International Journal of Nutrology
(Official Journal of the ABRAN - Brazilian Association of Nutrology)

ORIGINAL ARTICLE

DOI: 10.54448/ijn26116

Challenges to diabetes self-management among patients with type2 diabetes: a cross-sectional study

Younus Khudhur Baeez[1],*, Hussein Mohammed Abdul Fattah[1], Shelan Qahraman Shakor[1], Marwah Ali Khalaf[1]

[1] Kirkuk University. College of Nursing, Kirkuk City, Iraq.

*Corresponding author: Younus Khudhur Baeez.
Kirkuk University. College of Nursing, Kirkuk City, Iraq.
E-mail: younuskhadir@uokirkuk.edu.iq

DOI: https://doi.org/10.54448/ijn26116
Received: 12-18-2025; Revised: 02-27-2026; Accepted: 03-02-2026; Published: 03-05-2026; IJN-id: 26116

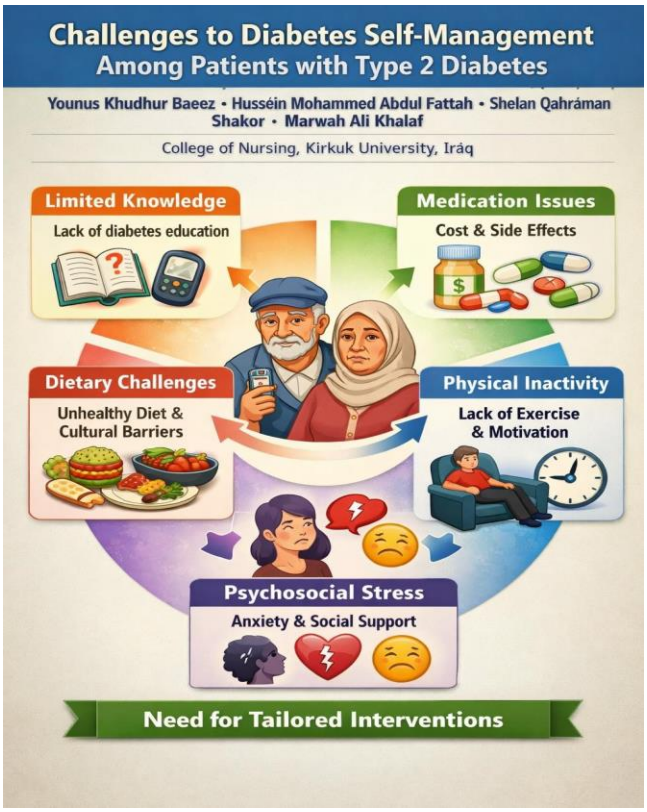
Editor: Dr Hind Mamoun Beheiry, MD, MPH.

Abstract

Introduction: Type 2 Diabetes Mellitus (T2DM) is a major global public health problem, affecting more than 537 million adults worldwide, with projections reaching 783 million by 2045. Effective self-management is essential to prevent complications; however, patients often face multiple barriers. **Objective:** To assess the challenges of diabetes self-management among patients with Type 2 Diabetes Mellitus in Kirkuk City, Iraq. **Methods:** A cross-sectional study was conducted in the outpatient clinics of Kirkuk City, Iraq, to assess challenges in diabetes self-management among adult patients with Type 2 Diabetes Mellitus (T2DM). A total of 336 patients were recruited using a convenience sampling technique, with sample size justified via standard formulas for population proportions at 95% confidence and 5% margin of error. Data were collected through a structured, validated, and reliable questionnaire covering demographics, clinical characteristics, and five domains of self-management (knowledge, medication adherence, diet, physical activity, and psychosocial challenges). Face-to-face interviews were conducted individually, with written informed consent obtained from all participants. Ethical approval was secured from the College of Nursing, Kirkuk University, and confidentiality and anonymity were ensured. Data were analyzed using SPSS 26.0, employing descriptive statistics, independent t-tests, and one-way ANOVA, with $p < 0.05$ considered statistically significant. **Results:** The mean age of participants was 51.9 ± 10.1 years, with females slightly predominating (52.4%). Overall knowledge of diabetes self-management was moderate (mean score = 3.46). Patients experienced moderate challenges related to medication adherence (mean = 2.94), dietary management (mean = 3.28), physical activity (mean = 3.15), and psychological and social factors (mean = 3.33). The most prominent barriers included dietary restrictions, lack of motivation for physical activity, medication costs, and psychological stress. **Conclusion:** Most participants were middle-aged to older adults, predominantly female and married, with moderate knowledge and self-management abilities. Challenges in medication adherence, lifestyle behaviors, and psychosocial aspects were evident and significantly associated with demographic factors, highlighting the need for tailored interventions.

