstrated higher MMAS-8 scores ($H = 11.100$; $P = 0.004$ and $Z = 3.042$; $P = 0.002$, respectively).

The study observed that respondents with a secondary or lower level of education reported lower medication adherence compared with those with a university-level education ($Z = 2.181$; $P = 0.029$). Furthermore, patients who had previously received diabetes education exhibited higher mean adherence scores than those who had not ($Z = 2.020$; $P = 0.043$). Regular follow-up in

the clinic was also associated with higher adherence scores ($Z = 2.559$; $P = 0.010$).

In terms of illness perception, a higher B-IPQ score was more commonly associated with patients aged >50 years ($Z = 2.935$; $P = 0.003$), with lower education ($Z = 4.903$; $P < 0.001$), taking three or more anti-diabetic drugs ($Z = 4.121$; $P < 0.001$), who used medication reminders ($Z = 2.065$; $P = 0.039$), and who had easy access to a physician ($Z = 3.366$; $P = 0.001$). Conversely, the score was significantly lower among patients with a monthly income >5000 SAR ($H = 50.915$; $P < 0.001$) and those who received diabetes education ($Z = 2.530$; $P = 0.011$).

Notably, variables such as gender, marital status, employment status, and the pattern of medication acquisition did not show significant differences in either the B-IPQ score or the MMAS-8 score ($P > 0.05$).

Association between the level of adherence and illness perception

As shown in Table 6, in the consequences domain, patients with lower medication adherence perceived the impact of T2DM as significantly more severe compared with those

with higher adherence ($P < 0.001$). Interestingly, perceiving T2DM as a chronic condition showed no significant difference across adherence levels ($P = 0.512$).

A significant difference was observed in the personal control domain, where higher medication adherence correlated with a greater sense of personal control over the illness ($P < 0.001$). This trend was mirrored in the treatment control domain, where belief in the effectiveness of treatment was notably stronger among patients with higher adherence ($P < 0.001$). In contrast, the illness identity domain showed that higher scores, indicating a stronger association with the illness, were more prevalent in the low adherence group ($P < 0.001$).

The emotional representation domain revealed that patients with lower adherence experienced a more intense emotional response to their illness ($P < 0.001$). In the understanding domain, a better comprehension of T2DM was associated with higher medication adherence, as evidenced by higher scores in this area among the high adherence group ($P < 0.001$).

DISCUSSION

The study's utilization of the B-IPQ to assess patients' perceptions of T2DM has yielded insightful findings into the psychological and cognitive aspects of living with the condition. A significant observation is the recognition of T2DM as a chronic and long-term illness, as evidenced by the high scores in the timeline dimension. However, this awareness is juxtaposed with a notable poor understanding of the disease, indicating a need for enhanced patient education about T2DM and its broader implications.

Table 3: Mean score of the Brief Illness Perception Questionnaire domains

Brief IPQ domains	Mean±SD
Consequences	5.36±2.98
Timelines	7.45±3.17
Personal control	4.04±2.72
Treatment control	2.27±2.52
Identity	5.78±2.79
Concern	5.26±3.18
Understanding	2.73±2.38
Emotional representation	5.79±3.09

IPQ – Illness Perception Questionnaire; SD – Standard deviation

Table 4: Morisky Medication Adherence Scale responses (N=365)

MMAS-8 questions	Yes, n (%)	No, n (%)
1. Do you sometimes forget to take your hypoglycemic medications?	184 (50.4)	181 (49.6)
2. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past 2 weeks, were there any days when you did not take your hypoglycemic medicine?	90 (24.7)	275 (75.3)
3. Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?	96 (26.3)	269 (73.7)
4. When you travel or leave home, do you sometimes forget to bring along your hypoglycemic medication?	218 (59.7)	147 (40.3)
5. Did you take your hypoglycemic medicine yesterday?	335 (91.8)	30 (8.2)
6. When you feel like your health condition is under control, do you sometimes stop taking your medicine?	67 (18.4)	298 (81.6)
7. Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	187 (51.2)	178 (48.8)
8. How often do you have difficulty remembering to take all your medications?		
Never/rarely	119 (32.6)	-
Once in while	129 (35.3)	-
Sometimes	104 (28.5)	-
Usually	13 (3.6)	-
All the time	0	-
Total MMAS-8 score, mean±SD	5.36±1.73	-

