

Compliance of Type 2 Diabetic Patients to Its Management: A Cross-Sectional Survey

Mohammad Abdulrahman Alghamdi¹, Tawfiq Ali Shihab¹, Maha Ali Hilabi²,
Shrouq Abdullah Alqaaiyan², Wesal Ibrahim Alzain³,
Ahmed Mansour Alhumaidan⁴, Khalid Kheder Ali Alfageeh⁵

¹Prince Abdul Majeed District Primary Health Care Center, Jeddah.

²Al Rehab Primary Health Care Center, Jeddah.

³Aldeyafah Primary Health Care Center, Makkah.

⁴King Fahad Specialist Hospital, Buraydah, Alqassim.

⁵King Fahad Hospital, Albaha.

ABSTRACT

Background: Despite the efficacy of hypoglycemic medications in controlling blood glucose level, several studies indicated poor levels of compliance with these medications.

Objectives: To estimate compliance of type 2 diabetic patients with diabetic medications and determine its impact on the control of diabetes in Saudi Arabia.

Subjects and Methods: This cross-sectional study included a random sample of adult diabetes mellitus type 2 patients (18-60 years), both sexes, who attend primary health care centers in Jeddah and Makkah during period of the study (15th December 2016-15th January, 2017). According to American diabetes association (ADA), control of type 2 diabetes mellitus (DM) has been defined strictly by achievement of targeted glycaemic control HBA1C < 7. Self-administered Arabic questionnaire was utilized to collect data from patients. It included demographic data, diabetes-related history, and lifestyle-related factors.

Results: The study included 298 type 2 diabetic patients out of 337 recruited for the study with a response rate of 88.4%. From table 1, it is clear that more than one-third of them (36.9%) aged over 60 years. Females represent 51.3% of them. Poor glycemic control was reported by most of patients (74.8%). Regarding compliance with diabetic therapy, 58.1% were always compliant with diabetic medications whereas 8.1% cited that they never compliant with diabetic medications. The association between poor glycemic control and compliance with diabetic therapy was statistically significant ($p < 0.001$),

Patients aged between 51 and 60 years ($p < 0.001$), females ($p = 0.002$), singles ($p = 0.044$), higher educated ($p < 0.001$), those having family members working in medical field ($p = 0.012$), patients with duration of diabetes ranged between 6 and 10 years ($p = 0.041$), without diabetic complications ($p < 0.001$), treated with diet or insulin alone ($p = 0.019$), adherent to diet regimen ($p < 0.001$), reported family support ($p < 0.001$) and underweight patients ($p < 0.001$) were more significantly compliant with diabetic therapy than their counterparts.

Conclusion: The self-reported medication compliance in the current study was high. It was associated with demographic factors as well as factors related to diabetes such. Further larger-scale study is recommended.

Keywords: Diabetes mellitus, Compliance, Medication.

*Correspondence to:

Mohammad Abdulrahman Alghamdi,
Prince Abdul Majeed District Primary Health Care Center,
Jeddah, Saudi Arabia.

Article History:

Received: 18-01-2017, Revised: 22-01-2017, Accepted: 27-01-2017

Access this article online	
Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2017.3.1.028	

INTRODUCTION

Diabetes Mellitus (DM) is a global public health problem affected 221 million in 2010 and is expected to affect up to 300 million in 2025.^{1,2}

In Saudi Arabia, the number of diabetic patients is increasing due to urbanization, population growth, increase life expectancy and increasing prevalence of physical inactivity and obesity. The overall prevalence of diabetes was 23.7%.³ The rate of

uncontrolled diabetes among Saudi diabetic patients was 59.3%, with males were more likely to be uncontrolled.⁴

Diabetes and its serious complications remain a major concern in clinical practice, with inability to achieve target glycemic levels among several patients.⁵

Poor diabetes control has been reported to be associated with microvascular complications⁶⁻⁸ and mortality.^{9,10}

Glycemic control as assessed by HbA1c levels, is dependent on patient's age and duration of diabetes.¹¹ Nevertheless, HbA1c levels greater than 9.0% are universally considered poor control.¹² Despite the efficacy of hypoglycemic medications in controlling blood glucose level, several studies indicated poor levels of compliance with these medications.¹³⁻¹⁹

According to the World Health Organization (WHO), "adherence is the extent to which a person's behavior; taking medication, following a prescribed diet, and/or executing lifestyle changes corresponds with agreed recommendations from the health care provider".²⁰ Inadequate adherence to medications leads to increased mortality and morbidity as a result of poor glycemic control, which has both direct and indirect influence on the healthcare system cost as a result of disease progression, prolonged hospitalization and pre-mature disability.²¹⁻²³

The aim of this study was to estimate compliance of type 2 diabetic patients with diabetic medications and determine its impact on the control of diabetes in Tabuk, Saudi Arabia.