Keywords: Type 2 Diabetes Mellitus. Self-Management. Challenges. Patients.

Graphical abstract



Source: Own authorship.

Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance, resulting in persistent hyperglycemia and a high risk of long-term microvascular and macrovascular complications if inadequately managed. The global burden of diabetes has risen dramatically over recent decades. In 2021, approximately 537 million adults were living with diabetes worldwide, and this number is projected to reach 643 million by 2030 and 783 million by 2045 **[1]**. This escalating prevalence poses a major public health challenge, particularly in low- and middle-income countries.

The Middle East has experienced one of the fastest growth rates in diabetes prevalence globally, driven by rapid urbanization, sedentary lifestyles, unhealthy dietary patterns, and population aging **[2]**. Regional estimates indicate that diabetes prevalence in Middle Eastern countries exceeds the global average, leading to increased healthcare costs, productivity losses, and reduced quality of life. These epidemiological trends underscore the urgent need for effective, context-specific diabetes management strategies.

Effective diabetes self-management is the cornerstone of T2DM care and plays a critical role in achieving optimal glycemic control, preventing or delaying complications, and improving patients' quality of life. Diabetes self-management encompasses adherence to pharmacological therapy, healthy dietary practices, regular physical activity, self-monitoring of blood glucose, and psychological coping skills **[3]**. Evidence consistently demonstrates that patients who actively engage in self-management behaviors achieve better metabolic outcomes, fewer hospital admissions, and lower rates of diabetes-related complications **[4]**. Strengthening self-management practices therefore offers significant benefits for both patients and healthcare systems.

Despite these advantages, many individuals with T2DM encounter substantial barriers that hinder effective self-management. Previous studies have identified inadequate diabetes knowledge, low health literacy, financial constraints related to medications and monitoring supplies, culturally influenced dietary habits, limited opportunities for physical activity, and psychological distress as major challenges **[5]**. In Middle Eastern societies, sociocultural norms, strong family food traditions, and economic pressures further influence self-care behaviors and adherence to recommended lifestyle modifications **[6]**.

Although several studies from neighboring Middle Eastern countries report moderate levels of diabetes knowledge accompanied by poor adherence to lifestyle recommendations and high diabetes-related distress, these findings cannot be generalized across all contexts due to differences in healthcare infrastructure, socioeconomic conditions, and cultural practices **[7,8]**. Importantly, there is a notable lack of empirical evidence from Iraq, particularly at the city level, regarding the multidimensional challenges faced by patients with T2DM in managing their disease. Existing regional literature tends to focus on prevalence or clinical outcomes, with limited attention to patient-reported self-management barriers within the Iraqi healthcare context. This gap restricts the development of tailored interventions and policies that address local patient needs.

This study aimed to assess the challenges to diabetes self-management among patients with Type 2 Diabetes attending hospitals in Kirkuk City, Iraq, in order to generate context-specific evidence that can inform targeted educational, clinical, and policy interventions to improve diabetes care outcomes.

Methods

Study Design

This study developed a cross-sectional observational study, following the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) rules. Available at: https://www.strobe-statement.org/checklists/. Accessed on: December, 10, 2025. A cross-sectional

study design was adopted to assess the challenges associated with diabetes self-management among patients with Type 2 Diabetes Mellitus (T2DM).