MMAS – Morisky Medication Adherence Scale; SD – Standard deviation

Table 5: Differences in the score of brief Illness Perception Questionnaire and Morisky Medication Adherence Scale according to the sociodemographic characteristics and the clinical information of the patients (N=365)

Factor	Brief IPQ score (80), mean±SD	Z/H-test; P	MMAS-8 score (8), mean±SD	Z/H-test; P
Age group ^a (years)				
≤50	36.1±12.8	2.965; 0.003**	5.10±1.77	2.343; 0.019**
>50	40.8±13.1		5.54±1.66	
Gender ^a				
Male	37.9±12.9	1.202; 0.229	5.25±1.77	1.304; 0.192
Female	39.3±13.3		5.42±1.66	
Level of education ^a				
Secondary or below	41.7±12.8	4.903; <0.001**	5.16±1.75	2.181; 0.029**
University degree	34.8±12.6		5.58±1.63	
Marital status ^a				
Unmarried	38.5±13.5	0.339; 0.735	4.98±1.98	1.933; 0.053
Married	38.8±13.0		5.50±1.56	
Employment status ^b				
Employed	35.9±14.4	14.128; 0.001**	5.10±1.86	5.173; 0.075
Retired	36.8±12.7		5.60±1.36	
Unemployed	41.8±11.7		5.39±1.76	
Monthly income (SAR) ^b				
<1500	42.7±13.5	50.915; <0.001**	5.15±1.66	11.100; 0.004**
1500–<5000	42.0±10.6		5.16±1.66	
≥5000	31.3±12.7		5.73±1.77	
Duration of T2DM (years)				
<15	38.3±12.3	0.939; 0.348	5.05±1.69	3.042; 0.002**
≥15	39.1±14.0		5.66±1.68	
Number of medicines taken by the patient ^a				
1–2	35.8±13.1	4.121; <0.001**	5.31±1.56	0.692; 0.489
3–5	40.7±12.9		5.37±1.82	
Use of medication reminders ^a				
Yes	40.0±15.9	2.065; 0.039**	5.46±1.42	0.324; 0.746
No	38.2±12.1		5.30±1.80	
Pattern of medication acquisition				
Free from the clinic	38.5±12.5	0.353; 0.724	5.40±1.66	1.611; 0.107
Buying from pharmacies	40.7±18.9		4.75±2.11	
Pattern of follow-up in the clinic ^a				
Regular follow-up	38.2±13.2	1.708; 0.088	5.45±1.57	2.559; 0.010**
Irregular follow-up	43.2±11.9		4.40±2.46	
Access to a physician ^a				
Yes	39.6±11.8	3.366; 0.001**	5.40±1.63	0.939; 0.348
No	35.4±16.8		5.14±1.97	
Received DM education ^a				
Yes	37.6±12.7	2.530; 0.011**	5.41±1.73	2.020; 0.043**
No	43.5±13.8		5.06±1.62	

**Significant at $P < 0.05$ level; ^a P -value has been calculated using the Mann–Whitney Z -test; ^b P -value has been calculated using the Kruskal–Wallis H -test. IPQ – Illness Perception Questionnaire; MMAS – Morisky Medication Adherence Scale, SD – Standard deviation; DM – Diabetes mellitus; T2DM – Type 2 DM

Table 6: Association between the level of adherence and illness perception (N=365)

