

Medication Adherence and its Predictors among Type 2 Diabetes Mellitus Patients: A Cross-Sectional Study

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Abstract

Medication adherence is vital in managing noncommunicable diseases like diabetes. Illness perception and an individual's knowledge regarding the disease may influence medication adherence. The present study aimed to assess the prevalence and predictors of medication adherence among type 2 diabetic patients. A cross-sectional study was conducted among 400 diabetes mellitus patients attending an outdoor patient department (OPD) of a tertiary care hospital in North India. Brief Medication Questionnaire (BMQ) and Brief Illness Perception Questionnaire (B-IPQ) were used to study medication adherence and illness perception, respectively. Descriptive and analytic statistics were computed using Epi Info software for Windows (CDC, Atlanta, GA, USA). The prevalence of medication adherence was 79.5% (82/400). The odds of medication adherence increased with higher age (odds ratio [OR] = 1.8 [1.1–2.9]) and more duration of illness (OR = 1.8 [1.0–3.2]). Patients having good knowledge of diabetes were more likely to adhere to medications. [OR=1.8(1.1-3.1). Diabetes medicine-adherent patients had a higher perceived understanding of the disease, felt having lesser negative consequences, and were less concerned about the illness than their counterparts. A high proportion adhered to diabetes medication. The guiding factors to further improve medication adherence are age, duration of illness, illness perception, and knowledge regarding the disease.

Keywords: Diabetes mellitus, illness perception, knowledge, medication adherence

INTRODUCTION

Diabetes mellitus is a noncommunicable disease. It affects many people around the world. According to the World Health Organization (WHO), around 400 million people worldwide have diabetes.^[1] The International Diabetes Federation (IDF) estimated that the global prevalence of diabetes is 10.5%, and the majority of them are living in developing countries.^[2] In India, nearly 1.5 million deaths are attributed to diabetes alone. The massive burden of diabetes in our country makes it the diabetes capital of the world. Interestingly, the prevalence of diabetes has been steadily increasing over the past few years.^[3]

Medication adherence is the extent to which a patient takes medicine as directed by the physician. Medication nonadherence increases the risk of severe and life-threatening complications, including heart disease, stroke, end-stage renal disease, vision loss, and foot gangrene. In addition, medication nonadherence is associated with an increased probability of hospital admission, thus increasing the workload of the existing health-care system. The possible reasons for

medication nonadherence include forgetfulness, inability to purchase medicine, and perception that the disease is not life-threatening.^[4] Illness perception is how a patient conceptualizes a particular disease condition. This includes his/her understanding of the disease and the consequence of illness. Positive illness perception is vital for appropriately managing a disease condition.^[5] Another essential variable for promoting medication adherence is knowledge regarding the disease. Good knowledge of the disease means a better understanding of the consequences of nontreatment and more trust in physicians, ultimately improving medication adherence.^[6]

Chandigarh, a city of North India, is home to the highest number of diabetic patients in India, according to a study

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conducted by the Indian Council of Medical Research-India Diabetes.^[7] A study in Punjab state using the WHO STEPS survey reported that one-third of people with diabetes have controlled blood glucose status, implying poor compliance with medications. Therefore, understanding medication compliance is essential for reducing diabetes-related complications, thereby improving their quality of life.^[8] Against this background, the present study was done to study the prevalence of medication adherence among diabetic patients and whether sociodemographic factors, illness perception, and knowledge regarding the disease predict medication adherence.

MATERIALS AND METHODS

This cross-sectional survey was conducted among type 2 diabetes mellitus patients attending the medicine outpatient patient department (OPD) of Government Medical College and Hospital, Chandigarh. The study was carried out over 3 months (March–May 2022). The inclusion criteria were adults aged ≥ 18 years and patients on antidiabetic medication for at least the past 1 year. A sample size of 407 was calculated based on the presumption of the prevalence of diabetes medication adherence as 60%,^[9] a confidence interval of 95%, a study power of 80%, and a nonresponse rate of 10%. The desired sample size was enrolled from the hospital's outpatient department using a convenience sampling methodology. A study participant was considered to suffer from type 2 diabetes mellitus based on his/her medical records when visiting OPD. An intern doctor was trained in administering the questionnaire to the participants. The intern approached the diabetic patients in the OPD waiting area while they waited for their turn to be seen by a doctor. They were provided with the requisite information regarding the study using a patient information sheet, after which written informed consent was obtained.

