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Factors responsible for non-compliance among diabetic patients: Primary healthcare experiences in Saudi Arabia

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ABSTRACT

Background: Diabetes mellitus is the most common endocrine pathology. According to the World Health Organization, non-compliance patients, especially with long-term medication prescriptions for diabetes, have become a serious healthcare concern. *Methods*: We conducted a cross-sectional study in the western region of Saudi Arabia from February to April 2022. The online questionnaire distributed through social media included questions on compliance among diabetic patients attending a primary health center. We entered the data automatically into an Excel spreadsheet and used the Statistical Package for the Social Sciences for the analysis. *Results*: We surveyed 526 diabetic patients from western Saudi Arabia. Participants aged more than 50 years old represented the majority of responses (36.1%). Most of the participants had type 2 DM (52.85%). Moreover, most diabetic patients complied with diabetic clinics. *Conclusion*: Our findings show an adequate level of diabetic patients' compliance. Future studies must address the related influencing factors for non-compliance patients to enhance patients' health outcomes.

Keywords: Factors, Non-compliance, diabetics, Saudi Arabia

1. INTRODUCTION

Diabetes mellitus (DM) is the most common endocrine pathology and one of the most common illnesses worldwide (Khan, 2012; Ghabban, 2020). According to reviews in 2016, Saudi Arabia has the seventh highest prevalence of DM worldwide and the second highest prevalence in the Middle East, and it is rapidly increasing (Abdulaziz et al., 2016). Compliance (often referred to as adherence) is the range of patients' behavior, not limited to taking medication but including modifying lifestyle, making investigations and appointments, and taking advice and recommendations from healthcare providers to achieve a health and medical goal (Partridge et al., 2002).

Compliance is determined by understanding the intervention's benefits, risks, and costs (Partridge et al., 2002). Non-compliant patients seek health advice with a lack of perception and accommodative behaviors towards the healthcare provider recommendation (Khan, 2012; Alresheedi & Rabbani, 2022).

According to the World Health Organization, non-compliant patients, especially those taking medication for diabetes in the long term, have become a serious healthcare concern (Cramer et al., 2008). This has led to the unsuccessful delivery of healthcare benefits and severe economic consequences in terms of wasting time and money (Cramer et al., 2008). Compliance is determined by patient-related factors, divided into psychological factors (beliefs, motivation and attitude) and demographic factors (age, gender, educational level, and marital status), and therapy-related factors (route, duration, and side effects of therapy) or healthcare provider-related treatment (availability and accessibility) (Baghikar et al., 2019). Compliance with medication, as a worldwide challenge, has become a topic of many studies. Many reveal the importance of compliance among patients with chronic diseases (Khan, 2012). However, we need further investigation because it is difficult to compare compliance studies due to the lack of standard methodologies, terminologies and various influencing factors. Consequently, the present study aimed to estimate and assess the factors contributing to non-compliance among individuals with diabetes in western Saudi Arabia.

2. SUBJECTS AND METHODS

We conducted a cross-sectional study in the western region of Saudi Arabia (Makkah, Jeddah, Al Madinah, Al Munawwarah, Yanbu and Taif). Data collection started from January to February 2022. All diabetic patients (type 1 and type 2) in western Saudi Arabia (including all age groups and both men and women) were eligible to participate, but we excluded individuals with gestational diabetes. We computed the sample size using Epi Info ™ 7.1.5 software, considering a 95% confidence interval and 5% level of significance (p-value). The estimated population of diabetic patients was approximately 7,000,000 (Abdulaziz et al., 2016). We distributed an online survey using the Google Platform through social media to collect the data. Of the 840 participants that answered the online survey, we excluded 314 responses from the data set for various reasons including incomplete information. We used a final sample of 526 individuals as the participants for the analysis.

We constructed and formulated the questionnaire from the relevant literature (Khan, 2012) and carefully evaluated it based on consultation with three experts at Umm Al-Qura University to assess content validity. We applied all the suggested modifications after consensus. We then piloted the survey among those not included in the study (n = 15) to assess the reliability of the items. We initially drafted the questionnaire in English and then two of the study researchers independently translated it into Arabic. Subsequently, professional linguists performed proofreading to check for errors and inconsistencies.