Study Setting

The study was conducted in the outpatient clinics of Kirkuk City, Iraq. These clinics provide various services to patients, including regular follow-up, medication administration, and health education.

Study Population

The study population comprised adult patients diagnosed with T2DM who attended the selected diabetes clinics during the data collection period.

Sample Size and Sampling Technique

A total of 336 patients were included in the study. The sample size was determined based on feasibility and statistical considerations to ensure adequate representation of the target population. Using standard formulas for estimating proportions in a population, and assuming an expected prevalence of the primary outcome of 50% (to maximize sample size), a 95% confidence level, and a 5% margin of error, the minimum required sample was calculated to be 384. Considering clinic attendance rates and potential non-response, the final recruited sample of 336 patients was deemed acceptable, providing sufficient power to detect meaningful differences and associations at a significance level of 0.05.

A convenience sampling technique was used to recruit eligible participants. Patients who met the inclusion criteria and were present at the clinics during the data collection period were invited to participate. Although convenience sampling is non-probabilistic and may limit generalizability, it was suitable for this study due to logistical constraints and the aim of capturing readily accessible patients within the clinical setting.

Data Collection Tool

A structured questionnaire was developed based on an extensive review of relevant literature and previous studies related to diabetes self-management. The questionnaire comprised two main parts:

- **Part I: Demographic and Clinical Characteristics**
  Included items on age, gender, marital status, educational level, occupation, duration of diabetes, and type of treatment (oral medication, insulin, or both).
- **Part II: Challenges of Self-Management**
  Addressed five domains: knowledge and understanding of diabetes self-management, medication adherence, dietary management, physical activity, and psychological and social challenges.

Validity and Reliability

The questionnaire was reviewed by a panel of experts in nursing and diabetes care to ensure content validity, clarity, and relevance. Minor modifications were made based on their feedback. The reliability coefficient for the self-management scale was 0.85, indicating good internal consistency.

Data Collection Procedure and Informed Consent

Data were collected through face-to-face interviews conducted by the researchers. To ensure comfort and confidentiality, interviews were conducted individually. Prior to data collection, the purpose of the study was explained to each participant, and written informed consent was obtained. Each interview lasted approximately 15-20 minutes.

Ethical Consideration

Ethical approval was obtained from the Scientific and Ethical Committee of the College of Nursing, Kirkuk University (approval number: 3/7/3036, reference: 25-11-2024), as well as from the relevant hospital authorities. Participants were informed that:

- Participation was voluntary
- They had the right to withdraw at any time without consequences
- All collected data would be kept confidential and used solely for research purposes

Anonymity was ensured by using codes instead of personal identifiers.

Data Analysis

Data were coded and entered into SPSS version 26 for statistical analysis.

1. **Descriptive statistics** were used to summarize the data:
   - Frequencies and percentages for categorical variables
   - Means and standard deviations for continuous variables
2. **Inferential statistics** were applied to examine relationships between demographic characteristics and diabetes self-management domains:
   - Independent t-tests for comparisons between two groups
   - One-way ANOVA for comparisons among more than two groups

A p-value < 0.05 was considered statistically significant.

Results

Table 1 summarizes age, gender, marital status, education, occupation, diabetes duration, and treatment type of participants. The mean age was 51.9 ± 10.1 years, with slightly more females (52.4%) than males (47.6%). Most participants were married (73.2%), had secondary or higher education (61.3%), and were employed or retired (60.5%). Diabetes duration was 1–5 years for 41.7%, and treatment included oral medication (59.5%), insulin (17.8%), or both (22.6%). All values are presented as number (%) except age, which is mean ± SD.

Table 1. Demographic Characteristics (n=336).

