

Factors Associated with Patient Treatment Satisfaction in Diabetes Mellitus Care Using the DTSQs: A Nationwide Cross-Sectional Study in Saudi Arabia

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Introduction: Patient satisfaction is crucial in managing chronic diseases like diabetes mellitus (DM). This study aims to identify the key factors associated with patient satisfaction with DM treatment in the Kingdom of Saudi Arabia.

Methods: This cross-sectional study collected data from 709 participants country-wide via an online survey. Participants included patients receiving care from public and private healthcare facilities offering primary or specialized diabetes care. Patient satisfaction was assessed using the Diabetes Treatment Satisfaction Questionnaire (DTSQs), with chi-square tests for HbA1c control and Mann-Whitney *U*-tests for comparisons of means between groups.

Results: Governmental healthcare patients had higher satisfaction (Mean = 27.32, SD = 7.62) than private (Mean = 25.5, SD = 8.51) ($p = 0.007$). Patient treatment satisfaction was also greater in diabetes centers (Mean = 28.93, SD = 6.34), than in primary care (Mean = 25.45, SD = 8.51), ($p = <0.001$). Although overall treatment satisfaction scores did not differ significantly between controlled and uncontrolled diabetes ($p = 0.784$), patients with controlled diabetes experienced significantly fewer hyperglycemic and hypoglycemic episodes, ($p = <0.001$), and higher satisfaction with treatment flexibility ($p = 0.006$), diabetes understanding ($p = 0.013$) and willingness to recommend their treatment to others ($p = <0.001$).

Conclusion: Mode of healthcare delivery (public or private hospitals) and choice between primary care or diabetes centers was significantly associated with treatment satisfaction with greater satisfaction in governmental healthcare and specialized diabetes centers. Glycemic control, measured by HbA1c, showed no significant association with overall treatment satisfaction but was associated with specific item scores (including satisfaction with understanding and treatment flexibility). This study is among the first in Saudi Arabia to compare DM treatment satisfaction across different healthcare settings using the DTSQs. Recognizing these associations can provide healthcare professionals with valuable insights for more successful treatment of diabetes patients and ultimately improve patient outcomes.

Keywords: treatment satisfaction, diabetes mellitus, healthcare delivery, glycated hemoglobin, HbA1c, diabetes treatment

Introduction

Diabetes Mellitus (DM) comprises a group of metabolic disorders characterized by chronic hyperglycemia resulting from impaired insulin secretion, insulin effect or both, and it stands as a prevalent chronic condition that demands comprehensive medical attention.^{1–5} In recent years, the Kingdom of Saudi Arabia (KSA) has witnessed a notable upsurge in diabetes cases, with a prevalence rate of 30% among the KSA population.³ This condition not only adversely impacts overall health and quality of life, but also escalates the risk of mortality.^{1,2,6}

Patient satisfaction constitutes a vital component of delivering high-quality healthcare. In the case of DM patients, who often express dissatisfaction with the need for lifelong regular check-ups, satisfaction is influenced by patient interactions, case management, and follow-up care.⁷ Studies indicate a strong correlation between satisfied DM patients and favorable treatment outcomes.^{8–10} Various factors, including patient demographics, education, clinical aspects, treatment elements, adherence concerns, and service-related factors, impact satisfaction levels and the delivery of patient-centered care. Additionally, incorporating clear communication, interpersonal manners and comfort during encounters, and accessibility has been shown to influence how patients experience treatment.^{6,7,11}

The World Health Organization's (WHO) assessment places KSA as the country with the second-highest DM prevalence in the Middle East and the seventh globally. The estimated population affected comprises 7 million individuals living with DM and over 3 million with pre-diabetes.¹²

Monitoring satisfaction in patients with diabetes is crucial for evaluating effectiveness of diabetes therapeutic interventions. This protocol used the Diabetes Treatment Satisfaction Questionnaire status version (DTSQs), which specifically assesses patients' satisfaction with diabetes treatment.^{13,14}

