Adherence of Patients with Diabetes to a Lifestyle Advice and Management Plan in Basra, Southern Iraq

Rawnaq Adil Aladhab^a Majid Hameed Alabbod^{b, c}

^aDepartment of Pharmacology and Toxicology, College of Pharmacy, University of Basrah, Basrah, Iraq;

^bThe Specialized Endocrine and Diabetes Center, Alkawani Teaching Hospital, Basrah, Iraq;

^cAlzahraa Medical College, University of Basrah, Basrah, Iraq

Keywords

Diabetes · Adherence · Therapy · Diet · Physical activity

Abstract

Background: Poor adherence to treatment regimens is a complex problem, especially for those with chronic illnesses. Noncompliance is believed to be the most common reason for treatment failure in diabetic patients, leading to the absence of metabolic control and accelerating disease-related complications. Data on the adherence of people with diabetes in Iraq are lacking. **Objectives:** The purpose of this study was to measure the rate of adherence among Iraqi patients with diabetes. **Methods:** This was a cross-sectional study conducted in the Specialized Endocrine and Diabetes Center in Basra, southern Iraq, during the period from June to August 2018. Data were collected by completing an interviewing questionnaire consisting of 13 questions. **Results:** A total of 231 patients were included in the study (54.5% were female). Mean age was 51.85 ± 13.55 years. 65.4% of the participants were taking their medications at the right times. The most common reason for not taking their medication (48.8%) was difficulty in remembering the dosage times. 40.7% of the participants were sedentary. Only one-third of the patients followed their doctors' instructions regarding diet. **Conclusions:** The rate of adherence to medication reg-

imens and lifestyle advice was unsatisfactory in this study group. The awareness of diabetic patients and their caring physicians about the importance of adherence to therapy, exercise, and diet should be emphasized.

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Introduction

The prevalence of type 2 diabetes is increasing globally and has become a serious public health problem [1]. The worldwide prevalence of type 2 diabetes is predicted to rise from 425 million people in 2017 to 629 million people by 2045 [2]. Furthermore, diabetes is presently among the 5 highest causes of death in most high-income countries; it resulted in 4.6 million deaths internationally in 2011 [3]. Half of patients with type 2 diabetes fail to achieve adequate glycemic control, i.e. glycated hemoglobin (HbA_{1c}) <7% [4].

Effective management of diabetes depends on patients' self-care [5]. Compliance may be a key part of health care and affects all areas [6]. Poor adherence to treatment regimens is a complex problem, especially for those with chronic illnesses, and it is undermining the advantages of medical care considerably [7].

Table 1. Basic characteristics of the 231 participants

Variable	N	%
Age group		
18–29 years	12	5.2
30–39 years	28	12.1
40–49 years	39	16.9
50–59 years	89	38.5
60–69 years	37	16
≥70 years	26	11.3
Gender		
Male	105	45.5
Female	126	54.5
Marital status		
Married	198	85.7
Single	15	6.5
Divorced	3	1.3
Widowed	15	6.5
Residence		
Rural	91	39.4
Urban	140	60.6
Education		
Illiterate	55	23.8
Primary school	79	34.2
Secondary school	88	38.1
College and above	9	3.9
Monthly income		
Low	165	71.4
Medium	61	26.4
High	5	2.2
Duration of diabetes		
<5 years	80	34.6
5–9 years	65	28.1
10–14 years	53	22.9
≥15 years	33	14.3
Type of diabetes		
Type 1	27	11.7
Type 2	204	88.3
Treatment of diabetes		
Diet	5	2.2
Oral antidiabetic	115	49.8
Insulin	35	15.2
A combination (oral + insulin)	76	32.9

There are different definitions of compliance; one is the degree to which the patient's real history of drug administration corresponds to the prescribed regimen [8]. Another is the degree to which a patient's conduct, in terms of taking their medication, following a recommended diet, or implementing lifestyle changes, goes along with medical advice [9]. Noncompliance is believed to be the most common reason for treatment failure. In addition, noncompliance leads to the absence of meta-

Table 2. Compliance of diabetic patients and reasons for noncompliance (*n* = 231)

	N	%
Taking medication on time		
Yes	151	65.4
No	80	34.6
Reasons for not taking medication at the right time		
Cost	5	6.3
Drug unavailability	11	13.8
Difficult to remember	39	48.8
Because of my job	6	7.5
I don't care	13	16.3
Insulin was ineffective	6	7.5
Total	80	100
Activity level		
Sedentary	94	40.7
Mild	50	21.6
Moderate	62	26.8
Active	25	10.8
Adherence to dietary instructions		
Yes	88	38.1
Sometimes	61	26.4
No	82	35.5

bolic control which contributes to the development and acceleration of diabetes complications [10–12].

Adherence rates are typically lower for patients with chronic conditions than for those with acute conditions [13]. Such decreased adherence not only results in unwanted health outcomes, it also has a significant impact on the cost of healthcare [14].