SUBJECTS AND METHODS

This cross-sectional study was conducted at primary health care centers in Jeddah and Makkah cities, KSA. It included adult diabetes mellitus type 2 patients (18-60 years), both sexes, who attend primary health care centers in Jeddah and Makkah during period of the study (15th December 2016-15th January, 2017).

According to American diabetes association (ADA), successful control of type 2 diabetes mellitus (DM) has been defined strictly by achievement of targeted glycaemic control HBA1C < 7.²⁴

Sample size was calculated according to random sample size determination equation

$$SS = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where: Z = Z value (e.g. 1.96 for 95% confidence level), p = percentage picking a choice, expressed as decimal (0.5 used for

sample size needed), c = confidence interval, expressed as decimal.

Due to lack of research of percentage of successful control of diabetes mellitus type 2 in our diabetic centre. So, we used the international figures which varied between 20% to 45 % (mean=32, 5%).²⁵

$$SS = \frac{1.96^2 * (32.5) * (67.5)}{5^2}$$

So, sample size is 337

Self-administered questionnaire in Arabic language was utilized to collect data from patients attending PHC centres. It included demographic data, diabetes-related history, and lifestyle-related factors. Glycated hemoglobin_(HBA1C) was recorded from the file of the patient.

Approval for the study was obtained from the Regional Research and Ethics team and approval was also obtained from the directors of PHC in Jeddah and Makkah.

Statistical Package for Social Sciences (SPSS) software version 22.0 was used for data entry and analysis. Descriptive statistics (number, percentage) analytic statistics using Chi Square tests (χ²) to test for the association and/or the difference between two categorical variables were applied. P-value less than 0.05 will be considered statistically significant.

RESULTS

The study included 298 type 2 diabetic patients out of 337 recruited for the study with a response rate of 88.4%. From table 1, it is clear that more than one-third of them (36.9%) aged over 60 years. Females represent 51.3% of them. Majority of the patients (83.9%) were married. Slightly less than one-third of patients were illiterates (31.3%) whereas 18.1% were university educated. Sixty patients (20.1%) had one or more family members working in medical field. More than half of the participants (51.7%) were working and 23.4% had income exceeded 15000 SR/month.

Table 1: Demographic characteristics of type 2 diabetic patients (n=298).

Variables	Categories	No.	%
Age in years	≤40	21	7.0
	41-50	72	24.2
	51-60	95	31.9
	>60	110	36.9
Gender	Male	145	48.7
	Female	153	51.3
Marital status	Single	12	4.0
	Married	250	83.9
	Divorced/widowed	36	12.1
Educational level	Illiterate	93	31.3
	Primary school	48	16.1
	Intermediate school	52	17.4
	Secondary school	51	17.1
	University/+	54	18.1
Having family member/s working in medical field	Yes	60	20.1
	No	238	79.7
Job status	Working	154	51.7
	Not working	144	48.3
Income in Saudi Riyals per month	≤5000	39	13.2
	5001-10000	98	33.2
	10001-15000	89	30.2
	>15000	69	23.4

Table 2: Medical and social characteristics of type 2 diabetic patients (n=298)

Variables	Categories	No.	%
Duration of diabetes in years	≤5	33	11.1
	6-10	173	58.0
	>10	92	30.9
Diabetic complications	yes	33	11.1
	No	265	88.9
Treatment of diabetes	Diet	3	1.0
	Oral hypoglycemics (OHGs)	218	73.2
	Insulin	6	2.0
	OHGs and insulin	71	23.8
Adherence to diet regimen	Always	116	38.9
	Sometimes	104	34.9
	Never	78	26.2
Family support	Yes	166	55.7
	No	132	44.3
BMI	Underweight	3	1.0
	Normal	87	29.2
	Overweight	112	37.6
	Obesity	96	32.2

Table 3: Association between compliance with diabetic therapy and glycemic control among type 2 diabetic patients.