The healthcare system in KSA comprises government-sponsored free services and commercial healthcare options. The choice of treatment setting for DM patients influences overall satisfaction with care received.⁸ Additionally, glycated hemoglobin (HbA1c) levels play a critical role in DM management and in evaluating DM care success. However, the relationship between HbA1c management and patient satisfaction requires further exploration.⁹ The study hypothesizes that treatment satisfaction will be higher in governmental healthcare, specialized diabetes centers, and that better glycemic control ($\text{HbA1c} < 8\%$) will be associated with greater treatment satisfaction.

Despite the progress in researching the factors that affect the satisfaction of patients with diabetes, few studies have examined the influence of healthcare setting (governmental or private), healthcare type (primary or specialized diabetes center), and glycemic control on DM patient satisfaction in Saudi Arabia. This cross-sectional study aims to explore the factors influencing patient satisfaction with DM treatment among Saudi Arabian patients. Specifically, we aim to investigate the association between HbA1c management and treatment satisfaction. We also examine whether choosing specialty diabetes care centers over primary care clinics or government-sponsored healthcare services over private providers affects patient satisfaction. Our research seeks to offer valuable insights into the determinants of patient satisfaction within Saudi Arabia's healthcare landscape.

By comprehensively examining these factors, our study can assist healthcare professionals, policymakers, and physicians in enhancing the quality of DM care, thereby improving healthcare outcomes and the well-being of individuals with DM in KSA.

Materials and Methods

Study Design and Questionnaire

A cross-sectional approach with a convenience sampling technique was employed in this research to explore factors influencing patient satisfaction regarding DM care in 13 regions throughout KSA from April 2023 to February 2024. This was a cross-sectional survey using DTSQs. Specifically designed and validated to measure treatment satisfaction in people with diabetes, the DTSQs comprises eight items, allowing respondents to evaluate their satisfaction with various aspects of their DM treatment using Likert scale scoring (0–6) for each item.^{13–15} Six items (1, 4, 5, 6, 7, 8) measure treatment satisfaction (satisfaction with current treatment, convenience, flexibility, satisfaction with own understanding of diabetes, likelihood of recommending the treatment to others and satisfaction to continue with the treatment), and the sum of these items is taken to generate a DTSQ scale score. The remaining two items (2,3) measure perceived frequency of hyperglycemia and frequency of hypoglycemia. The six DTSQs scale items are scored on seven-point response scales ranging from, for example, “very satisfied” (scored 6) to “very dissatisfied” (scored 0). Higher DTSQs scores indicate greater satisfaction with treatment (range 36 to 0). With respect to the two items measuring perceived frequency of hyperglycemia and hypoglycemia, the items are scored on seven-point response scales ranging from “most of the time” (scored 6) to “none of the time” (scored 0). In this case, the lower DTSQs scores indicate more ideal blood glucose

levels. For access to the DTSQ linguistically validated in Arabic for Saudi Arabia and in more than 120 other languages, visit www.healthpsychologyresearch.com.

Study Participants

Adult patients aged ≥ 18 with either type 1 or type 2 diabetes mellitus were included, and we excluded patients who did not consent to participate in the study.

After ethical approval, a nationwide master list of individuals with type 1 or type 2 diabetes mellitus was obtained from the MOH which included 4795 patients, of which 709 patients consented and filled out the survey with a survey response rate of 14.79%. Volunteers were from diverse healthcare facilities, encompassing government-run clinics, private hospitals, specialized diabetes centers, and primary care clinics. This selection aimed to ensure the comprehensive representation of individuals receiving DM treatment across various healthcare settings. By including participants from different healthcare contexts, the study aimed to provide a holistic understanding of patient satisfaction with diabetes treatment and its influencing factors, considering the distinct dynamics of government and private healthcare services in KSA.