Brief IPQ domains	Low adherence		Moderate adherence		High adherence		$P^{\$}$
	Mean±SD	Median (IQR)	Mean±SD	Median (IQR)	Mean±SD	Median (IQR)	
Consequences	6.17±2.73	3	3.78±2.99	6	4.73±2.61	4	<0.001**
Timelines	7.34±3.22	4	7.52±3.21	4	7.95±2.71	4	0.512
Personal control	5.30±2.64	3	6.90±2.52	4	7.49±2.42	4	<0.001**
Treatment control	7.22±2.63	3	8.14±2.25	3	9.68±0.67	0	<0.001**
Identity	6.35±2.58	3	5.10±2.89	5	4.14±2.83	6	<0.001**
Concern	6.01±3.06	4	4.14±3.22	7	3.70±2.32	3	<0.001**
Understanding	6.63±2.43	4	8.05±2.01	3	9.03±1.26	1	<0.001**
Emotional representation	6.69±2.85	5	3.92±2.85	5	5.32±2.79	2	<0.001**

**Significant at $P < 0.05$ level; ^{\\$} P -value has been calculated using Kruskal–Wallis H -test. SD – Standard deviation; IPQ – Illness Perception Questionnaire; IQR – Interquartile range

Patients exhibited a low sense of personal control over their illness and skepticism about the effectiveness of medical treatments, which could adversely affect their adherence to medication and lifestyle changes. The moderate perception

of illness identity suggests some awareness of T2DM symptoms and nature, but not a complete understanding. In addition, the perception of diabetes as a less severe condition and the moderate level of concern might lead

to underestimating the risks and complications associated with T2DM, potentially impacting disease management and treatment adherence. The emotional response to T2DM varied, with some participants showing detachment, which could be a coping mechanism or a sign of denial. The perceived causes of T2DM, such as stress, heredity, and fate, reflect a mix of accurate and misconceived beliefs about the disease's etiology. These findings were aligned with findings from other regional studies.^[16,17] In terms of medication adherence, the study found that a significant majority (62.2%) had low adherence rates, with only 10.1% showing high adherence to antidiabetic drugs. These figures are consistent with previous research from Saudi Arabia,^[17,18] but in contrast to adherence rates reported in other countries, such as Pakistan,^[19] Malaysia,^[20] the United States,^[21] Singapore^[22] and the UAE.^[23] The variation in adherence rates across different countries underscores the influence of cultural and healthcare system differences on diabetes management.

A notable finding was the impact of travel on medication adherence. Over half of the respondents reported forgetting to take their hypoglycemic medication when traveling or leaving home. This suggests a need for enhanced patient education about managing diabetes during travel, as recommended by previous studies,^[20] including consulting with their doctors 4 to 6 weeks before travel.^[24] The measures required for the care of diabetes while travelling should be included in education initiatives to enhance patient's knowledge. Earlier work has suggested that >95% of individuals with DM who are dependent on insulin seek an appointment prior to a trip.^[25]

As to the relationships between illness perception and medication adherence, patients with lower adherence levels tended to perceive the consequences of T2DM as more severe, had a stronger association with the illness, and experienced more intense emotional responses. This pattern aligns with existing research,^[26,27] suggesting that strong consequences, illness identity, and emotional response perceptions are related to poor self-care behaviors, including medication non-adherence.

Conversely, patients with higher adherence levels had a more positive outlook on their condition, and such patients exhibited a greater sense of personal control, a stronger belief in the effectiveness of their treatment, and a better understanding of their illness. This is similar to the findings in other studies that have found that patients with a more positive outlook and perception of disease have higher adherence to medication and self-care.^[26-29]

Overall, the study underscores the complex and nuanced relationship between various perceptions of illness and medication adherence in T2DM patients. It highlights the need for a multifaceted approach in patient education and support to improve adherence and overall management of the condition. The insights gained from this study can inform future interventions aimed at enhancing medication adherence by addressing the underlying perceptions and beliefs patients hold about their illness.

Limitations

While the study's measurement tools were valid and reliable, a significant limitation is their self-reported nature, which can introduce biases. In addition, the study was conducted in a single diabetic center in Jeddah, limiting the generalizability of the results. This study's results are more reflective of the specific sample group rather than the entire population of T2DM patients in the region.