Variable	Category	Frequency	Percentage
Age (years)	<40	50	14.9
	40–49	80	23.8
	50–59	120	35.7
	≥60	86	25.6
	Mean age: 51.9 years SD: ± 10.1		
Gender	Male	160	47.6
	Female	176	52.4
Marital Status	Single	40	11.9
	Married	246	73.2
	Widowed	30	8.9
	Divorced	20	6.0
Education Level	No formal education	50	14.9
	Primary	80	23.8
	Secondary	90	26.8
	Diploma	56	16.7
	University	60	17.8
Occupation	Unemployed / Homemaker	120	35.7
	Worker / Laborer	80	23.8
	Office / Professional	72	21.4
	Retired	64	19.1
Duration of Diabetes	<1 year	20	6.0
	1–5 years	140	41.7
	6–10 years	100	29.8
	>10 years	76	22.6
Type of Treatment	Oral medication	200	59.5
	Insulin	60	17.8
	Both	76	22.6

Source: Own authorship.

Responses were measured on a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. The table shows the frequency (F) and percentage (%) of participants selecting each response for each item. The Mean Score (MS) represents the average response for each item, with higher scores indicating greater agreement or higher perceived impact. The Total Mean Score summarizes the overall psychological and social challenge level among participants.

Table 2 presents participants' knowledge and understanding of diabetes management. Most patients reported awareness of how diet affects blood sugar (58.3% Agree/Strongly Agree) and the importance of regular monitoring (60.7% Agree/Strongly Agree). Knowledge on managing high or low blood sugar episodes was moderate, with 52.4% agreeing, while understanding complications from poor control was slightly higher at 53.6%. Confidence in overall diabetes management was lower, with only 46.5% agreeing or strongly agreeing. The overall mean score of 3.46 indicates a moderate level of knowledge and understanding among the participants.

Table 2. Patients Knowledge and Understanding (n = 336).

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		MS
	F	%	F	%	F	%	F	%	F	%	
I understand how my diet affects my blood sugar	20	6.0	40	11. 9	80	23.8	120	35.7	76	22.6	3.57
I am aware of the importance of regular blood sugar monitoring	16	4.8	44	13. 1	72	21.4	128	38.1	76	22.6	3.61
I know how to manage high or low blood sugar episodes	24	7.1	52	15. 5	84	25.0	120	35.7	56	16.7	3.39
I understand the complications from poor diabetes control	12	3.6	48	14. 3	96	28.6	128	38.1	52	15.5	3.48
I am confident in my knowledge of diabetes management	28	8.3	64	19. 0	88	26.2	104	31.0	52	15.5	3.26
Total Mean of Knowledge & Understanding											17.31
Overall Mean of Knowledge & Understanding											3.46

Source: Own authorship.

Responses were measured on a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. The table shows the frequency (F) and percentage (%) of participants selecting each response for each item. The Mean Score (MS) represents the average response for each item, with higher scores indicating greater agreement or higher perceived impact. The Total Mean Score summarizes the overall psychological and social challenge level among participants.

Table 3 presents participants' challenges in adhering to diabetes medications. Forgetfulness, cost, and side effects were the main barriers, while skipping doses when feeling better was less common. The overall mean score of 2.94 indicates a moderate level of medication adherence challenges among the participants.

Table 3. Medication Adherence Challenges (n=336).

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		MS
	F	%	F	%	F	%	F	%	F	%	
I sometimes forget to take my diabetes medication	96	28.6	120	35.7	64	19.0	40	11.9	16	4.8	2.10
Cost of medications affects my ability to take them regularly	40	11.9	64	19.0	88	26.2	100	29.8	44	13.1	3.11
Side effects make it difficult to follow my regimen	52	15.5	72	21.4	96	8.6	84	25.0	32	9.5	2.97
I sometimes skip medications when I feel better	88	6.2	104	31.0	72	21.4	48	14.3	24	7.1	2.30
I understand how and when to adjust my medications if needed	32	9.5	64	19.0	96	28.6	96	28.6	48	14.3	3.20
Total Mean of Medication Adherence	–	–	–	–	–	–	–	–	–	–	13.68
Overall Mean of Medication Adherence	–	–	–	–	–	–	–	–	–	–	2.94

Source: Own authorship.

Responses were measured on a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. The table shows the frequency (F) and percentage (%) of participants selecting each response for each item. The Mean Score (MS) represents the average response for each item, with higher scores indicating greater agreement or higher perceived impact. The Total Mean Score summarizes the overall psychological and social challenge level among participants.