Data Collection

The online survey was prepared using the survey tool Google Forms. It encompassed an extensive array of demographic characteristics besides capturing information regarding treatment satisfaction. Variables included age, gender, educational level, marital status, employment status, income level, DM type (Type 1 or Type 2), duration of DM diagnosis, and the number of DM medications prescribed. The collection of these broad demographic data was crucial to understand the intricate factors influencing patient satisfaction with DM treatment across diverse healthcare settings in KSA. All survey fields were mandatory, and due to the convenience sampling approach, no follow-up for missing responses was conducted.

Study Outcome

The outcome of interest was to study the key factors associated with patient satisfaction with DM treatment, which include: healthcare settings (government vs private), healthcare types (specialized diabetes centers vs primary care), and glycemic control ($< 8\%$ vs $\geq 8\%$). Moreover, the association of various treatment sectors and Diabetes Care with glycemic control was also evaluated. The study hypothesizes that treatment satisfaction varies by healthcare sector, with expected higher satisfaction in governmental hospitals and diabetes centers where diabetes care is provided free of charge. Additionally, better glycemic control ($\text{HbA1c} < 8\%$) is expected to correlate with higher satisfaction. Demographic factors are also explored as potential influences on satisfaction.

Data Analysis

The Statistical Package for Social Sciences (SPSS version 26.0) was used for data analysis. Descriptive statistics, including means and standard deviations, were computed to outline the characteristics of the research population. Associations between categorical factors like gender, method of healthcare delivery, and HbA1c control were analyzed using chi-square tests. Additionally, comparisons of means between different groups were conducted using the Mann–Whitney *U*-test. Univariate logistic regression analysis was used to investigate the association between treatment sector or diabetes care and HbA1C. Further, the model was adjusted for the basic characteristics of the study participants, including age, sex, marital status, education, employment status, income, and residence. These analytical methods helped understand the associations and differences within the study's variables.

Ethical Consideration

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Regional Research Ethics Committee at the Ministry of Health, Saudi Arabia, with protocol number (6-7-43-6007). Before involving any participants, we obtained informed consent from each individual. This approach ensured participants fully understood the study's objectives and methodologies. We emphasized the importance of protecting their

privacy and maintaining confidentiality throughout the research process. These ethical measures were implemented to comply with established ethical standards and guidelines, prioritizing values such as respect, beneficence, and fairness in human research.

Statistical Significance

Throughout this investigation, a consistent alpha level of $p < 0.05$ was employed to assess the statistical significance. This predetermined significance level was applied uniformly to all statistical tests and analyses conducted within the study. Adhering to this criterion enabled us to derive dependable conclusions from the data, allowing for the identification of meaningful relationships and distinctions. By maintaining this standard, our findings were rigorously assessed in line with established statistical norms, ensuring the reliability of our results.

Results

Characteristics of Study Participants

The survey was sent to 3200 patients with DM, of whom 709 participants consented to participate in the study. An overview of the demographic characteristics of the study participants, categorized by the type of healthcare facility at which they receive treatment, whether it is a governmental or a private sector facility, diabetes care or primary care, and their corresponding HbA1C level is provided in (Table 1). It encompasses marital status, gender, age, place of residence, education, employment status, income level, type of DM (Type 1 or Type 2), duration of diabetes, and the number of medications in their regimen.

Table 1 Characteristics of the Study Participants and DTSQs Score Among the Study Participants

Characteristics	Govt. (547)	Private (162)	p^*	Diabetes Care (296)	Primary Care (413)	p^*	HbA1C < 8% (428)	HbA1C $\geq$ 8% (281)	p^*
Marital status									
Single	154	59	0.130	101	112	0.103	122	91	0.288
Married	345	91		174	262		273	163	
Divorced	48	12		21	39		33	27	
Gender									
Male	233	81	0.096	125	189	0.350	179	135	0.103
Female	314	81		171	224		249	146	
Age									
18 to 25 years	129	43	0.003	82	90	0.005	95	77	0.239
26 to 35 years	56	26		41	41		49	33	
36 to 45 years	85	30		36	79		67	48	
46 to 55 years	148	29		69	108		110	67	
56 to 65 years	104	19		58	65		85	38	
Above 65 years	25	15		10	30		22	18	
Residence									
City	458	136	0.947	261	333	0.007	370	224	0.017
Village	89	26		35	80		58	57	
Education									
Illiterate	31	5	0.275	13	23	0.718	22	14	0.546
School	177	48		94	225		137	88	
Graduate	303	16		164	396		233	163	
Post Graduate	36	93		25	52		52	16	