There are several techniques used to measure compliance; self-reports and interviews with patients are considered the most common techniques for this purpose [15]. There are several studies from different parts of the world that have tried to measure the treatment compliance of people with diabetes. However, data from Iraq are lacking. Therefore, we conducted a questionnaire-based interview with patients afflicted by diabetes to measure the rate of their adherence to lifestyle and management advice supplied by their health care providers.

Design and Methods

This was a cross-sectional study conducted on patients with diabetes attending the Specialized Endocrine and Diabetes Center in Basra, southern Iraq, during the period from June to August 2018. All people with diabetes attending the center on the day of

Table 3. Relationship between educational level of participants and physical activity ($n = 231$)

Education	Physical activity				
	sedentary	mild	moderate	active	total
Illiterate	33 (60.0)	9 (16.4)	8 (14.5)	5 (9.1)	55 (100)
Primary school	32 (40.5)	16 (20.3)	26 (32.9)	5 (6.3)	79 (100.0)
Secondary school	27 (30.7)	23 (26.1)	24 (27.3)	14 (15.9)	88 (100.0)
College and above	2 (22.2)	2 (22.2)	4 (44.4)	1 (11.1)	9 (100.0)
Total	94 (40.7)	50 (21.6)	62 (26.8)	25 (10.8)	231 (100.0)

Values represent n (%). $p < 0.05$.

Fig. 1. Relationship between age and physical activity ($p = 0.000$).

the interview who agreed to participate in the study were included after taking an informed consent from each participant.

The data were collected for each patient by completing an interviewing questionnaire. The questionnaire was validated. Data were collected by face-to-face interviews with the patients by the investigators. There were 13 questions and the following data were collected: age, gender, address, marital status, smoking, educational level, monthly income, type and duration of the diabetes, and treatment type (insulin, an oral antidiabetic drug [OAD], or a combination of the 2).

The other part of the questionnaire was about compliance regarding taking their medications as prescribed and on time, adherence to a dietary regimen as advised by the health care provider, questions about self-care and physical activity, and recording the level of HbA_{1c} from the last visit. Finally, the participants were asked about the frequency of HbA_{1c} measurements and their self-monitoring of blood glucose (SMBG) at home.

Patient adherence to medications was measured by the recall method and recording the number of missed doses over 15 days prior to the date of the interview. Failure to take >2 doses over the last 15 days was considered as nonadherence. All the participants had received a written dietary plan as part of the usual care provided at the center prior to the interview. Physical activity was classified as the following: active for those who exercised for ≥ 30 min/

day, moderate for those who exercised for 15–30 min/day, mild for those who exercised for <15 min a day, and sedentary for those who do not exercise at all.

Statistical Analysis

Categorical variables are presented as frequencies and percentages. Numerical variables are reported as the mean $\pm$ standard deviation. The χ^2 test was used to test the correlation between variables except for tables with small frequencies, where the Fisher exact test was used. $p < 0.05$ was considered significant. Data analysis was performed by means of SPSS for Windows (Statistical Package for Social Sciences) v25.

Results

A total of 231 patients were included in the study. Of these, 54.5% were female. The participants' age ranged from 18 to 91 years (mean 51.85 ± 13.55 years). Those in the age group of 50–59 years represented 38.5% of the participants. Those from urban areas represented 60.6%. The majority of the patients were married (85.7%). Illit-

Fig. 2. Relationship between gender and physical activity ($p = 0.036$).

Fig. 3. Relationship between type of diabetes and physical activity ($p = 0.006$).

Table 4. Relationship between monthly income and whether not patients followed dietary advice ($n = 231$)

Monthly income	Followed dietary advice			
	yes	sometimes	no	total
Low	53 (32.1)	45 (27.3)	67 (40.6)	165 (100)
Medium	32 (52.5)	14 (23)	15 (24.6)	61 (100)
High	3 (60)	2 (40)	0 (0)	5 (100)
Total	88 (38.1)	61 (26.4)	82 (35.5)	231 (100)

Values represent n (%). $p = 0.013$.

Table 5. Relationship between monthly income and physical activity in 231 patients

Monthly income	Physical activity				
	sedentary	mild	moderate	active	total
Low	78 (47.3)	32 (19.4)	40 (24.2)	15 (9.1)	165 (100)
Moderate	14 (23)	17 (27.9)	20 (32.8)	10 (16.4)	61 (100)
High	2 (40)	1 (20)	2 (40)	0 (0)	5 (100)
Total	94 (40.7)	50 (21.6)	62 (26.8)	25 (10.8)	231 (100)

Values represent n (%). $p = 0.025$.

eracy was prevalent in 23.8%. Approximately two-thirds of the participants had a low income. Patients with type 2 diabetes comprised 88.3%. Half of the participants were on an OAD (Table 1).

We found that 65.4% of the participants were taking their medications at the right time. The most common reason for not taking their medication (48.8%) was the difficulty of remembering the dosage times. Regarding physical activity, 40.7% of the participants were sedentary and only 10.8% were active. Only one-third of the patients followed their doctors' instructions regarding diet (Table 2).

