

Patients' Adherence to Anti-Diabetic Medications in a Hospital at Ajman, UAE

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Abstract

Background: Anti-diabetic medications are integral for glycemic control in diabetes. Non-adherence to drugs can alter blood glucose levels, resulting in complications. Adherence to anti-diabetic medications reported by patients and the factors associated with medication adherence among adult patients with diabetes mellitus were explored.

Methods: This cross-sectional study was carried out among patients with type II diabetes mellitus attending the Internal Medicine Department of a hospital in the United Arab Emirates. Consecutive patients were selected, and data regarding their medication adherence were collected using a questionnaire. Data analysis was carried out using SPSS-20. The chi-square test was performed to examine the associations between categorical variables; a two-sided *P* Value < 0.05 was considered significant.

Results: A total of 132 patients participated in the study (63 males; 69 females). The mean age (standard deviation) of the respondents was 54 years (SD 10.2). The self-reported adherence rate to anti-diabetic drugs was 84%. The most common reason for non-adherence was forgetfulness, and the adherence rate was similar in both genders. Patients with Bachelor's and Master's degree reported greater adherence rate to anti-diabetic medication in comparison to the secondary school educated.

Conclusion: The self-reported adherence rate to anti-diabetic medications was 84%, and forgetfulness was the most common reason for non-adherence. Future studies on strategies to improve adherence rate should be considered.

Keywords: anti-diabetic drugs, compliance, diabetes mellitus, patient-physician relationship, patient adherence

Introduction

The prevalence of diabetes mellitus is increasing dramatically, with approximately 171 million people worldwide currently diagnosed with diabetes and 350 million adults likely to be diagnosed with diabetes by 2030 (1). In the United Arab Emirates (UAE), the prevalence of diabetes is approximately 20%, which is expected to reach 22% by 2025 (2). The prevalence of diabetes is higher in UAE citizens (25%) than in expatriates (13–19%), varying with the country of origin (3).

Anti-diabetic drug therapy plays a pivotal role in the glycemic control of patients with diabetes.

Medication adherence or compliance is the extent to which an individual is taking their medication as instructed by a health care professional (4). Patients with chronic illnesses often experience difficulty in adhering to treatments recommended to them and consequently do not always receive optimal benefit from their prescribed drug therapy.

Suboptimal treatment can result in disease related complications, increased use of health care services, decreased quality of life and increased health care costs (4–8). In 2003, the World Health Organization emphasised that “increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatment” (4). Previous studies have demonstrated that non-adherence to anti-diabetic medications can result in poor glycemic control and can consequently lead to complications associated with disease progression, hospitalisation, pre-mature disability, and mortality (2,6,9,10).

Identification of the factors leading to non-adherence to a prescribed treatment can assist in planning interventions to overcome these barriers. Few studies on anti-diabetic medication adherence have been reported from the UAE. Hence, the present study was carried out to assess patient adherence to their anti-diabetic drug therapies and the factors associated with adherence among adult patients with diabetes attending the department of Internal Medicine in a hospital in Ajman, UAE.

Materials and Methods

This cross-sectional study was conducted among patients with type II diabetes mellitus attending the outpatient department of Internal Medicine in a hospital from January to March 2011. A structured, researcher administered questionnaire with both open-ended and closed-ended questions was used to record the patient responses. The questionnaire was devised by the investigators, and the content and face validity of the questionnaire was established by the subject experts. A pilot study was conducted before the commencement of the study and suitable modifications were made to the questionnaire (Figure 1).

The questionnaire included socio-demographic characteristics, details of anti-diabetic medication adherence, and reasons for non-adherence. The questions regarding medication adherence and related factors included: “do you take the anti-diabetic drugs as advised by your doctor?”, “What are the reasons for non-adherence to the medications prescribed?”, “Do you make your own modifications to the doses of drugs prescribed?”, “Do you make your own modifications to the timing of the administration of your anti-diabetic drugs?”, “Do you regularly

monitor your blood glucose levels?”, “Did your physician give you information about diabetes?”, “Did your physician give you information regarding anti-diabetic medications?”, “Were you involved in the process of treatment decision-making?”, and “Were you comfortable enough to ask your doctor drug related questions?”.

Consecutive patients with type II diabetes on anti-diabetic medications for at least two months and irrespective of their nationality were included. Patients who were not willing to participate in the study were excluded. The adherence to dosage regimens of oral anti-diabetic medications was determined for sulfonylureas, biguanides, gliptins, and alpha-glucosidase inhibitors.

Considering the feasibility of the research in terms of time and cost, self-reported medication adherence by patients was the method used for measuring adherence rates. Moreover, it has been reported that the estimation of adherence rates by different methods provides similar estimates of overall adherence (11). The primary outcome measure used in this research was the adherence rate for anti-diabetic medications.

