A Cross-Sectional Study On "Nonadherence to Medication, Self-Care Practices and Health-Related Quality of Life Of Type-2 Diabetic Patients Visiting To Tertiary Care Hospital Of Vadodara, Gujarat"

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ABSTRACT

Background: India has the second-highest number of diabetics globally, with over 74.2 million individuals diagnosed in 2021. This number is projected to rise to 124.9 million by 2045, according to the International Diabetes Federation (2021).

Aim: To determine the association between nonadherence to self-care practices, medication, and health-related quality of life (HR-QoL) among type-2 diabetic patients.

Materials and Methods: A hospital-based cross-sectional study was conducted at the Medicine Outpatient Department (OPD) of a tertiary care hospital in Vadodara, Gujarat. The study included 164 type-2 diabetic patients aged 30–60, interviewed between September to October 2021 using a pre-designed schedule based on the EQ-5D-5L questionnaire. Nonadherence rates were assessed for self-care practices such as diet care, exercise, foot care, and medication. Data analysis was performed using Chi-squared tests to explore relationships between variables and ordinal logistic regression in Jamovi software to assess significant associations. A p-value of <0.05 was considered statistically significant.

Results: Nonadherence rates were highest for foot care (56%), followed by exercise (26.8%), diet care (19.5%), and medication (12.8%). Significant associations were found between nonadherence to all self-care practices and issues in mobility and self-care (p<0.05). Nonadherence to exercise and medication was associated with problems in usual activities (p<0.05). Pain/discomfort issues were linked to nonadherence to diet care, exercise, and foot care (p<0.05), while anxiety was associated with nonadherence to diet care, exercise, and medication (p<0.05).

Conclusions: The study identified varying nonadherence rates to self-care practices among type-2 diabetic patients, significantly impacting their HR-QoL and contributing to a poorer quality of life.

Keywords: Type-2 diabetes, diabetic patients, health-related quality of life (HR-QoL), nonadherence, self-care practices.

INTRODUCTION

Diabetes is a significant public health concern worldwide, with India bearing a disproportionately high burden. Currently, approximately 50.9 million individuals in India are affected by diabetes, a figure projected to surge to 80 million by 2025, earning the country the title of the "Diabetes Capital of the World."[1] Globally, the prevalence of diabetes is expected to more than double, from 171 million in 2000 to 366 million by 2030.[2]

In India, the prevalence has steadily risen, increasing from 7.1% in 2009 to 8.9% in 2019. Alarmingly, an estimated 57% of adults with diabetes, approximately 43.9 million individuals, remain undiagnosed, posing a substantial challenge to early intervention and management.[3,4]

Nonadherence to self-care practices among individuals with diabetes is a critical factor contributing to the development of complications. Several barriers to adherence have been identified, including inadequate communication by healthcare providers regarding the importance of self-care, limited health literacy, financial constraints, and lack of social support.[5] These challenges affect glycemic control and significantly impact the health-related quality of life (HR-QoL) of diabetic patients. This study aimed to evaluate the rates of nonadherence to various self-care practices and explore their association with HR-QoL among individuals with type 2 diabetes.

MATERIALS AND METHODS

Study Design and Setting: A cross-sectional study was conducted at the Medicine Outpatient Department (OPD) of Dhiraj Hospital, Sumandeep Vidyapeeth, located in the Vadodara district.

Study Duration and Participants: The study included 164 type-2 diabetic patients (diagnosed with diabetes for at least one year) aged 30 to 60 attending the Medicine OPD between September 2021 to October 2021. Patients with terminal medical complications or those unable to answer a short questionnaire (covering sociodemographic details, self-care practices, and disease complications) were excluded.

Ethical Considerations: The study was done as a part of EviGenCHIP (Evidence Generating Community Health Intervention Program), for which Ethical approval was obtained from the Human Research Review Panel (HRRP) & Sumandeep Vidyapeeth Institutional Ethics Committee (SVIEC). Informed written consent was obtained from all the participants after explaining the study's nature, purpose and procedures.

Data Collection: A structured three-part questionnaire was designed, consisting of the following sections: "Sociodemographic Information," which collected details about the participants' age, gender, education, occupation, and family history of diabetes; "Diabetic Profile," which included information about the duration of diabetes and associated complications; and "Self-Care Practices and Health-Related Quality of Life (HR-QoL)." The "self-care practices" section evaluated adherence to "diet care," "foot care," "exercise," and "medication." To assess "HR-QoL," the EQ-5D-5L (EuroQol, September 2019)[6] questionnaire was utilized, which measured five dimensions: "mobility," "self-care," "usual activities," "pain/discomfort," and "anxiety/depression." Each dimension had five response levels ranging from "no problem" to "extreme problem."