The questionnaire consisted of 22 questions in four main sections. The first section included the consent form. The second section included questions on the exclusion criteria ("have you been diagnosed with diabetes?"). The third section included six questions on participants' socio-demographics (age, gender, education, marital status, residence, and occupation). The fourth section included 15 questions assessing the influencing factors that correlate with non-compliant diabetic patients attending primary healthcare centers. We obtained ethical approval from the biomedical ethics committee of Umm Al-Qura University, Makkah, Saudi Arabia. Participation was voluntary and the study participants provided informed consent after we explained the study objectives. We kept their information anonymous and used it for research purposes only. We used Microsoft Excel spreadsheets to enter the data. We then uploaded the data to the Statistical Package for the Social Studies (SPSS) version 23 after checking for completeness and minor typographical mistakes (IBM, Armonk, NY). We expressed the descriptive statistics as percentages for the categorical variables, with a p-value of less than 5% considered as significant. We used the Chi-square test to compare the categorical variables.

3. RESULTS

We surveyed 526 diabetic patients from western Saudi Arabia overall. Participants aged more than 50 years old represented the majority of responses, accounting for 36.1%, followed by the 40–50 age groups, represented by 23.8%. Male participants predominated (63.9%). Most respondents were married, followed by singles (68.3% and 24.3%, respectively). According to the participants' geographical distribution, the majority lived in urban areas, accounting for 93.5% (Table 1). Additionally, most respondents had university degrees as the highest educational level, followed by high-school certificates (50% and 30.4%, respectively). Most of the participants were employed, accounting for 39.4% (Table 1).

Concerning the associated chronic diseases of the participants, most suffered from cardiac or respiratory comorbidities (51.5%; Table 1). Conversely, most patients had no complications, while a significant number complained of ocular and neurological complications (24.9% and 14.1%, respectively) (Table 1).

Table 1 Patient's demographical characteristics		
Variable	Category	(%)
Age groups	Less than 20	7.4
	20-30	16.7
	30-40	16.0
	40-50	23.8
	More than 50	36.1
Gender	Male	63.9
	Female	36.1
Resident area	Urban	93.5
	Rural	6.5
Educational level	High-school	30.4
	University	50.0
	Diploma	6.3
	None	5.1
	Others	8.2
Occupation	Students	16.9
	Employee	39.4
	Not- Employee	19.8
	Retired	24.0
Marital status	Single	24.3
	Married	68.3
	Divorced	3.4
	Widow	4.0
Associated chronic diseases	Cardiac/Respiratory	51.5
	Endocrine	1.1
	Rheumatological	.2
	Urological	.4
	Ocular	.4
	Musculoskeletal	.2
	None	46.2
Complications	Neurological	14.1
	Nephrological	6.3
	Urological	.6
	Ocular	24.9
	Diabetic foot	8.2
	Musculoskeletal	.4
	None	45.6

Most of the participants had type 2 DM, corresponding to 52.85% (Figure 1). Moreover, the majority of the diabetic patients were positively compliant in diabetic clinics (Figure 2). Furthermore, most had suffered from diabetes for one to five years, accounting for 33.1% (Figure 3).