Table 4 highlights participants' challenges in managing a diabetic diet. Difficulty following recommended diets, resisting non-recommended foods, and family or cultural food habits were common barriers. The overall mean score of 3.28 indicates a moderate level of dietary challenges among participants.

Table 4. Dietary Challenges (n = 336).

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		MS
	F	%	F	%	F	%	F	%	F	%	
Following a diabetic diet is difficult for me	28	8.3	64	19.0	92	27.4	108	32.1	44	13.1	3.36
I find it hard to resist foods that are not recommended	24	7.1	56	16.7	100	29.8	112	33.3	44	13.1	3.40
Family or cultural food habits affect my ability to manage my diet	32	9.5	64	19.0	104	31.0	100	29.8	36	10.7	3.25
Access to healthy foods is limited for me	40	11.9	72	21.4	104	31.0	88	26.2	32	9.5	3.07
I know how to plan meals according to my blood sugar levels	36	10.7	64	19.0	96	28.6	88	26.2	52	15.5	3.33
Total Mean of Dietary Challenges	–	–	–	–	–	–	–	–	–	–	16.41
Overall Mean of Dietary Challenges	–	–	–	–	–	–	–	–	–	–	3.28

Source: Own authorship.

Responses were measured on a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. The table shows the frequency (F) and percentage (%) of participants selecting each response for each item. The Mean Score (MS) represents the average response for each item, with higher scores indicating greater agreement or higher perceived impact. The Total Mean Score summarizes the overall psychological and social challenge level among participants.

Table 5 presents participants' challenges in engaging in regular physical activity. Lack of time, health issues, and low motivation were the main barriers, while understanding exercise benefits was moderate. The overall mean score of 3.15 indicates a moderate level of physical activity challenges among participants.

Table 5. Physical Activity Challenges (n=336).

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		MS
	F	%	F	%	F	%	F	%	F	%	
I engage in regular physical activity as advised	64	19.0	88	6.2	96	28.6	60	17.9	28	8.3	2.78
Lack of time makes it difficult to exercise	28	8.3	72	21.4	104	31.0	88	26.2	44	13.1	3.33
Health conditions (pain, fatigue) prevent me from exercising	32	9.5	64	19.0	96	28.6	96	28.6	48	14.3	3.35
I lack motivation to maintain regular physical activity	24	7.1	56	16.7	96	28.6	112	33.3	48	14.3	3.45
I understand the benefits of exercise	60	17.9	88	26.2	96	28.6	64	19.0	28	8.3	2.84

Total Mean of Physical Activity Challenges	–	–	–	–	–	–	–	–	–	–	15.75
Overall Mean of Physical Activity Challenges	–	–	–	–	–	–	–	–	–	–	3.15

Source: Own authorship.

Responses were measured on a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. The table shows the frequency (F) and percentage (%) of participants selecting each response for each item. The Mean Score (MS) represents the average response for each item, with higher scores indicating greater agreement or higher perceived impact. The Total Mean Score summarizes the overall psychological and social challenge level among participants.

Table 6 shows participants' psychological and social challenges in managing diabetes. Stress, anxiety, and feeling overwhelmed were common, while family and social support were reported as moderate. The overall mean score of 3.33 indicates a moderate level of psychological and social challenges among participants.

Table 6. Psychological and Social Challenges (n=336).

Items	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		MS
	F	%	F	%	F	%	F	%	F	%	
I feel stressed or anxious about managing my diabetes	20	6.0	44	13.1	88	26.2	120	35.7	64	19.0	3.66
Diabetes management affects my mood or emotional well-being	24	7.1	52	15.5	88	26.2	112	33.3	60	17.9	3.57
I sometimes feel overwhelmed by managing my condition	28	8.3	56	16.7	92	27.4	112	33.3	48	14.3	3.48
Family or friends support me in managing my diabetes	72	21.4	96	28.6	88	26.2	52	15.5	28	8.3	2.69
I feel socially restricted due to my diabetes	32	9.5	64	19.0	104	31.0	88	26.2	48	14.3	3.24
Total Mean of Psychological & Social Challenges	–	–	–	–	–	–	–	–	–	–	16.64
Total Mean of Psychological & Social Challenges	–	–	–	–	–	–	–	–	–	–	3.33

Source: Own authorship.