Criteria for nonadherence: Nonadherence to self-care practices was assessed across four domains: "diet care," "exercise," "foot care," and "medication." Patients were considered non-adherent to "diet care" if they "did not follow the prescribed dietary chart, timing, or recommended food quantity and quality." Nonadherence to "exercise" was defined as "engaging in less than 45 minutes of physical activity daily." "Foot care" nonadherence was described as "failing to perform essential practices such as daily foot examination, cleaning, moisturizing, wearing appropriate footwear, or trimming nails properly." "Medication" nonadherence was identified if patients "reported irregular timing, altering prescribed dosages, or skipping doctor follow-ups," this was further verified through prescription checks and the number

of medicines in their possession.

Data Analysis: Data was entered and analyzed using Microsoft Excel and Jamovi software (version 2.3.21). Statistical tests included the "Chi-Square Test," used to assess relationships between categorical variables, and "Ordinal Logistic

Regression," applied to determine significant associations between dependent variables such as mobility, self-care, usual activities, pain/discomfort, and anxiety/depression, and independent variables including sex, education, occupation, family history, duration of diabetes, and nonadherence to self-care practices. The assumption of proportional odds was evaluated using the test of parallel lines, which was found to be non-significant, confirming that the assumption was met. A p-value of <0.05 was considered statistically significant.
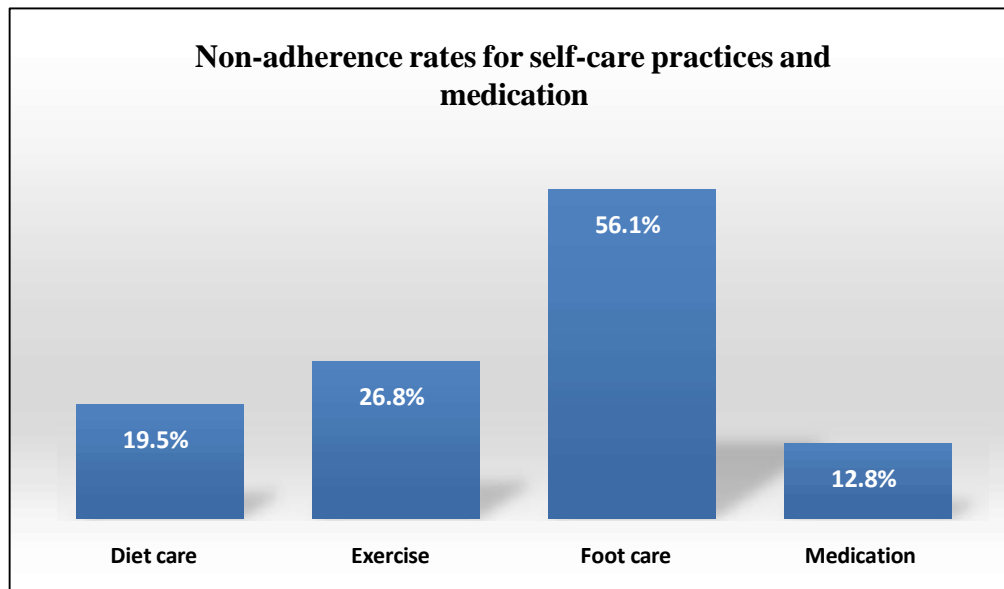
RESULTS

Among type-2 diabetic patients, 54.9% were male and 45.1% female. Education levels showed 40.8% with primary schooling, 28.6% with secondary schooling, 15.8% with high school/diploma, and 5.4% graduates. Socioeconomic status revealed 18.3% in classes I-II, 40.2% in class III, and 41.5% in classes IV-V. A family history of diabetes was noted in 52.4%. Diabetes duration was under 3 years in 70.1%, 3-5 years in 23.2%, and 5-10 years in 6.7% (Table 1). The nonadherence rates for self-care practices and medication among diabetic patients are depicted, with the highest rate observed in foot care (56.1%), followed by exercise (26.8%), diet care (19.5%), and medication (12.8%) (Diagram 1).