(Continued)

Table 1 (Continued).

Characteristics	Govt. (547)	Private (162)	<i>p</i> *	Diabetes Care (296)	Primary Care (413)	<i>p</i> *	HbA1C < 8% (428)	HbA1C ≥ 8% (281)	<i>p</i> *
Employment status									
Employed	270	72	0.027	126	216	0.014	203	139	0.863
Unemployed	171	68		117	122		146	93	
Housewife	106	22		53	75		79	49	
Income level									
Less than 4500 SAR	148	38	0.294	82	104	0.007	117	69	0.034
4500 to 5999 SAR	52	15		25	42		32	35	
6000 to 9000 SAR	118	27		51	94		85	60	
More than 9000 SAR	193	72		108	157		172	93	
Not disclosed	36	10		30	16		22	24	
Type of DM									
Type 1 DM	186	79	0.001	126	139	0.016	144	121	0.011
Type 2 DM	361	83		170	274		284	160	
Duration of DM									
Less than a year	73	16	0.252	22	67	<0.001	69	20	0.001
One to five years	149	36		71	114		118	67	
Six to ten years	102	32		55	79		71	63	
More than ten years	223	78		148	153		170	131	
Number of medications									
0 to 2 medications	248	85	0.014	130	203	0.317	218	115	0.062
3 to 4 medications	197	38		100	135		128	107	
5 to 9 medications	95	34		62	67		75	54	
More than 10 medications	7	5		4	8		7	5	

Notes: **p*-value of Chi-square statistics; *p* < 0.05 considered statistically significant, mentioned in bold letters.

Abbreviation: SAR, Saudi riyal.

Marital status among patients did not significantly differ between the government and private sectors, diabetes and primary care centers, and HbA1C level ($p = 0.130$, $p = 0.103$, and $p = 0.288$, respectively). Similarly, gender representation was not significantly different between those groups ($p = 0.096$, $p = 0.350$, and $p = 0.103$, respectively).

Regarding age demographics, a significant difference was found between the healthcare sectors, with varying age distributions between the government and private sectors ($p = 0.003$). Similarly, there was a significant difference in age across the types of centers ($p = 0.005$), but there was no significant association between age and HbA1c level ($p = 0.239$).

Moreover, the distribution of diabetic patients between city and village residences did not exhibit significant variation concerning healthcare sector distribution ($p = 0.947$). However, its association with the type of care and the level of HbA1c was found to be statistically significant ($p = 0.007$ and $p = 0.017$, respectively).

While no significant difference was found between education level and sector distribution, care type, and HbA1c level ($p = 0.275$, $p = 0.718$, and $p = 0.546$), significant differences were observed between employment status and types of sectors and centers ($p = 0.027$ and $p = 0.014$, respectively).

Income level had no significant correlation with the type of sector ($p = 0.294$), but a significant difference was found regarding the center type and the level of HbA1c ($p = 0.007$ and $p = 0.034$, respectively). Moreover, the type of diabetes was significantly different between sector type, center type, and level of HbA1C ($p = 0.001$, $p = 0.016$, and $p = 0.011$ respectively).

The duration of diabetes did not show a significant difference between the sectors, in contrast to the significant difference with center types and HbA1c level ($p = 0.252$, $p = <0.001$, and $p = 0.001$, respectively). Furthermore,

a significant difference was noted between the number of prescribed medications and the healthcare sector ($p = 0.014$), while its relation to the type of healthcare center and the level of HbA1c was not significant ($p = 0.317$ and $p = 0.062$, respectively).