Differences across groups were analyzed using ANOVA (for age, education, and diabetes duration) or t-test (for gender). P-values indicate statistically significant differences ($p < 0.05$).

Table 7 shows the relationship between demographic variables and diabetes self-management domains. Younger age, male gender, higher education, and shorter diabetes duration were associated with better knowledge, medication adherence, dietary, physical activity, and psychological outcomes ($p \leq 0.05$). These findings indicate that demographic factors significantly influence patients' self-management behaviors and challenges.

Table 7. Relationship Between Demographic Characteristics and Diabetes Self-Management Domains among Patients with Type 2 Diabetes (n = 336).

Demographic Variable	Category	Knowledge & Understanding (Mean)	Medication Adherence (Mean)	Dietary Challenges (Mean)	Physical Activity Challenges (Mean)	Psychological & Social Challenges (Mean)	Test	P value
Age (years)	< 40	3.72	2.68	3.10	2.98	3.12	ANOVA	0.001
	40–49	3.55	2.85	3.24	3.05	3.28		
	50–59	3.38	3.02	3.34	3.22	3.42		
	≥ 60	3.21	3.18	3.48	3.36	3.58		
Gender	Male	3.52	2.88	3.22	3.08	3.26	t-test	0.032
	Female	3.40	3.00	3.33	3.20	3.40		
Education Level	≤ Secondary	3.18	3.12	3.42	3.30	3.55	ANOVA	<0.001
	Diploma	3.44	2.90	3.28	3.14	3.32		
	University	3.70	2.70	3.05	2.96	3.10		
Duration of Diabetes	< 5 years	3.62	2.75	3.18	3.00	3.22	ANOVA	0.002
	6–10 years	3.42	2.96	3.32	3.18	3.38		
	> 10 years	3.24	3.15	3.48	3.34	3.56		

Source: Own authorship.

Discussion

The results of the study revealed that the majority of participants were Middle-aged, with a mean age of 51.9 years, and slightly more were female (52.4%). Most were married (73.2%) and had at least a secondary level of education (26.8%), while the largest occupational group consisted of unemployed individuals or homemakers (35.7%). Regarding diabetes characteristics, most participants had been living with the condition for 1–5 years (41.7%) and were primarily managed with oral medications (59.5%). These findings are consistent with global and regional data indicating an increased prevalence of Type 2 Diabetes with advancing age **[8,9]**. The slightly higher proportion of female participants aligns with previous studies suggesting that women may be more likely to seek healthcare services for chronic conditions **[10]**.

Although patients demonstrated a moderate level of knowledge about diabetes self-management, their confidence in implementing this knowledge was comparatively low. Similar results have been observed in studies from Jordan and Saudi Arabia, where

patients possessed basic awareness but lacked practical self-management skills [11]. Diabetic treatment should incorporate non-pharmacological strategies. Interventions such as increased physical activity, dietary modifications, and cognitive-behavioral therapy are important in maintaining normal glycemia [12].

Medication adherence challenges in the present study were primarily related to medication cost and side effects rather than forgetfulness. Financial barriers to medication adherence are widely reported in low-resource settings and are known to negatively affect glycemic control [13]. These findings highlight the importance of affordable access to essential diabetes medications and patient counseling on managing side effects.

Dietary challenges emerged as one of the most significant barriers to effective self-management. Participants frequently reported difficulty adhering to recommended nutritional habits and low compliance with healthy food options. These results are consistent with previous studies demonstrating that cultural and social food practices strongly influence dietary adherence among patients with Type 2 Diabetes [14].