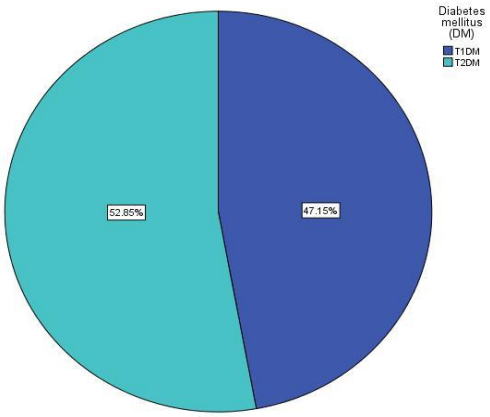

Figure 1 Frequency of DM among participants

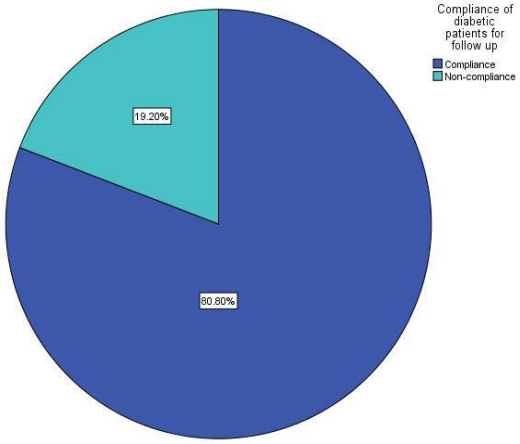

Figure 2 Frequency of compliance patterns among diabetic patients

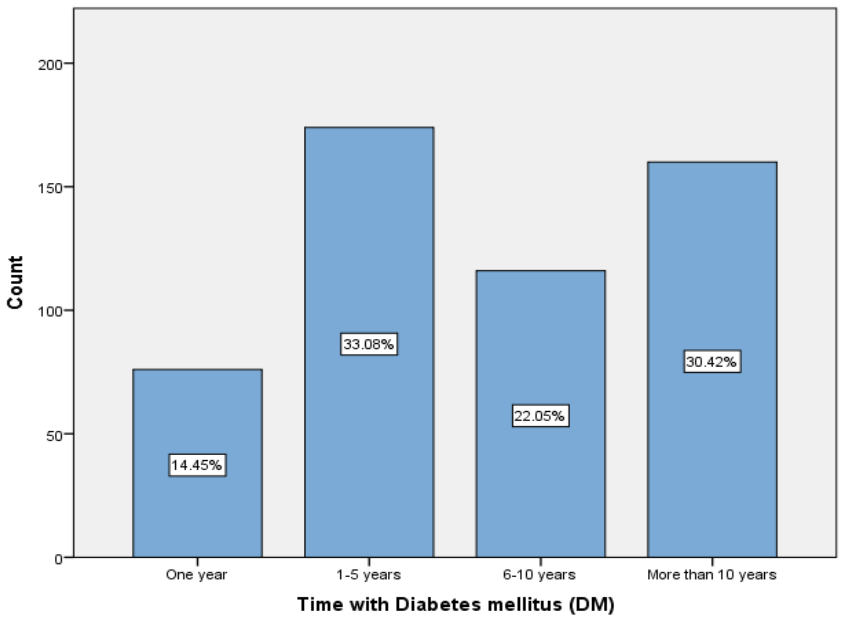

Figure 3 Diabetic duration among participants

According to the relation of patients' compliance patterns with their demography, age group corresponded significantly with a positive compliance pattern (p-value = 0.020; Table 2), while the gender distribution reached a significant level (p-value = 0.051). On the other hand, the association of compliance patterns and participants' geographical distributions, educational level, occupational status and marital status were not significant (p-values of 0.068, 0.595, 0.165, and 0.102, respectively) (Table 2). Table 2 also shows the relations of patients' compliance patterns with their related factors; patients who committed to attend on the day of the appointment and follow-up also corresponded significantly with compliance patterns (p-value = 0.000). Additionally, patients on diet instructions and medication regimens showed a significantly positive relation with compliance patterns (p-values of 0.026 and 0.019, respectively).

Regarding the association between diabetes classification and patients' demographics, as shown in Table 2, participants' age group and educational level corresponded significantly with type 1 DM (p-values of 0.000 and 0.001, respectively), while occupational status and marital status corresponded significantly with type 2 DM (p-value = 0.000). However, participants' gender and geographical distributions were not significantly related to diabetes classification (Table 2). On the other hand, for the relation between diabetes classification and patient-related factors, patients who committed to attend on the day of appointment were significantly associated with type 2 DM (p-value = 0.008). Additionally, we found a significant association between medication regimens, particularly metformin + glibenclamide and type 2 DM (p-value = 0.000) (Table 2).