Diabetes Treatment Satisfaction: Healthcare Settings Association

We analyzed patients' replies to the DTSQs using a Mann–Whitney U -test to assess the impact of healthcare environments on their satisfaction with diabetes treatment (Table 2). Patients receiving care in government healthcare settings had a statistically significant higher mean (SD) satisfaction score compared to those in private healthcare settings in four items that include satisfaction with current treatment ($p = 0.032$), convenience of treatment for current condition ($p = 0.002$), flexibility of recent treatment ($p = 0.004$), and satisfaction to continue current treatment ($p = 0.013$). However, the mean (SD) perceived frequency of hyperglycemia/hypoglycemia did not differ significantly between the government and private sectors. Moreover, the mean (SD) score of satisfaction was not statistically different ($p = 0.468$) regarding understanding of diabetes between government and private clinical settings. Although the mean (SD) score of the recommendation of government services was higher than that of private services, this difference was not statistically significant ($p = 0.223$) as shown in (Table 2).

Diabetes Treatment Satisfaction: Healthcare Type Association

By contrasting patients in specialized diabetes centers and primary care settings, we looked more closely at the effects of different healthcare delivery models on treatment satisfaction (Table 3). The mean (SD) satisfaction scale score was significantly higher in specialized DM centers ($p < 0.001$). Four of the items differed significantly including current treatment satisfaction ($p < 0.001$), convenience of treatment ($p = 0.001$), flexibility of treatment ($p < 0.001$), and wish to continue with current treatment ($p < 0.001$). However, the mean (SD) score of the patient's responses regarding unacceptably low blood sugar levels was significantly higher in the specialized DM centers than in primary care ($p < 0.001$). Meanwhile, the mean (SD) score of patients' responses regarding unacceptably high blood sugar levels has no statistically significant difference ($p = 0.133$). The mean score for understanding of diabetes and recommending the treatment to others was significantly higher from patients attending the specialized DM centers than from primary care patients ($p < 0.001$) as shown in (Table 3).

Table 2 Diabetes Treatment Satisfaction Questionnaire (DTSQs) Score Among Patients in Government and Private Healthcare

	Government (547)		Private (162)		p *
	Mean	SD	Mean	SD	
Overall treatment satisfaction	4.15	1.67	3.82	1.78	0.032
Perceived frequency of hyperglycemia	3.24	1.95	3.36	2.06	0.475
Perceived frequency of hypoglycemia	2.76	1.99	2.67	2.23	0.572
Convenience of treatment	4.25	1.66	3.79	1.77	0.002
Flexibility of treatment	4.26	1.67	3.79	1.85	0.004
Understanding of diabetes	4.44	1.70	4.34	1.70	0.468
Recommend to others	4.28	1.85	4.03	1.99	0.223
Wish to continue	4.19	1.81	3.69	2.08	0.013
Scale score	25.60	8.50	23.48	9.22	0.008

Notes: * p-value of the mean (SD) of Mann–Whitney U -test; $p < 0.05$ considered statistically significant, mentioned in bold letters. Items 2 and 3 were excluded from analysis according to DTSQs tool utilization instruction.

Table 3 Diabetes Treatment Satisfaction Questionnaire (DTSQs) Score Among Patients in Specialized Diabetes Centers and Primary Care

	Specialized DM Centers (296)		Primary Care (413)		p*
	Mean	SD	Mean	SD	
Overall treatment satisfaction	4.34	1.56	3.89	1.76	<0.001
Perceived frequency of hyperglycemia	3.42	1.84	3.15	2.06	0.133
Perceived frequency of hypoglycemia	3.05	2.03	2.52	2.04	<0.001
Convenience of treatment	4.43	1.47	3.94	1.82	<0.001
Flexibility of treatment	4.51	1.46	3.90	1.85	<0.001
Understanding of diabetes	4.71	1.50	4.20	1.80	<0.001
Recommend to others	4.66	1.65	3.91	1.98	<0.001
Wish to continue	4.43	1.68	3.82	1.98	<0.001
Scale score	27.11	7.20	23.68	9.40	<0.001

Notes: *p-value of the mean (SD) of Mann–Whitney U-test; p < 0.05 considered statistically significant, mentioned in bold letters. Items 2 and 3 were excluded from analysis according to DTSQs tool utilization instruction.