Table 1: Sociodemographic characteristics of study participants (N=164)

Variables	Frequency	Percentages
Gender		
Male	90	54.9%
Female	74	45.1%
Education status		
Illiterate	15	9.1%
Prim. School	67	40.8%
Sec. school	47	28.6%
High school/Diploma	26	15.8%
Graduate	9	5.4%
Socioeconomic class (Modified BG Prasad's scale, August 2021)		
Social Class I & II	30	18.3%
Social Class III	66	40.2%
Social Class IV & V	68	41.5%
Family History of Diabetes		
Yes	86	52.4%
No	78	47.6%
Duration of having DM		
< 3 years	115	70.1%
3-5 years.	38	23.2%
5-10 years.	11	6.7%

Diagram 1: Nonadherence rate among diabetic patients (multiple answers included)

Non-adherence rates for self-care practices and medication

Diet care: 19.5%
Exercise: 26.8%
Foot care: 56.1%
Medication: 12.8%

Table 2: Distribution of type-2 diabetic patients according to their responses on scale of EQ-5D-5L domains (n=164)

	Mobility Problem n (%)	Self-care problem n (%)	Usual activities n (%)	Pain/discomfort n (%)	Anxiety/depression n (%)
No problems	105 (64.0)	118 (72.0)	123 (75.0)	92 (56.1)	129 (78.7)
Slight problems	47 (28.7)	37 (22.6)	30 (18.3)	59 (36.0)	23 (14.0)
Moderate problems	9 (5.5)	7 (4.3)	8 (4.9)	11 (6.7)	9 (5.5)
Severe problems	2 (1.2)	2 (1.2)	2 (1.2)	1 (0.6)	3 (1.8)
Unable to/Extreme problem	1 (0.6)	0 (0.0)	1 (0.6)	1 (0.6)	0 (0.0)

As shown in Table 2, most type-2 diabetic patients reported no problems in the EQ-5D-5L domains of mobility (64.0%), self-care (72.0%), usual activities (75.0%), pain/discomfort (56.1%), and anxiety/depression (78.7%). Slight problems were the next most common across all domains, while moderate and severe problems were reported by fewer patients, with extreme issues being rare.

Table 3: Relationship between Nonadherence to self-care practices and Health-related quality of life (HR- QoL) (N=164)

Health-Related Quality of Life*	Diet care(n=32) Nonadherence	Exercise(n=44) Nonadherence	Foot care(n=92) Nonadherence	Medication(n=21) Nonadherence
Mobility Problem				
Present*	21(65.6%)	25(56.8%)	41(44.5%)	15(71.4%)
Not present	11(34.3%)	19(43.2%)	51(55.5%)	6(28.6%)
Chi square/p value	**15.17/0.000098**	**11.34/0.0007**	**6.71/0.009**	**13.14/0.00029**
Self-care problem				
Present*	15(46.8%)	19(43.1%)	32(34.7%)	12(57.1%)
Not present	17(53.1%)	25(56.9%)	60(65.3%)	9(42.9%)
Chi square/p value	**6.98/0.008**	**6.82/0.0089**	**4.708/0.03**	**10.101/0.0015**
Usual activities				
Present*	12(37.5%)	20(45.4%)	26(28.2%)	9(42.8%)
Not present	20(62.5%)	24(54.5%)	66(71.8%)	12(57.1%)
Chi square/p value	3.31/0.0687	**13.41/0.00025**	1.1884/0.276	**4.096/0.0429**
Pain/discomfort				
Present*	23(71.8%)	25(56.8%)	51(55.4%)	13(62%)
Not present	9(28.2%)	19(43.2%)	41(44.6%)	8(38%)
Chi square/p value	**12.63/0.0003**	**4.07/0.0436**	**11.31/0.0007**	3.169/0.075
Anxiety/depression				
Present*	11(33.3%)	17(32%)	24(29.3%)	8(38.3%)
Not present	21(66.6%)	27(68%)	68(70.6%)	13(61.6%)
Chi square/p value	**4.0232/0.045**	**10.71/0.0011**	2.811/0.094	**4.027/0.0448**

Present indicates any degree of suffering in all the components of health-related quality of life.

Table 3 highlights the relationship between nonadherence to self-care practices, medication, and the health-related quality of life (HR-QoL) of type-2 diabetic patients. A significant association was observed between mobility, self-care problems, and nonadherence to all self-care practices and medication (p<0.05). Usual activity problems were significantly associated with nonadherence to exercise and medication (p<0.05). Pain/discomfort issues were linked to nonadherence to diet care, exercise, and foot care (p<0.05), while anxiety/depression was significantly associated with nonadherence to diet care, exercise, and medication (p<0.05).