Ethics/ethical approval was obtained from the Institutional Ethics Committee before the initiation of the study. Informed consent was obtained from the participants prior to the administration of the questionnaire. A pilot study was conducted on 15 patients before finalising the questionnaire.

Data analysis was carried out using SPSS, version 20 (IBM, Heliopolis, Cairo, Egypt). Pearson’s chi-square test was performed to examine the association between a patient’s characteristics and adherence status. A two-sided *P* value less than 0.05 was considered statistically significant.

Results

A total of 132 patients were interviewed; 63 males and 69 females. The mean age of the subjects was 54 years (SD 10.2), with a minimum and maximum age of 28 and 88 years, respectively. The education profile of these patients revealed that 106 participants (80.3%) were graduates (with Bachelor’s degree), 11 (8.3%) were postgraduates (with Master’s degree) and 9 (6.8%) completed education up to secondary school. A total of 89.4% of the patients included in the study were married. Twenty-five (18.9%) patients were younger than 45 years of age, 67 (50.8%) were between 45 and 60 years of age and 40 (30.3%) were older than 60 years of age.

Approximately 111 (84%) of the patients self-reported adherence to their anti-diabetic drug regimens. The proportion of male patients adherent to their anti-diabetic medications was found to be higher (87.0%) compared to the female patients (81%), but the difference was not statistically significant (Table 1). Adherence to anti-diabetic drugs was found to be higher among graduates (Bachelor's degree) (85.6%) and post-graduates (Master's degree) (84.6%) compared to those with education up to school (69.2%), but this finding was not statistically significant. It was also noted that patients with a duration of diabetes \leq 5 years were more compliant to their medication than those with diabetes $>$ 5 years, which was found to be statistically significant ($P = 0.048$).

A total of 66.7% of the participants ascribed

their non-adherence to forgetting to take their medications. Lack of finances and interference with food were the other factors that were noted to contribute to non-adherence (Table 2).

Of the total population, 98% of the patients reported that they monitored their blood glucose levels on a regular basis. Self-modification of the dose and timing of the drugs was reported to be negligible ($< 1\%$). Approximately 130 (98.4%) of the patients stated that their physician had provided information regarding their disease and their anti-diabetic medications, including the timing of doses and the possible side effects. A good number of patients, 103 (78%), reported that their physician involved them in treatment decisions. Approximately 125 (94%) patients felt that they felt comfortable enough to ask their physicians any drug related queries.

Factors Associated With Patients' Adherence To Anti-Diabetic Medications

I. Baseline characteristics:

Age: Gender: Male/Female Education: Occupation: Nationality: Marital status:

II. Profile of Diabetes Mellitus

1. Duration of diabetes mellitus 2. Age at onset:: 3. Family history of diabetes: Yes/No

III. Patient adherence to drug therapy

1. Do you take the anti-diabetic drugs as advised by your doctor? Yes/No If No, please tick the options []

Items	Yes	No	Items	Yes	No
Lack of finance			Side effects		
Feeling drug is not effective			Feeling the dose given is high		
Interferes with my meal plan			Complexity of drug regimen		
Taking them since many years			Multiple medications		
I forget			Poor family support		

Items	Yes	No
Do you regularly monitor your blood glucose?		
Do you make your own modification in the dose of drugs prescribed?		
Do you make your own modification in the timing of anti-diabetic drugs?		
Do you have good knowledge about anti-diabetic medications prescribed to you?		
Do you know the importance of anti-diabetic medication		
Did your physician give information on diabetes		
Did your physician give information on anti-diabetic medications		
Were you involved in treatment decisions		
Do you feel comfortable to ask questions to your doctor		

Figure 1: Questionnaire on factors associated with patients' adherence to anti-diabetic medications.

Table 1: Patient characteristics and adherence to their anti-diabetic medications

Characteristics		Adherence		Total	P value
		Yes (%)	No (%)		
Gender	Male	51 (81.0)	12 (19.0)	63	0.346
	Female	60 (87.0)	9 (13.0)	69	
Education	Secondary Schooling	9 (69.2)	4 (30.8)	13	0.302
	Graduate (Bachelor's Degree)	91 (85.8)	15 (14.2)	106	
	Postgraduate (Master's Degree)	11 (84.6)	2 (15.4)	13	
Marital status	Married	97 (82.2)	21 (17.8)	118	0.065
	Unmarried/Widow/Divorced	6 (50)	6 (50)	12	
Age	< 45 years	23 (92.0)	2 (8.0)	25	0.431
	45–60 years	56 (83.6)	11 (16.4)	67	
	> 60 years	32 (80.0)	8 (20.0)	40	
Duration of diabetes	≤ 5 years	94 (87.0)	14 (13.0)	108	0.048
	> 5years	17 (70.8)	7 (29.2)	24	

Table 2: Common self-reported reasons for non-adherence to recommended treatment, *n* = 21