Table 2 Associations between (patient's demographic characteristics and patients related factors.

Category			Patients compliance				P-value	Diabetes classifications				P-value
			Compliance		Non-compliance			T1DM		T2DM		
			(N.)	(%)	(N.)	(%)		(N.)	(%)	(N.)	(%)	
Patients demography's	age groups	Less than 20	37	94.9%	2	5.1%	0.020*	35	89.7%	4	10.3%	0.000*
		20-30	65	73.9%	23	26.1%		61	69.3%	27	30.7%	
		30-40	63	75.0%	21	25.0%		32	38.1%	52	61.9%	
		40-50	99	79.2%	26	20.8%		46	36.8%	79	63.2%	
		More than 50	161	84.7%	29	15.3%		74	38.9%	116	61.1%	
	Gender	Male	263	78.3%	73	21.7%	0.051	155	46.1%	181	53.9%	0.585
		Female	162	85.3%	28	14.7%		93	48.9%	97	51.1%	
	Resident area	Urban	402	81.7%	90	18.3%	0.068	230	46.7%	262	53.3%	0.595
		Rural	23	67.6%	11	32.4%		18	52.9%	16	47.1%	
	Educational level	High-school level	127	79.4%	33	20.6%	0.595	86	53.8%	74	46.3%	0.001*
		University level	209	79.5%	54	20.5%		101	38.4%	162	61.6%	
		Diploma	28	84.8%	5	15.2%		20	60.6%	13	39.4%	
		None	23	85.2%	4	14.8%		13	48.1%	14	51.9%	
		Other	38	88.4%	5	11.6%		28	65.1%	15	34.9%	
	Occupational	Students	74	83.1%	15	16.9%	0.165	69	77.5%	20	22.5%	0.000*
		Employee	163	78.7%	44	21.3%		84	40.6%	123	59.4%	
		Not-employee	79	76.0%	25	24.0%		45	43.3%	59	56.7%	
		Retired	109	86.5%	17	13.5%		50	39.7%	76	60.3%	
	Marital status	Single	98	76.6%	30	23.4%	0.102	92	71.9%	36	28.1%	0.000*
		Married	293	81.6%	66	18.4%		140	39.0%	219	61.0%	
		Divorced	18	100.0%	0	0.00%		7	38.9%	11	61.1%	
		Widow	16	76.2%	5	23.8%		9	42.9%	12	57.1%	
	Attendance on the day of	Attended	307	93.6%	21	6.4%	0.000*	170	51.8%	158	48.2%	0.008*
		Not attended	16	76.2%	5	23.8%		8	38.1%	13	61.9%	

	appointment	Forgot the appointment	27	75.0%	9	25.0%		18	50.0%	18	50.0%	
		None availability of transport	31	45.6%	37	54.4%		19	27.9%	49	72.1%	
		Did not think it necessary as he is taking medicine from other source	44	60.3%	29	39.7%		33	45.2%	40	54.8%	
	Follow-up in the clinic	Never missed an appointment	237	94.8%	13	5.2%	0.000*	125	50.0%	125	50.0%	0.106
		Missed the appointment once or twice	116	85.9%	19	14.1%		69	51.1%	66	48.9%	
		Missed the appointment more than twice	60	69.0%	27	31.0%		33	37.9%	54	62.1%	
		Never attended the clinic	12	22.2%	42	77.8%		21	38.9%	33	61.1%	
	Died instruction	Followed the diet instruction	210	85.0%	37	15.0%	0.026*	119	48.2%	128	51.8%	0.663
		Didn't follow the diet instruction	215	77.1%	64	22.9%		129	46.2%	150	53.8%	
	Exercise instruction	Follow the exercise instruction	214	82.0%	47	18.0%	0.508	128	49.0%	133	51.0%	0.432
		Didn't follow the exercise in	211	79.6%	54	20.4%		120	45.3%	145	54.7%	
	Drug regimen	Metformin only	114	77.0%	34	23.0%	0.019*	68	45.9%	80	54.1%	0.000*
		Glibenclamide only	51	76.1%	16	23.9%		27	40.3%	40	59.7%	
		Glazide only	7	50.0%	7	50.0%		4	28.6%	10	71.4%	
		Insulin only	109	84.5%	20	15.5%		89	69.0%	40	31.0%	
		Metformin + glibenclamide	51	86.4%	8	13.6%		12	20.3%	47	79.7%	0.000*
		Metformin + glazide	21	80.8%	5	19.2%		8	30.8%	18	69.2%	
		Insulin + glazide or glibenclamide	72	86.7%	11	13.3%		40	48.2%	43	51.8%	