Table 4 presents the results of ordinal logistic regression analyzing the association between health-related quality of life (HR-QoL) domains (mobility problems, self-care problems, usual activity problems, pain/discomfort, and anxiety/depression) and independent factors such as sex, education, occupation, family history of diabetes, duration of diabetes, and adherence to diet care, foot care, exercise, and medication schedules. The model fit chi-square value, p-value, and McFadden's R² are detailed in the table. Significant associations were identified: education and duration of diabetes were significantly related to mobility problems (p<0.05). Self-care issues were linked to a family history of diabetes, duration of diabetes, and nonadherence to exercise and medication schedules (p<0.05). Usual activity problems were associated with education and nonadherence to exercise (p<0.05). Pain/discomfort showed significant associations with family history, duration of diabetes, and nonadherence to diet care (p<0.05). Lastly, anxiety/depression was significantly associated with education, duration of diabetes, and nonadherence to exercise (p<0.05).

Variables		Health-related quality of life (domains)														
		Mobility problem			Self-care problem			Usual activity problem			Pain/discomfort			Anxiety/ depression		
		β	Odds ratio	P-value	β	Odds ratio	P-value	β	Odds ratio	P-value	β	Odds ratio	P-value	β	Odds ratio	P-value
Sex	Female Male=Ref	0.01	1.01	0.98	0.33	1.39	0.43	0.7	2.02	0.11	-0.58	0.55	0.13	0.2	1.22	0.67
Education	Literate Illiterate=Ref	-1.84	0.16	0.002	-0.43	0.64	0.45	-1.86	0.15	0.001	-0.54	0.58	0.33	-1.3	0.27	0.02
Occupation	Employed Unemployed=Ref	-0.05	0.95	0.9	0.85	2.34	0.08	0.14	1.15	0.76	5.68	1.01	0.99	0.75	2.11	0.17
Family H/O of DM	Present Absent=Ref	-0.52	0.6	0.19	-0.88	0.41	0.03	0.48	1.62	0.27	-0.99	0.36	0.009	-0.69	0.5	0.14
Duration of having DM (years)	>3 yrs <3 yrs=Ref	1.18	3.26	0.003	1.108	3.03	0.009	0.54	1.73	0.19	1.26	3.55	0.001	0.98	2.66	0.03
Diet care	Nonadherence Adherence=Ref	0.74	2.11	0.11	0.6	1.83	0.21	0.06	1.06	0.9	1.33	3.81	0.004	0.11	1.12	0.84
Foot care	Nonadherence Adherence=Ref	0.23	1.26	0.56	0.43	1.54	0.31	0.05	1.05	0.89	0.65	1.92	0.07	0.36	1.44	0.45
Exercise	Nonadherence Adherence=Ref	0.79	2.21	0.06	0.91	2.47	0.05	1.30	3.69	0.004	0.43	1.54	0.3	1.13	3.09	0.02
Drug schedule	Nonadherence Adherence=Ref	0.96	2.61	0.06	1.06	2.88	0.04	0.56	1.76	0.3	0.35	1.41	0.51	0.27	1.31	0.65
Model fit		$X^2=53.8$, p<0.001			$X^2=34.5$, p<0.001			$X^2=33.4$, p<0.001			$X^2=48.1$, p<0.001			$X^2=27.6$, p<0.001		
R^2McFadden		0.185			0.138			0.134			0.157			0.121		

DISCUSSION

The primary objective of diabetes management is to enhance patients' quality of life, enabling them to lead as everyday life as possible. Adherence to self-care practices is essential for the successful management of diabetes. This study aimed to determine nonadherence rates to self-care practices and medication and examine their association with health-related quality of life (HR-QoL) in type-2 diabetic patients.

In the present study, most participants were male (54.9%) with a mean age of 47.53 ± 10.73 years. Most patients had education up to the primary school level (40.8%) and belonged to lower socioeconomic classes IV and V (41.5%). These demographics are comparable to those reported by Athira KP et al.,[7] where the mean

age was 56.03 ± 11.79 years, and 56.75% of participants were male. Similarly, Aggarwal M et al.[8] reported a mean age of 44.53 ± 8.13 years, with 50% male participants. The predominance of lower education and socioeconomic status in these studies highlights the need for tailored educational interventions to address gaps in knowledge and adherence.

Our study identified nonadherence rates of 56.1% for foot care, 26.8% for exercise, 19.5% for diet, and 12.8% for medication. These findings are consistent with Elmuzghi RF et al.,[9] who reported 55.5% nonadherence to exercise and 25.5% nonadherence to blood glucose monitoring. Similarly, Amerzadeh M et al.[10] found poor self-care practices in foot care and exercise among elderly patients. In addition, Wabe NT et al.[11] reported that financial constraints and medication side effects contributed significantly to nonadherence. These high rates of nonadherence across various studies underscore the global challenge of diabetes self- management and the need for comprehensive, patient-centred interventions.