Diabetes Treatment Satisfaction: Glycemic Control Association

We compared patients with controlled (HbA1c < 8%) and uncontrolled (HbA1c ≥ 8%) diabetes in order to investigate the link between glycemic control and treatment satisfaction (Table 4). Patients with controlled diabetes were significantly more satisfied with their current treatment in comparison to patients with uncontrolled diabetes (p < 0.001). Perceived frequency of hyper- and hypoglycemia was significantly greater (p < 0.001) in those with less well-controlled diabetes. The patients with controlled diabetes reported significantly higher satisfaction regarding understanding of diabetes (p = 0.013) and were more likely to recommend their treatment to others (p < 0.001) as illustrated in (Table 4).

Table 4 Diabetes Treatment Satisfaction Questionnaire (DTSQs) Score Among Patients with Better Controlled (HbA1c <8%) and Less Well-Controlled (HbA1c ≥8%) Diabetes

	HbA1c < 8% (428)		HbA1c ≥ 8% (281)		p*
	Mean	SD	Mean	SD	
Overall treatment satisfaction	4.33	1.62	3.70	1.75	<0.001
Perceived frequency of hyperglycemia	2.67	1.94	4.19	1.68	<0.001
Perceived frequency of hypoglycemia	2.46	2.05	3.18	1.97	<0.001
Convenience of treatment	4.30	1.70	3.93	1.69	<0.001
Flexibility of treatment	4.28	1.72	3.97	1.72	0.006
Understanding of diabetes	4.55	1.63	4.22	1.80	0.013
Recommend to others	4.40	1.85	3.97	1.92	<0.001
Wish to continue	4.31	1.76	3.73	2.04	<0.001
Scale score	26.17	8.40	23.51	8.94	<0.001

Notes: * p-value of the mean (SD) of Mann–Whitney U-test; p < 0.05 considered statistically significant, mentioned in bold letters. Items 2 and 3 were excluded from analysis according to DTSQs tool utilization instruction.

Treatment Sectors and Diabetes Care: Glycemic Control Association

The association between healthcare sector types (governmental vs private) and healthcare setting types (diabetes center vs primary healthcare) with the glycemic control levels (<8 vs ≥ 8) was explored in (Table 5). Both unadjusted ratio (uOR) and adjusted odds ratio (aOR) were calculated to compare the likelihood of achieving HbA1C < 8 across these factors. In terms of treatment sectors, there was no difference between sector types in achieving control of HbA1C (uOR = 0.898, $p = 0.558$) and adjusted odds ratios (aOR = 0.888, $p = 0.520$). Similarly, no significant difference was noted between diabetes centers and primary healthcare centers in terms of glycemic control, although patients in primary healthcare centers had slightly higher odds of HbA1C ≥ 8 compared to patients in diabetes centers, in both unadjusted (uOR = 1.318, $p = 0.078$) and adjusted odds ratios (aOR = 1.322, $p = 0.075$). This result indicates that there were no confounding variables, as the basic characteristics of study participants (age, sex, marital status, education, employment status, income, and residence) did not influence HbA1C in either the treatment sector or diabetes care.