Concerning the relation between patients' compliance patterns and physician-related factors, as shown in Table 3, a number of factors corresponded significantly with positive compliance patterns. These included physicians' attitudes toward explaining how to use medication to diabetic patients, patients' satisfaction toward multi-medication prescriptions, satisfaction with the duration of medication to act, and physicians' perspective of understanding patients' health issue when they visit the clinic (p-values of 0.000, 0.000, 0.000, and 0.008, respectively). However, diabetic patients' level of awareness of medications' side effects showed no significant relation with the level of compliance (p-value = 1.000). Conversely, for the relation between diabetes classification and physician-related factors, both physicians' attitudes toward explaining how to use medication to diabetic patients and satisfaction with the duration of medication to act corresponded significantly with type 2 DM (p-values of 0.041 and 0.002, respectively; Table 3).

Table 3 the associations between (patients' demography and physician related actors) with patients compliance patterns and diabetes classifications

Category			Patients compliance				P-value	Diabetes classifications				P-value
			Compliance		Non-compliance			T1DM		T2DM		
			(N.)	(%)	(N.)	(%)		(N.)	(%)	(N.)	(%)	
Physician related actors	Attitude towards medication explanation	Not-enough	45	54.9%	37	45.1	0.000*	30	36.6%	52	63.4%	0.041*
		Enough	380	85.6%	64	14.4		218	49.1%	226	50.9%	
	Awareness of medications' side effects	Yes	174	80.9%	41	19.1%	1.000	94	43.7%	121	56.3%	0.214
		No	251	80.7%	60	19.3%		154	49.5%	157	50.5%	
	Physicians responds to patients comments	Yes	354	84.7%	64	15.3%	0.000*	202	48.3%	216	51.7%	0.331
		No	71	65.7%	37	34.3%		46	42.6%	62	57.4%	
	satisfaction of time to medication to act	Little	67	65.7	35	34.3	0.000*	34	33.3%	68	66.7%	0.002*
		Enough	358	84.4	66	15.6		214	50.5%	210	49.5%	
	Understanding the underlying health issue of patients	Yes	219	85.5%	37	14.5%	0.008*	127	49.6%	129	50.4%	0.295
		No	206	76.3%	64	23.7%		121	44.8%	149	55.2%	

4. DISCUSSION

Our sample comprised 526 individuals from western Saudi Arabia. Men made up the majority of the participants in this study (63.9%), in line with Ghabban, (2020). By contrast, women made up the vast majority (58.8%) in Khan, (2012). The predominant age in this study was more than 50 years old (36.1%), followed by the 40–50 age groups (23.8%), while the average age was more than 50 years old in Khan, (2012). However, in Ghabban, (2020), 28.8% were more than 65 years old, 58.5% were in the 45–64 age group, and 12.6% were less than 44 years old. In the study conducted by Baghikar et al., (2019), the mean age of participants was 57 years old. In our study, most of the participants were married, followed by singles (68.3% and 24.3%, respectively). Khan, (2012) found that 72% were married, while singles comprised 16.2%. On the other hand, in Baghikar et al., (2019), the percentage of married participants was 56%. According to the participants' geographical distribution, the majority lived in urban areas (93.5%). At study of Khan, (2012), the majority (71.6%) also lived in urban areas.