Culturally tailored nutritional counseling is therefore essential to improve dietary compliance. Self-management is a key component of diabetes care, although its effectiveness in young adults with Type 2 Diabetes remains unclear. Recent reviews have assessed the impact of self-management interventions on health outcomes in young adults (18–45 years) with Type 2 Diabetes [15]. Psychological and social challenges were prominent in this study, with many patients reporting stress, anxiety, emotional burden, and limited social support.

Diabetes-related distress has been recognized as a critical barrier to effective self-management and is associated with poor glycemic control and reduced quality of life [16]. The low perceived support from family and friends further emphasizes the need for family-centered and psychosocial interventions. Individualized regimens with shared decision-making and treatment persistence maximize benefits and minimize harm [17]. Overall, the findings of this study confirm that diabetes self-management is influenced by complex, interrelated factors. Addressing these challenges requires a comprehensive, multidisciplinary approach that integrates medical care, patient education, psychological support, and community-based strategies.

Limitations of the Study

1. The cross-sectional design limits the ability to infer causal relationships between demographic factors and diabetes self-management challenges.
2. The study was conducted only in selected hospitals in Kirkuk City. Regional differences in healthcare access, cultural practices, and socioeconomic conditions may affect the applicability of results to other Iraqi cities or the broader Middle Eastern population.

Conclusion

The majority of patients with type 2 diabetes were middle-aged to older adults, with a slight predominance of females and most of them were married. There overall knowledge diabetes management were moderate, indicating a gap in confidence and self-management skills. Medication adherence showed moderate challenges. Dietary, physical activity, and psychological–social challenges were also at moderate levels, highlighting lifestyle and emotional burdens of diabetes. Significant associations were found between self-management domains and age, gender, education level, and duration of diabetes, emphasizing the need for tailored, demographic-specific interventions.

CRediT

Author contributions: **Conceptualization -** Younus Khudhur Baeez, Hussein Mohammed Abdul Fattah, Shelan Qahraman Shakor, Marwah Ali Khalaf. **Data curation-** Younus Khudhur Baeez, Hussein Mohammed Abdul Fattah; **Formal Analysis-** Shelan Qahraman Shakor, Marwah Ali Khalaf; **Investigation-** Younus Khudhur Baeez, Hussein Mohammed Abdul Fattah, Shelan Qahraman Shakor, Marwah Ali Khalaf; **Methodology-** Younus Khudhur Baeez, Hussein Mohammed Abdul Fattah, Shelan Qahraman Shakor, Marwah Ali Khalaf; **Project administration-** Younus Khudhur Baeez; **Supervision -** Younus Khudhur Baeez; **Writing - original draft-** Younus Khudhur Baeez, Hussein Mohammed Abdul Fattah, Shelan Qahraman Shakor, Marwah Ali Khalaf; **Writing-review & editing-** Younus Khudhur Baeez, Hussein Mohammed Abdul Fattah, Shelan Qahraman Shakor, Marwah Ali Khalaf.

Acknowledgment

Not applicable.

Ethical Approval

Ethical approval was obtained from the Scientific and Ethical Committee of the College of Nursing, Kirkuk University (approval number: 3/7/3036, reference: 25-11-2024), as well as from the relevant hospital authorities.

Informed Consent

It was applicable.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Data Sharing Statement

All referenced sources are accessible through the respective journals or public repositories.

Conflict of Interest

The authors declare no conflict of interest.

Similarity Check

It was applied by Ithenticate[@].

Application of Artificial Intelligence (AI)

Not applicable.

Peer Review Process

It was performed.