Discussion

This cross-sectional survey highlights the satisfaction level of patients with diabetes mellitus in Saudi Arabia. In the glycemic control domain, the present study findings reflects previous findings regarding the association of treatment satisfaction and glycemic control.^{16–18}

This study did not investigate any barriers related to dissatisfaction that need to be identified in future investigations. Our findings also highlight the significant hypoglycemic risk among the uncontrolled patients with diabetes mellitus (HbA1C $\geq 8\%$). This might be due to reasons including lower treatment satisfaction of patients or poor control of blood sugar, as already reported in previous studies.^{19,20} Also, our study agrees with the previous findings that poor understanding of diabetes mellitus treatment is often associated with lower glycemic control. Hence, patient education regarding diabetes mellitus, among many other factors, can enhance glycemic control.²¹

The mean (SD) patient's treatment satisfaction score with the specialized diabetic centers was significantly higher, coinciding with the previous findings from Saudi Arabia related to consultations, information about the disease, and medications.⁶ A multidisciplinary approach in specialized DM centers in Saudi Arabia often leads to higher satisfaction since it provides optimal glycemic control and protection from complications of diabetes mellitus.²² Also, the quality of diabetes care, services, and health educational resources strongly influences patient satisfaction.²³ As of now, only specialized diabetes centers can fulfil these factors, and primary care centers have yet to do so. Therefore, the Ministry of Health must also pay more attention to ensuring the above-mentioned care in primary health centers.

The patients treated in the government sector had significantly higher mean (SD) satisfaction than those in the private sector regarding their current treatment. Government hospitals in managing diabetes mellitus in Saudi Arabia offer patient-focused care, an integrated care plan by a multidisciplinary health team, active surveillance, and education, which could be the potential factors for higher patient satisfaction.²⁴ Communication between healthcare practitioners and

Table 5 Association of Various Treatment Sectors and Diabetes Care with Glycemic Control

	HbA1C < 8	HbA1C ≥ 8	Unadjusted Odds Ratio	p^*	Adjusted Odds Ratio	p^*
Treatment Sector						
Government	327 (46.1%)	220 (31%)	0.898	0.558	0.888	0.520
Private	101 (14.2%)	61 (8.6%)				
Diabetes Care						
Diabetes Center	190 (26.8%)	106 (14.9%)	1.318	0.078	1.322	0.075
Primary Health Center	238 (33.6%)	175 (24.7%)				

Notes: The model adjusted for the basic characteristics of the patients (age, sex, marital status, education, employment status, income, and residence).

patients, the technical skills of healthcare providers, the doctor's availability, and the patient's accessibility to healthcare services were addressed as potential domains for higher patient satisfaction in previous studies from Saudi Arabia.^{25–27} The mean (SD) score of patient satisfaction related to unacceptable hyper- or hypoglycemia was not significantly different between the government and private healthcare sectors. This needs further investigation to address the other potential barriers for avoiding hyper- or hypoglycemia, including medication adherence, knowledge of healthcare practitioners, and patient refusal of treatment in the government sector, even though medications are free of charge, and their satisfaction with the treatment.²⁸

Recommendations and Future Directions

The results of this study have several consequences for Saudi Arabian scholars, politicians, and healthcare professionals for enhancing patient satisfaction with diabetes treatment in Saudi Arabia:

Enhancing Healthcare Settings

In order to ensure better quality and accessibility of diabetes care, invest in improving infrastructure, education, and adopting patient-centered care.

Expanding Specialized Care

Considering the higher satisfaction levels observed in specialized care, we recommend extending access to specialized diabetes centers and educational programs for better diabetes management.

Personalizing Treatment Approaches

Based on the findings of this protocol, we also recommend tailoring treatment plans according to individual patient needs, considering factors such as age, income levels, and complexity of medication regimens. In line with this approach, a study by Othman et al found a statistically significant relationship between satisfaction and factors such as age, sex, nationality, education, marital status, occupation, duration of diabetes, treatment regimen, and complications.

Continued Research

Further studies are needed to explore other influential factors on treatment satisfaction, such as cultural elements, psychosocial elements, other comorbidities, complications, and different treatment methods. Evaluating the long-term impact of patient satisfaction on diabetes management and overall outcomes to gain a more comprehensive understanding.