Nonadherence to foot care (56.1%) in our study was significantly associated with mobility problems (44.5%). This finding is supported by Elmuzghi RF et al.[9] and Amerzadeh M et al.,[10] who reported that poor foot care practices led to increased mobility issues and reduced quality of life. Similarly, Chantzaras A et al.[12] found that medication nonadherence negatively impacted mobility, pain/discomfort, and anxiety/depression domains of health-related quality of life (HRQoL). These studies emphasize the importance of foot care education and preventive measures to improve mobility and reduce complications.

In our study, exercise nonadherence (26.8%) was linked to significant impairments in mobility (56.8%) and usual activities (45.4%). These findings are comparable to those by Wabe NT et al.,[11] who observed that low adherence to physical activity contributed to inadequate glycemic control and increased complications. Aggarwal M et al.[8] also reported a decline in self-care practices with increasing age and disease duration, affecting mobility and functional independence. These consistent findings highlight the need for community-based exercise programs and structured physical activity interventions to enhance HRQoL.

Despite a lower medication nonadherence rate (12.8%), our study found significant associations with anxiety and depression (38.3%). Elmuzghi RF et al.[9] reported that 32.9% of patients were nonadherent due to forgetfulness and medication side effects. Chantzaras A et al.[12] identified a significant negative correlation between nonadherence medication and HRQoL, particularly in the mental health domains. Similarly, Martínez YV et al.[13] emphasized that improving knowledge and attitudes toward medication adherence positively influences quality of life. These findings suggest that addressing psychological barriers and providing mental health support can improve medication adherence and overall well-being.

Our study significantly associated nonadherence to dietary recommendations (19.5%) with pain and discomfort (71.8%). This aligns with findings by Wabe NT et al.,[11] who reported poor dietary practices as a barrier to glycemic control. Hankó B et al.[14] also noted that 76.8% of patients did not adhere to dietary guidelines, contributing to increased diabetes complications. These results highlight the importance of culturally sensitive dietary counselling and personalized nutritional support to improve adherence and reduce

discomfort. In the present study, a family history of diabetes was reported in 52.4% of participants, indicating a substantial genetic predisposition. This prevalence is higher than the 33% observed by Saleh et al.,[15] who also noted better exercise and dietary management adherence among those with a family history. Chantzaras et al.[11] similarly found a significant association between family history and participation in exercise sessions, reflecting a heightened awareness of diabetes risks. Aggarwal et al.[8] reported higher compliance with medication and lifestyle practices among patients with a family history, aligning with the current study's findings. Amerzadeh M et al.[10] highlighted those patients without a family history had significantly lower adherence to exercise (p = 0.04), whereas those with a family history exhibited better foot care behaviours. Ose et al.[16] also noted that family history positively influenced dietary adherence. These studies consistently

demonstrate that a family history of diabetes enhances adherence to self-care practices, reinforcing the current study's results.

Our study revealed that longer disease duration (>3 years) was significantly associated with mobility issues (OR=3.26) and pain/discomfort (OR=3.55). Martínez YV et al.[13] similarly reported that prolonged diabetes negatively affects HRQoL due to the cumulative burden of complications. Ose D et al.[16] found that comorbid conditions exacerbate HRQoL deterioration in long-standing diabetes. Saleh et al.[15] noted that patients with shorter disease durations exhibited better adherence to exercise and dietary practices, while adherence diminished with increased disease duration. These findings collectively highlight that as diabetes duration increases, adherence to self-care and quality of life tend to decline, reinforcing the need for continuous support and intervention for long-term diabetic patients.

CONCLUSION

The present research concludes that there are global similarities in adherence challenges among type-2 diabetic patients, particularly in self-care practices like exercise, diet, and foot care. Despite variations in adherence rates across studies, common barriers such as low awareness, financial constraints, and psychological factors persist. Tailored interventions addressing these barriers, informed by local cultural and socioeconomic contexts, are essential to improving adherence and quality of life outcomes.

LIMITATIONS

The study's limitations include its cross-sectional design, which captured nonadherence and HR-QoL at a single point in time, potentially limiting the broader applicability of the findings. Self-reported data may not fully reflect actual adherence behaviours. Additionally, convenience sampling restricts the generalizability of the results to the broader diabetic population in India. Continuous and longitudinal assessments are needed to provide more comprehensive insights into these variables.

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