Items	No	Percentage
Forgetfulness	14	66.7
Lack of finance	5	23.8
Interferes with my meal plan	3	14.3
Multiple medications	2	9.5
Too busy	2	9.5
Feeling drug is not effective	1	4.8
Side effects	1	4.8
Complexity of drug regimen	1	4.8

Discussion

This investigation among patients with type II diabetes evaluated the patients' self-reported adherence to their anti-diabetic drug therapy. The prevalence of adherence to anti-diabetic medications in the present study was 84%. In comparison to this finding, a cross-sectional survey conducted by Grant et al. showed that the patients' self-reported adherence rate to anti-diabetic medications was 95.7% (12) and a retrospective cohort study by Donnan et al. (13) reported an adherence rate of 90%. Two other studies by Gimenes et al. (14) and Tiv et al. (15) documented lower self-reported adherence rates of 78.3% and 39% to anti-diabetic medications. In Schectman et al (16), the adherence rate, as measured by prescription refill data from the pharmacy, was 79.7%.

The adherence rates were similar in both genders in the present study. In contrast, Gimenes et al. documented non-adherence to be more common among male patients (12). With regard to the educational level, higher adherence rates were noted among patients with graduation (bachelor's degree) and postgraduation patients (master's degree) were found to be the most compliant to the prescribed treatment in our study. As the complexity of the diabetes drug therapy increases, patients are required to understand the prescribed drug therapy to adhere to treatment, hence it would be better understood by those with higher educational profiles.

The prevalence of adherence was reported to be higher among patients with ≤ 5 years of diabetes. This finding was consistent with Giemens et al. (14), indicating a negative relationship between the duration of diabetes and patient adherence to

drug therapy (14). During the early years of the disease, patients tend to show more adherence to keep their blood glucose under control, and after years of suffering with the disease, the attitude towards the disease and the related medications may change, compromising drug compliance.

The most common reasons stated for the non-adherence to medications were modifiable factors that could be overcome by adopting suitable measures. Forgetfulness was the most commonly mentioned reason for non-compliance, similar to the findings of Adisa et al. (17) from Nigeria. In contrast, Grant et al. (12) and Jayant et al. (18) reported drug related adverse effects as the main causal factor for non-adherence to anti-diabetic medications. This barrier can be overcome by assisting patients in organising their medications with pillboxes and dosing alarms. Family members can assist in medication adherence in the elderly and in those taking multiple medications. A meta-analysis by Schroeder et al. (19) showed that interventions such as reducing the number of daily doses are effective in improving adherence rates by up to 23%.

Lack of finances was another self-reported reason stated by the participants for their non-adherence to anti-diabetic medications. Studies focusing on chronic diseases have also reported that the unaffordability of the prescribed medications is one of the key factors influencing patient adherence to a drug regimen (17,20).

More than 95% of the respondents in this study reported that they monitor their blood glucose levels regularly. In comparison to previous studies with similar study design, this finding was similar to the findings of Grant et al. (12); however, an exception was the report from Nigeria, where the majority of the participants did not monitor their blood glucose levels on a regular basis (17). The practice of self-monitoring of blood glucose levels by patients is indicative of their commitment to diabetes management. This was likely one of the reasons for the good self-reported adherence rate of 84% observed in the study.

It was observed that the majority of the patients in the study agreed that their respective doctors had given them adequate information regarding the disease and medications and involved them in treatment decisions. The involvement of patients in the choice of treatment motivates them and provides them with the opportunity to raise their concerns about the drug prescribed and improve their adherence to the prescribed therapy (14,20–22).

The limitations of this study include those

pertaining to questionnaire-based studies, such as the subjective nature of the data on medication adherence, which may be influenced by recall bias. However, self-reported questionnaires have frequently been used in research due to their feasibility with regards to cost and time expenditure. The non-generalisability of the results is another limitation of the study. The patients' responses, such as forgetfulness or omission of medication doses, are only a subjective measure of the patients' non-adherence; in comparison, a patient diary or pill counts are objective methods to account for drug adherence. The self-reported adherence rate was not confirmed with blood glucose levels or HbA1c values. The adherence rate in different dosage regimens such as once, twice or thrice daily dosing was not assessed in this study.

Conclusion

In conclusion, the medication adherence rate in the present study was 84%, although the exact estimate of adherence may not be accurately depicted, as this is a small cross-sectional study; future large-scale studies are needed. Forgetfulness was the most common reason for non-adherence, which can be overcome by pillboxes, alarms and assistance by family members. Furthermore, an adherence program can be a multipronged approach with initiatives from the patients to strictly adhere to the recommended treatment and health care providers by providing patient education and cost-effective treatment.

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Conflict of Interest

None.

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Authors' Contributions

Conception and design and final approval of the article: MA

Analysis and interpretation of the data: LJJ, JS

Drafting of the article: LJJ, JM, SAB
 Critical revision of the article for the important intellectual content: MA, LJJ, JS, JM
 Provision of study materials or patient: SAB
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