HBA1c	Compliance with diabetic therapy		
	Always	Sometimes	Never
<7% (n=75)	75 (100)	0 (0.0)	0 (0.0)
≥7% (n=223)	98 (43.9)	101 (45.3)	24 (10.8)

$\chi^2=72.42, p<0.001$

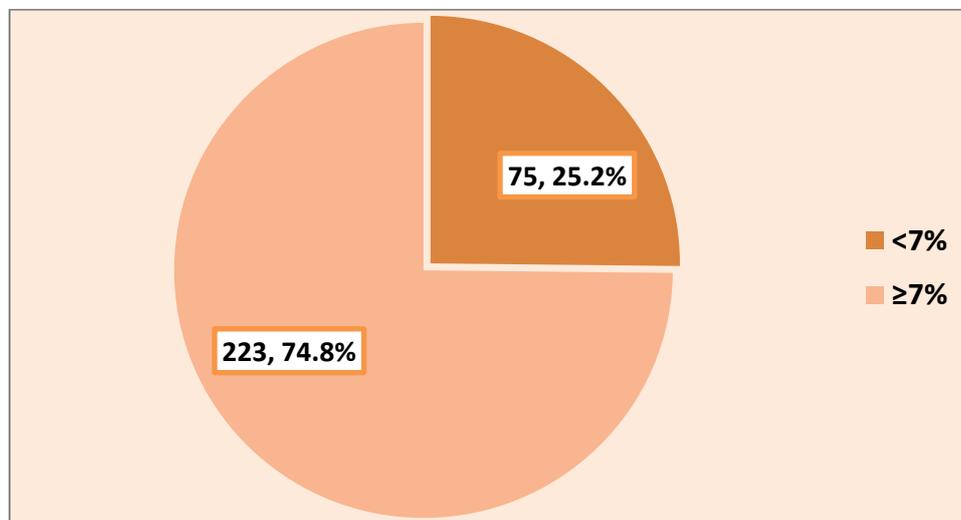


Fig 1: Level of glycemic control among type 2 diabetic patients

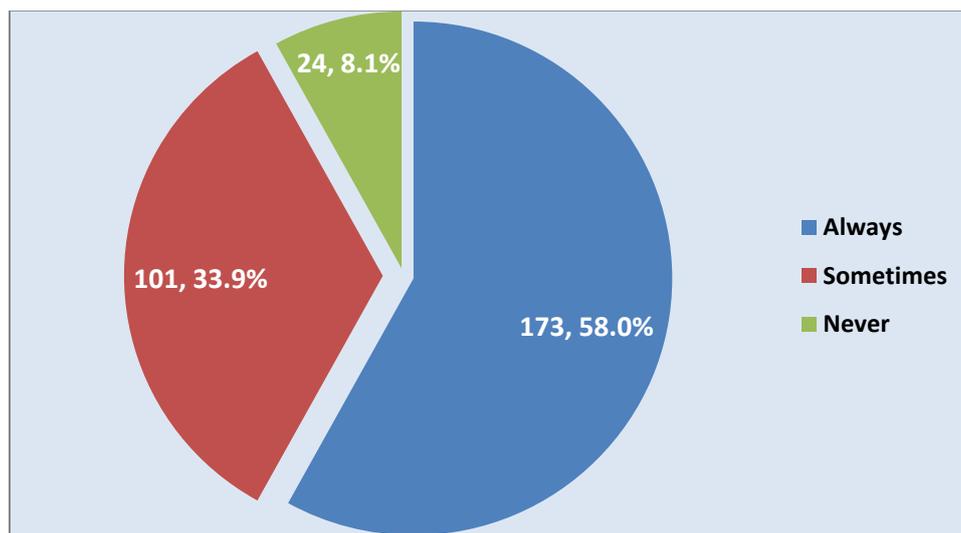


Fig 2: Compliance of type 2 diabetic patients with diabetic therapy

Table 4: Factors associated with compliance of type 2 diabetic patients to diabetic therapy