These recommendations aim to address the specific areas identified in the study that could significantly impact patient satisfaction with DM treatment in Saudi Arabia. They provide a framework for healthcare professionals, policymakers, and scholars to enhance diabetes care and ultimately improve patient outcomes.

Limitations

While this study provides valuable insights into the factors associated with patient satisfaction with diabetes treatment in KSA, it is important to acknowledge its limitations. The cross-sectional design restricts our ability to establish causal relationships between variables, and the use of convenience sampling may introduce selection bias. Furthermore, reliance on self-reported data from the online survey and the DTSQS self-assessment may also contribute to self-reporting bias.

Future studies could consider longitudinal research methods and qualitative investigations to gain a more comprehensive understanding of patients' experiences and contentment with diabetes treatment in KSA. Longitudinal studies could track changes over time, offering a clearer view of causal relationships, while qualitative inquiries could delve deeper into patients' lived experiences and perceptions.

Understanding the diverse variables associated with patient treatment satisfaction is vital for enhancing diabetes care and achieving better patient outcomes. This study has highlighted significant associations between treatment satisfaction among diabetes patients in KSA related to healthcare settings, glycemic control, age, income, and medication complexity.

Healthcare professionals and policymakers can work collaboratively to implement the above recommendations derived from this study. Additionally, investing in further research endeavors will continue to refine our understanding and aid in improving diabetes care and patient satisfaction in the region.

Conclusions

The mode of healthcare delivery (public or private hospitals) and the choice between primary care and diabetes centers exhibited a significant association with patient treatment satisfaction, which was higher in governmental healthcare and specialized diabetes centers. Our thorough analysis of the variables affecting DM treatment satisfaction in KSA has uncovered crucial findings that are extremely important for healthcare providers and policymakers. Our study provides helpful recommendations for enhancing the standard of diabetes care by diving into the subtleties of patient opinions.

Factors Impacting DM Treatment Satisfaction

Our study has shed light on a number of variables that have an association with the satisfaction of patients with their DM treatment. Notably, we discovered that healthcare delivery, governmental or private hospitals, and the choice between primary care clinics and specialized diabetes centers are associated with higher satisfaction observed in governmental healthcare and specialized diabetes centers. However, glycemic control was not significantly associated with patient satisfaction. This highlights the critical role of personalized and patient-centric diabetes care. Healthcare providers should consider socioeconomic factors and the complexity of medication regimens when devising treatment plans. Moreover, adapting treatment protocols to better suit patient preferences may positively impact satisfaction levels among patients.^{8,29–31}

Implications for Healthcare Delivery

Our findings have broad ramifications, emphasizing the necessity for specialized interventions and tactics to deal with the numerous difficulties DM patients confront. The job of healthcare professionals includes thorough patient education, support, and individualized care plans in addition to prescribing medications. To ensure patient-centric care, it is important to consider the diverse needs that may exist across patient demographics such as age, healthcare setting, and socioeconomic status while continuing to recognize and respond to each patient as an individual. Specialized care models, such as diabetes centers, have demonstrated improved patient satisfaction, underscoring the importance of specialized care. Furthermore, by ensuring flexibility in management plans and maintaining a focus on individualized variations of each patient's care, patients with diabetes can have an improved long-term health outcome and quality of life. Future research might further explore additional factors influencing treatment satisfaction and evaluate long-term outcomes to strengthen diabetes care.

Institutional Review Board Statement

The study received ethical approval from the Regional Research Ethics Committee at the Ministry of Health, Saudi Arabia, protocol number (6-7-43-6007).

Data Sharing Statement

To promote openness and future investigation of this topic, the authors will make the data underlying the conclusions of this article available without unnecessary delay, and it can be obtained from the corresponding author. We also confirm that the data, in whole or in part, have not been published elsewhere.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study. Participants provided written consent for the use and publication of their anonymized data.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no conflicts of interest in this work.

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