About The License©

References

1. Khan MAB, Hashim MJ, King JK, Govender RD, Mustafa H, Al Kaabi J. Epidemiology of type 2 diabetes—global burden of disease and forecasted trends. J Epidemiol Glob Health. 2020;10(1):107–11.
2. Mathur P, Leburu S, Kulothungan V. Prevalence, awareness, treatment and control of diabetes in India from the countrywide National NCD Monitoring Survey. Front Public Health. 2022;10:748157.
3. Kolb L. An effective model of diabetes care and education: the ADCES7 Self-Care Behaviors™. Sci Diabetes Self Manag Care. 2021;47(1):30–53. doi:10.1177/0145721720978154.
4. Olesen K, Folmann Hempler N, Drejer S, Valeur Baumgarten S, Stenov V. Impact of patient-centred diabetes self-management education targeting people with type 2 diabetes: an integrative review. Diabet Med. 2020;37(6):909–23. doi:10.1111/dme.14284.
5. Diriba DC, Leung DYP, Suen LKP. The effects of diabetes self-management interventions on physiological outcomes in people living with diabetes in Africa: a systematic review and meta-analysis. Diabet Med. 2021;38(5):e14501.
6. Karachaliou F, Simatos G, Simatou A. The challenges in the development of diabetes prevention and care models in low-income settings. Front Endocrinol. 2020;11:518.
7. Desse TA, Namara KMC, Yifter H, Manias E. Collaborative practice in type 2 diabetes management in a developing country: a qualitative study of perceptions and attitudes of key stakeholders. J Clin Nurs. 2023;32(23–24):8137–48.
8. Yimam M, Desse TA, Hebo HJ. Glycemic control among ambulatory type 2 diabetes patients with hypertension co-morbidity in a developing country: a cross-sectional study. Heliyon. 2020;6(12):e05671.
9. Hailu FB, Moen A, Hjortdahl P. Diabetes self-management education (DSME)— effect on knowledge, self-care behavior, and self-efficacy among type 2 diabetes patients in Ethiopia: a controlled clinical trial. Diabetes Metab Syndr Obes. 2019;12:2489–99.
10. Ketema DB, Leshargie CT, Kibret GD, et al. Level of self-care practice among diabetic patients in Ethiopia: a systematic review and meta-analysis. BMC Public Health. 2020;20(1):309.
11. Uloko A, Adeleye O, Olamoyegun M, Ezeani I, Onung S, Ugwu E. Barriers to diabetes care in a developing country: exploratory evidence from diabetes healthcare providers. J Adv Med Med Res. 2020;32(10):72–83.
12. Młynarska E, Czarnik W, Dzieża N, Jędraszak W, Majchrowicz G, Prusinowski F, et al. Type 2 diabetes mellitus: new pathogenetic mechanisms, treatment and the most important complications. Int J Mol Sci. 2025;26(3):1094. doi:10.3390/ijms26031094.
13. Pamungkas RA, Chamroonsawasdi K, Vatanasomboon P, Charupoonphol P. Barriers to effective diabetes mellitus self-management (DMSM) practice for glycaemic uncontrolled type 2 diabetes mellitus (T2DM): a socio-cultural context of Indonesian communities in West Sulawesi. Eur J Invest Health Psychol Educ. 2020;10(1):250– 61.
14. Grawbowski D, Overgaard M, Meldgaard J, Johansen LB, Willaing I. Disrupted self-management and adaptation to new diabetes routines: a qualitative study of how people with diabetes managed their illnesses during COVID-19 lockdown. Diabetology. 2021;2(1):1–15.
15. Khavere S, Hadjiconstantinou M, Miksza J,

Hagan J, Salisu-Olatunji S, Naderpour S, et al. Effectiveness of self-management interventions on type 2 diabetes among young adults (18–45 years): a systematic review and meta-analysis. Diabet Med. 2025;42(10):e70127. doi:10.1111/dme.70127.

16. Malini H, Zhahara S, Lenggogeni DP, Putri ZM. Self-care and quality of life for people with type 2 diabetes during the COVID-19: cross-sectional study. J Diabetes Metab Disord. 2022;21:785–90.

17. Chan JCN, Deerochanawong C, Khunti K, Hassanein M, Mohan V. Glycaemic control remains central in type 2 diabetes mellitus management: key learnings from the latest International Diabetes Federation guidelines. Diabetes Res Clin Pract. 2026 Feb 19;183:113173. doi: 10.1016/j.diabres.2026.113173.

MetaScience Press
The Best Science
https://zotarellifilhoscientificworks.com/