	Compliance with diabetic therapy			p-value*
	Always N=173	Sometimes N=101	Never N=24	
Age in years				
≤40 (n=21)	12 (57.1)	9 (42.9)	0 (0.0)	<0.001
41-50 (n=72)	42 (58.3)	24 (33.3)	6 (8.3)	
51-60 (n=95)	75 (78.9)	17 (17.9)	3 (3.2)	
>60 (n=110)	44 (40.0)	51 (46.4)	15 (13.6)	
Gender				
Male (n=145)	71 (49.0)	56 (38.6)	18 (12.4)	0.002
Female (n=153)	102 (66.7)	45 (29.4)	6 (3.9)	
Marital status				
Single (n=12)	12 (100)	0 (0.0)	0 (0.0)	0.044
Married (n=250)	143 (57.2)	86 (34.4)	21 (8.4)	
Divorced/widowed (n=36)	18 (50.0)	15 (41.7)	3 (8.3)	
Educational level				
Illiterate (n=93)	51 (54.8)	36 (38.7)	6 (6.5)	<0.001
Primary school (n=48)	29 (60.4)	16 (33.3)	3 (6.3)	
Intermediate school (n=52)	29 (55.8)	11 (21.2)	12 (23.1)	
Secondary school (n=51)	21 (41.2)	27 (52.9)	3 (5.9)	
University/+ (n=54)	43 (79.6)	11 (20.4)	0 (0.0)	
Having family member/s working in medical field				
Yes (n=60)	43 (71.7)	17 (28.3)	0 (0.0)	0.012
No (n=238)	130 (54.6)	84 (35.3)	24 (10.1)	
Job status				
Working (n=154)	83 (53.9)	56 (36.4)	15 (9.7)	0.266
Not working (n=144)	90 (62.5)	45 (31.3)	9 (6.3)	
Income in Saudi Riyals per month				
≤5000 (n=39)	21 (53.8)	18 (46.2)	0 (0.0)	0.113
5001-10000 (n=98)	63 (64.3)	29 (29.6)	6 (6.1)	
10001-15000 (n=89)	47 (52.8)	30 (33.7)	12 (13.5)	
>15000 (n=69)	39 (56.5)	24 (34.8)	6 (8.7)	
Duration of diabetes in years				
≤5 (n=33)	18 (54.5)	12 (36.4)	3 (9.1)	0.041
6-10 (n=173)	107 (61.8)	48 (27.7)	18 (10.4)	
>10 (n=92)	48 (52.2)	41 (44.6)	3 (3.3)	
Diabetic complications				
Yes (n=33)	6 (18.2)	21 (63.6)	6 (18.2)	<0.001
No (n=265)	167 (63.0)	80 (30.2)	18 (6.8)	
Treatment of diabetes				
Diet (n=3)	3 (100)	0 (0.0)	0 (0.0)	0.019
Oral hypoglycemics (OHGs) (n=218)	134 (61.5)	69 (31.7)	15 (6.9)	
Insulin (n=6)	6 (100)	0 (0.0)	0 (0.0)	
OHGs and insulin (n=71)	30 (42.3)	32 (45.1)	9 (12.7)	
Adherence to diet regimen				
Always (n=116)	107 (92.2)	9 (7.8)	0 (0.0)	<0.001
Sometimes (n=104)	57 (54.8)	41 (39.4)	6 (5.8)	
Never (n=78)	9 (11.5)	51 (65.4)	18 (23.1)	
Family support				
Yes (n=166)	110 (66.3)	53 (31.9)	3 (1.8)	<0.001
No (n=132)	63 (47.7)	48 (36.4)	21 (15.9)	
BMI				
Underweight (n=3)	3 (100)	0 (0.0)	0 (0.0)	<0.001
Normal (n=87)	36 (41.4)	45 (51.7)	6 (6.9)	
Overweight (n=112)	62 (55.4)	35 (31.3)	15 (13.4)	
Obesity (n=96)	72 (75.0)	21 (21.9)	3 (3.1)	

* Chi-square test

Duration of diabetes ranged between 6 and 10 years among 58% of the participants. Diabetic complications were reported among 11.1% of patients. Majority of type 2 diabetic patients (73.2%) were treated with oral hypoglycemic whereas 23.8% were treated with a combination of OHGs and insulin. Never adherence to diet regimen was reported by 26.2% of the participants. Family support in management of diabetes was mentioned by 55.7% of patients.

More than two-thirds of them (69.8%) were either overweight (37.6%) or obese (32.2%). (Table 2)

Poor glycemic control was reported by most of patients (74.8%) as displayed in figure 1. Regarding compliance with diabetic therapy, 58.1% were always compliant with diabetic medications whereas 8.1% cited that they never compliant with diabetic medications as shown in figure 2. The association between poor glycemic control

and compliance with diabetic therapy was statistically significant ($p < 0.001$) as demonstrated in table 3.