In our study, university degree was the highest educational level (50%), followed by high school degree (30.4%). By contrast, Khan, (2012) showed that university degree was the lowest educational level (1.7%), followed by secondary degree (9.6%). On the other hand, Baghikar et al., (2019) found that 70% had less than a high-school diploma. Furthermore, the current study revealed that most of the participants suffered from cardiac or respiratory comorbidities (51.5%). Khan, (2012) revealed that most of the participants had no associated chronic diseases (54.1%), followed by hypertension (42.9%) and asthma (0.9%). While in Baghikar et

al., (2019), the percentage of hypertension sufferers was the highest at 63%. Most of the participants had type 2 DM (52.85%). However, in Ghabban, (2020), all the participants had type 2 DM.

The majority of diabetic patients were compliant in diabetic clinics. Khan, (2012) showed that 46.9% of compliant patients never missed an appointment, 35.5% missed an appointment once or twice, 26.4% missed an appointment more than twice, and 18.2% never attended the clinic. By contrast, of non-compliant patients, 81.8% never attended the clinic, 73.6% missed an appointment more than twice, 64.5% missed an appointment once or twice, and 53.1% never missed an appointment. Moreover, most diabetic patients had suffered diabetes for 1–5 years (33.1%). Conversely, in Khan, (2012), sufferers of 1–5 years accounted for 20.3% of all patients.

In compliant patients, the present study showed that 85% followed diet instructions, 77.1% did not follow diet instructions compared with 15% and 22.9% in non-compliant patients, respectively. However, in Khan, (2012), among compliant patients, 64.7% followed diet instructions and 35.3% did not, while 64.8% of non-compliant patients followed diet instructions and 35.2% did not. In our study, 82% of the compliant patients followed exercise instructions and 79.6% did not, whereas 18% of non-compliant patients followed exercise instructions and 20.4% did not. In Khan, (2012), of compliant patients, 45.3% followed exercise instructions and 54.7% did not; on the other hand, one-third of non-compliant patients followed exercise instructions and two-thirds did not.

The current study revealed that compliant patients used metformin only (77%), glibenclamide only (76.1%), glazide only (50%), insulin only (84.5%), metformin + glibenclamide (86.4%), metformin + glazide (80.8%), and insulin + glazide or glibenclamide (86.7%). On the other hand, non-compliant patients used metformin only (23%), glibenclamide only (23.9%), glazide only (50%), insulin only (15.5%), metformin + glibenclamide (13.6%), metformin + glazide (19.2%), and insulin + glazide or glibenclamide (13.3%). In (Khan, 2012), 51.7% of compliant patients used metformin only, while 38.1% used glibenclamide only. Furthermore, 21.4% used glazide only, 21% insulin only, 33.3% metformin + glibenclamide, 38.7% metformin + glazide, and 21% on insulin + glazide or glibenclamide. By contrast, of non-compliant patients, 48.3% used metformin only, 61.9% used glibenclamide only, 78.6% used glazide only, 79% used insulin only, 66.7% used metformin + glibenclamide, 61.3% used metformin + glazide, and 79% used insulin + glazide or glibenclamide.

5. CONCLUSION

Many significant factors including age, area of residence, type of DM, and education level influence compliance. Determining the level of compliance is challenging, but patients' behaviors and actions toward healthcare recommendations and services can affect it, including appointment attendance, lifestyle modification, and medication adherence. This study concludes that the compliance of diabetic patients in the western region is adequate. It is higher than that in other regions of the Kingdom. This may be because of the Ministry of Health's new serveries, which may enable easy access to medication. We recommend and encourage new approaches to increase DM awareness and education by involving more on-site and online strategies, personalizing the recommendations, and tailoring them to suit the non-compliant diabetic population.

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Ethical approval

The study was approved by the Medical Ethics Committee of Umm Al-Qura University (ethical approval code: HAPO-02-K-012-2021-11-822).

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Conflict of interest

The authors declare that there is no conflict of interests

Data and materials availability

All data associated with this study are present in the paper.

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