CONCLUSION

This study highlights the intricate relationship between illness perceptions and medication adherence among patients with T2DM. The findings reveal that patients with lower adherence perceive their illness more severely and experience stronger emotional responses, whereas those with higher adherence demonstrate a greater sense of personal control and have a better understanding of their condition. These insights emphasize the importance of addressing psychological and perceptual factors in the management of T2DM, suggesting that tailored interventions focusing on modifying illness perceptions could be crucial in enhancing medication adherence and overall disease management.

Ethical considerations

The study was approved by the Institutional Review Board of the Directorate of Health Affairs (Ref. No: A01252; date: December 19, 2021), Jeddah, Saudi Arabia. Informed consent was obtained from all subjects involved in the study. The study adhered to the principles of the Declaration of Helsinki, 2013.

Peer review

This article was peer-reviewed by three independent and anonymous reviewers.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author contributions

Conceptualization: S.A and A.A.; Methodology: S.A, A.A, and M.M.A; Data analysis: S.A. and A.A.; Writing—original

draft preparation: S.A. and A.A.; Writing – review and editing: S.A, A.A, and M.M.A; Supervision: S.A., A.A., and M.M.A.

All authors have read and agreed to the published version of the manuscript.

Acknowledgement

We acknowledge that the MMAS-8 Scale, including its content, name, and trademarks, is protected by US copyright and trademark laws. We obtained the necessary permission for the use of the scale and its coding in accordance with the guidelines set forth by MMAR, LLC. More information and licensing agreements can be obtained from www.moriskyscale.com.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Vijan S. In the clinic. Type 2 diabetes. *Ann Intern Med* 2010;152:C31-15.
- Alqarni AM, Alrahbeni T, Qarni AA, Qarni HM. Adherence to diabetes medication among diabetic patients in the Bisha governorate of Saudi Arabia – A cross-sectional survey. *Patient Prefer Adherence* 2019;13:63-71.
- Robert AA, Al Dawish MA. The worrying trend of diabetes mellitus in Saudi Arabia: An urgent call to action. *Curr Diabetes Rev* 2020;16:204-10.
- Zhou B, Lu Y, Hajifathalian K, Bentham J, Di Cesare M, Danaei G, *et al.* Worldwide trends in diabetes since 1980: A pooled analysis of 751 population-based studies with 4.4 million participants. *Lancet* 2016;387:1513-30.
- El Kebbi IM, Bidikian NH, Hneiny L, Nasrallah MP. Epidemiology of type 2 diabetes in the Middle East and North Africa: Challenges and call for action. *World J Diabetes* 2021;12:1401-25.
- Kim H, Sereika SM, Lingler JH, Albert SM, Bender CM. Illness perceptions, self-efficacy, and self-reported medication adherence in persons aged 50 and older with type 2 diabetes. *J Cardiovasc Nurs* 2021;36:312-28.
- Broadbent E, Wilkes C, Koschwanez H, Weinman J, Norton S, Petrie KJ. A systematic review and meta-analysis of the brief illness perception questionnaire. *Psychol Health* 2015;30:1361-85.
- Sawyer AT, Harris SL, Koenig HG. Illness perception and high readmission health outcomes. *Health Psychol Open* 2019;6:2055102919844504.
- Shahin W, Kennedy GA, Stupans I. The impact of personal and cultural beliefs on medication adherence of patients with chronic illnesses: A systematic review. *Patient Prefer Adherence* 2019;13:1019-35.
- Polonsky WH, Henry RR. Poor medication adherence in type 2 diabetes: Recognizing the scope of the problem and its key contributors. *Patient Prefer Adherence* 2016;10:1299-307.