From table 4, it is shown that patients aged between 51 and 60 years ($p < 0.001$), females ($p = 0.002$), singles ($p = 0.044$), higher educated ($p < 0.001$), those having family members working in medical field ($p = 0.012$), patients with duration of diabetes ranged between 6 and 10 years ($p = 0.041$), without diabetic complications ($p < 0.001$), treated with diet or insulin alone ($p = 0.019$), adherent to diet regimen ($p < 0.001$), reported family support ($p < 0.001$) and underweight patients ($p < 0.001$) were more significantly compliant with diabetic therapy than their counterparts.

DISCUSSION

In the present study, compliance with anti-diabetic medications was 91.9% (58% always and 33.9% sometimes). It was determined by several factors related to patients, the disease and social/behavioral factors. We depend on a single self-reported question in assessing patients' compliance. Comparable results have been reported in other studies.^{19, 26-30} However, compliance information obtained in this study was based on patients recall, therefore, the actual compliance level may be lower than what has been reported in the current study, because it has been documented that self-reports usually overestimate patients compliance rate.³¹ Lower rates have been reported in Saudi Arabia³² and other countries.³³⁻³⁶ The difference in the compliance rates between different studies could be attributed to differences in methodological approaches used to assess compliance, as well as differences in the nature of health care settings as well as socio economic background of the participants.

In the present study, diabetes duration was significantly associated with compliance to anti-diabetic medications as those with relatively longer duration were more compliant. Similar results were reported in studies carried out by Bezie and Gimenes.^{37,38} Patients with longer durations of diabetes are more likely to have had more visits to their health care providers, could have understood their mode of therapy better and would be self-motivated to have their medications. It is possible that patients who have been on treatment for a short duration may be less aware of their disease and are thus more likely to be poorly compliant.

In this study, compliance with anti-diabetic medications was significantly higher among patients who had family members working in medical field. This could be due to these patients may be more aware that anti-diabetic medications are necessary for their current and future health. It has been suggested that patients' concerns of about long-term effects of taking anti-diabetic medications should be addressed by healthcare workers to minimize these concerns and consequently improve medication compliance.³⁹

Regarding marital status, the present study showed that single patients were more likely to compliant with anti-diabetic medications compared to married patients. The same has been observed in a study conducted by Sweileh et al in Palastine.³⁹

In the current study, compliance was lower among males than females. The same reported by Gimenes et al.³⁹ However, in UAE,¹⁹ no gender difference was reported regarding compliance with anti-diabetic medications.

Regarding educational level, higher compliance rates were observed among higher educated patients. The same was

observed in a study carried out by Arifulla et al (2014) in UAE.¹⁹ As the complexity of the diabetes drug therapy increases, patients are needed to understand the prescribed schedule to be compliant with it, therefore high compliance was observed among higher educated patients.

Majority of patients in this study were either overweight or obese, accounting for 69.8% of all patients. The same has been reported in Tanzania.⁴⁰ Being obese or overweight has been found to have a negative influence on compliance resulting to patients not following dietary advice or fear of weight gain associated with medication use.⁴¹

In the present study, finding that compliance rates were higher among patients aged between 51 and 60 years and those having family support may be due to these patients are more likely to visit health care facilities and having support more than others.

Compliance was higher among patients treated with insulin may be due to the dangerousness of the disease and depending on others who remind patients. This agrees with what has been reported by others.^{42, 43} In contrast, others reported that compliance was higher among those treated with oral hypoglycemic than insulin.⁴⁴

The study has few limitations including the possibility of recall bias as a result of subjective nature of data on drug compliance in the questionnaire. Also, self-reported questionnaires utilization greatly lead to overestimation of compliance. Inclusion of diabetic patients attending primary health care center only is another limitation which could influence the generalizability of the results. Finally, we did not include reasons for non-compliance in the present study. However; among strengths of this study is the fact that the self-reported compliance level was confirmed with HbA1c values.

In conclusion, the self-reported medication compliance in the current study was high. It was associated with demographic factors such as age, sex, marital status and educational level as well as factors related to diabetes such as duration, presence of complications and more of therapy. Further larger-scale study is recommended.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

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Cite this article as: Mohammad AA, Tawfiq AS, Maha AH, Shrouq AA, Wesal IA, Ahmed MA, Khalid KAA. Compliance of Type 2 Diabetic Patients to Its Management: A Cross-Sectional Survey. *Int J Med Res Prof*. 2017; 3(1):146-52.

DOI:10.21276/ijmrp.2017.3.1.028