On further analysis of the data, we found that half of the patients in the age group of 18–29 years were active compared to 11.4% in the age group of 40–49 years (Fig. 1).

Illiterate patients were more likely to be sedentary than those who had finished secondary school or college ($p <$

0.05; Table 3). Furthermore, males were more likely to be physically active than females, and those with type 1 diabetes more than those with type 2 diabetes (Fig. 2, 3).

We found that participants with a high monthly income were more likely to follow dietary advice ($p < 0.05$; Table 4). Those with an average income tended to be more active than those with a high or low income ($p < 0.05$; Table 5).

There was no significance relationship between age, gender, residential area (urban/rural), type and duration of diabetes, income, type of medication, or education level, and whether a patient took their medication on time. Similarly, there was no significant relationship between age, gender, residential area, type and duration of diabetes, or education level, and following their dietary instructions. Likewise, residential area and duration of diabetes had no effect on physical activity.

Discussion

This study was conducted in the Specialized Endocrine and Diabetes Center in Basra, Southern Iraq on 231 diabetic patients to assess their compliance to diabetes management.

We found that approximately two-third of the participants were taking their medication at the right times. This is similar to 2 studies from Egypt and Saudi Arabia which revealed that about 57 and 67.9% of patients always took their medications, as prescribed and on time, respectively [16, 17]. This rate is unsatisfactory and represents a challenge in achieving treatment goals, and thus plays a major role in the failure to achieve a target HbA_{1c}. Difficulty remembering the dosage time was the reason for not taking medication on time in about half of the participants in our study. This reflects the importance of using less complicated treatment regimens such as those with fewer pills and fewer insulin injections. This may be achieved by using single or twice-daily basal or biphasic insulin instead of basal-bolus insulin, if possible. Likewise, the use of combination pills instead of multiple separated pills is preferable.

In contrast to our study, greater adherence to therapy was demonstrated in studies conducted in southern India and the UAE, i.e., 84 and 83.6%, respectively [18, 19].

An interesting finding in this study was the low rate of adherence to dietary and physical activity advice. Only 38.1 and 10.8% of the participants followed the prescribed diet and exercise schedule, respectively; this is similar to the results of 36.4 and 27.0%, respectively, in Mukherjee et al. [20]. This may have been due to the lack of awareness among the patients about the importance of lifestyle in diabetes management, and that diet and exercise with pharmacotherapy represent the triangle of this management. It could also be attributed to the failure of health care providers to emphasize the importance of these 2 measures in the management plan.

As expected, younger patients tended to be more active than older ones. This was clearly due to the greater presence of comorbidities such as cardiovascular disease and joint problems in the elderly.

There was a significant association between physical activity and the level of education. As the level of education increased, the physical activity increased. Educated people are more aware of the health benefits of physical activity. This is in line with Gimenes et al. [21], who found that highly educated patients were more adherent to therapy and physical activity advice.

Following dietary advice was significantly lower among those with a low monthly income. This is similar

to the study by Mukherjee et al. [20]. Following a special diet is usually more expensive than eating ordinary available food and this can add to the cost burden for patients with diabetes.

Similarly, there was a significant relationship between gender and physical activity. Males were more physically active than females. In a typical Middle Eastern community, exercise is considered inappropriate for women and there are cultural constraints that prohibit females from exercising in public. Similar to Gimenes et al. [21], we found a significant relationship between age and physical activity. Elderly people are more likely to be physically inactive due to a lack of energy, the presence of comorbidities, and musculoskeletal problems.

Regarding the effect of gender on patients' compliance to drug therapy, no difference was demonstrated in our study. This is in line with Arifulla et al. [18].

Surprisingly, there was no significant relationship between the duration of diabetes and adherence to drug therapy. This contrasts with the common belief that the longer the duration of the chronic disease, the lower the adherence rate.

The strength of this study is the large study sample and that it is the first study from Iraq to measure the adherence of people with diabetes, not only to their medications, but also to their lifestyle advice and follow-up plan. There are several limitations. First, it was conducted in a single center; second, it was a questionnaire-based study; and third, there was the possibility of recall bias by the patients.

Conclusion

We found that the adherence of the patients to medication and lifestyle advice was unsatisfactory. Not remembering the dosing time was the single most important cause for poor adherence to therapy. We recommend increasing the awareness of people with diabetes about the importance of good control achieved by adherence to their therapy as advised by their health care provider as well the importance of regular exercise and diet. Physicians should prescribe simpler insulin regimens such as single or twice-daily doses of basal or premixed insulin, if possible, and use combination tablets instead of multiple OAD. Our findings may represent a baseline data for future larger studies or to test the effect of implementing the recommended measures on improving the adherence rate.

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Statement of Ethics

This study was approved by the ethics committee of Basra Health Directorate with the approval No. 286 on 18/4/2018. The authors have no ethical conflicts to disclose.

Disclosure Statement

No conflicts of interest relevant to this article were reported.

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Author Contributions

R.A.A. and M.A. designed the study, collected and interpreted the data, performed the statistical analysis, and wrote the paper.

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