- Gonzalez JS, Tanenbaum ML, Commissariat PV. Psychosocial factors in medication adherence and diabetes self-management: Implications for research and practice. *Am Psychol* 2016;71:539-51.
- Broadbent E, Petrie KJ, Main J, Weinman J. The brief illness perception questionnaire. *J Psychosom Res* 2006;60:631-7.
- Saarti S, Jabbour H, El Osta N, Hajj A, Khabbaz LR. Cross-cultural adaptation and psychometric properties of an Arabic language version of the brief illness perception questionnaire in Lebanon. *Libyan J Med* 2016;11:31976.
- Morisky DE, Ang A, Krousel Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich)* 2008;10:348-54.
- Ashur ST, Shamsuddin K, Shah SA, Bosseri S, Morisky DE. Reliability and known-group validity of the Arabic version of the 8-item Morisky Medication Adherence Scale among type 2 diabetes mellitus patients. *East Mediterr Health J* 2015;21:722-8.
- Bilondi SS, Noghbi AD, Aalami H. The relationship between illness perception and medication adherence in patients with diabetes mellitus type II: Illness perception and medication adherence. *J Prev Med Hyg* 2021;62:E966-71.
- Alyami M, Serlachius A, Mokhtar I, Broadbent E. Illness perceptions, HbA1c, and adherence in type 2 diabetes in Saudi Arabia. *Patient Prefer Adherence* 2019;13:1839-50.
- Alatawi YM, Kavookjian J, Ekong G, Alrayees MM. The association between health beliefs and medication adherence among patients with type 2 diabetes. *Res Social Adm Pharm* 2016;12:914-25.
- Nazir SU, Hassali MA, Saleem F, Bashir S, Aljadhey H. Disease related knowledge, medication adherence and glycaemic control among patients with type 2 diabetes mellitus in Pakistan. *Prim Care Diabetes* 2016;10:136-41.
- Jannoo Z, Mamode Khan N. Medication adherence and diabetes self-care activities among patients with type 2 diabetes mellitus. *Value Health Reg Issues* 2019;18:30-5.
- Shiyanbola OO, Unni E, Huang YM, Lanier C. The association of health literacy with illness perceptions, medication beliefs, and medication adherence among individuals with type 2 diabetes. *Res Social Adm Pharm* 2018;14:824-30.
- Lee CS, Tan JH, Sankari U, Koh YL, Tan NC. Assessing oral medication adherence among patients with type 2 diabetes mellitus treated with polytherapy in a developed Asian community: A cross-sectional study. *BMJ Open* 2017;7:e016317.
- Al Haj Mohd MM, Phung H, Sun J, Morisky DE. Improving adherence to medication in adults with diabetes in the United Arab Emirates. *BMC Public Health* 2016;16:857.
- Lin IW, Chang HH, Lee YH, Wu YC, Lu CW, Huang KC. Blood sugar control among type 2 diabetic patients who travel abroad: A cross sectional study. *Medicine (Baltimore)* 2019;98:e14946.
- Pavela J, Suresh R, Blue RS, Mathers CH, Belalcazar LM. Management of diabetes during air travel: A systematic literature review of current recommendations and their supporting evidence. *Endocr Pract* 2018;24:205-19.
- Hashimoto K, Urata K, Yoshida A, Horiuchi R, Yamaaki N, Yagi K, *et al.* The relationship between patients' perception of type 2 diabetes and medication adherence: A cross-sectional study in Japan. *J Pharm Health Care Sci* 2019;5:2.
- Farhat R, Assaf J, Jabbour H, Licha H, Hajj A, Hallit S, *et al.* Adherence to oral glucose lowering drugs, quality of life, treatment satisfaction and illness perception: A cross-sectional study in patients with type 2 diabetes. *Saudi Pharm J* 2019;27:126-32.
- Albargawi M, Snethen J, Gannass AA, Kelber S. Perception of persons with type 2 diabetes mellitus in Saudi Arabia. *Int J Nurs Sci* 2016;3:39-44.
- Kugbey N, Oppong Asante K, Adulai K. Illness perception, diabetes knowledge and self-care practices among type-2 diabetes patients: A cross-sectional study. *BMC Res Notes* 2017;10:381.