Medication adherence was assessed using Brief Medication Questionnaire (BMQ). It is designed to measure the presence or absence of self-reported nonadherence. BMQ consists of four screens: regimen, beliefs, recalls, and access. The regimen screen contains five questions regarding a patient's behavior of taking medications. Each question carries 1 point, and a total score of ≥ 1 indicates the presence of "nonadherence." The remaining subscales indicate the presence or absence of a barrier, namely, belief (drug effects and their bothersome features), recall (potential difficulties in remembering pills), and access (problems in getting a refill of medications in time and hard-to-pay for medicine).^[10] These subscales contain two questions each, with 1 point for each question. A total score of >1 in any of these screens indicated the existence of that barrier to diabetes medication. Knowledge assessment of diabetes was done using a pretested structured eight-item questionnaire having the options of "yes" or "no." One mark was awarded for each correct answer. The total score was obtained by adding the eight items. A score from 0 to 3 was categorized as poor knowledge and from 4 to 8 as good knowledge. The Brief Illness Perception Questionnaire (B-IPQ) was used to study the illness perception of study participants.

This scale includes items regarding patients' perception/belief of the disease affecting their life, duration of illness (timeline), control over the condition (personal control), the effectiveness of treatment (treatment control), the experience of symptoms (identity), worry about their health (concern), degree of comprehension (understanding), and emotional aspects (emotional). Each item ranges on a scale from 0 (minimum) to 10 (maximum). Items 3, 4, and 7 were reverse-scored to facilitate the interpretation and added to items 1, 2, 5, 6, and 8 to compute the total score. A higher total score reflects a more threatening view of the illness.^[11]

The independent variables included in this study were age, gender, marital status, type of family, suffering from a comorbid condition (hypertension, heart disease, chronic kidney disease), and duration of diabetes (< 10 years to denote the comparatively lesser duration of disease and > 10 years to denote the comparatively higher duration of disease). Current substance use was defined as either smoking tobacco, chewing smokeless tobacco, or drinking alcohol at least once in the 30 days preceding the interview. The data was analyzed using Epi Info software for Windows (CDC, Atlanta, GA, USA). Descriptive statistics were computed. Chi-square test of significance and *t*-test were used to study the association between dependent and independent variables. A *P* value of < 0.05 was considered statistically significant. Approval was obtained from the ethics committee of Government Medical College and Hospital, Chandigarh (GMCH/IEC/678/2022/15). After data collection, every patient was counseled to improve and maintain medication adherence.

RESULTS

A total of 400 diabetes mellitus patients participated in the study (response rate 98.2%). The mean age of study participants was 54.6 years (standard deviation [SD] = 11.5 years), and the mean duration of the disease was 9.2 years (SD = 7.5 years). There were 185 males (46.3%), 17% were illiterate, and 84.5% were married individuals. Regarding comorbidities, 52.3%, 12.8%, and 4.8% suffered from hypertension, heart disease, and chronic kidney disease, respectively. The prevalence of current tobacco use was 7% (28/400), while 4.3% (17/400) were current smokeless tobacco users and 23.8% currently consumed alcohol.

Among the 400 study participants, 79.5% (318/400) adhered to diabetes medication. An access barrier was present in 18.8% (75/400), followed by belief barriers in 4.3% (17/400) and a recall barrier in 3.3% (13/400). A high proportion of them knew that diabetes could be prevented by a healthy lifestyle (92.3%), 69% knew about the cause of the disease, and 59.6% knew the normal fasting blood sugar level. A high proportion of study participants knew that being overweight (91.5%) and having a stressful lifestyle could lead to diabetes (83.3%). Around half of them knew that uncontrolled disease could lead to numbness of feet (50.2%), damage to kidneys (37.8%), and signs of low blood sugar (41.5%).

On the B-IPQ scale, the mean total illness perception score was 40.7 (SD = 5.5). An item-wise analysis of this scale shows that the study participants highly perceived that their illness would last for a long time (mean 8.1 ± 1.3) and that diabetes causes greater worries about their health (mean 6.2 ± 1.5). They moderately perceived that their illness causes more symptoms (mean 7.0 ± 1.8) and affects their life (mean 6.2 ± 1.8). The study participants felt that diabetes could not be effectively controlled by themselves (mean 3.7 ± 1.8), and that treatment would not be of much help in controlling the disease (mean 3.2 ± 1.6). In addition, they perceived that they had little understanding of the disease (mean 4.1 ± 2.2) and were quite emotionally detached (mean 2.4 ± 2.2).

The bivariate analysis showed no association of medication adherence with gender, marital status, and type of family. Suffering from any one comorbid condition did not influence

adherence. Further, the odds of medication adherence increased with higher age [OR =1.8 [1.1–2.9] and more duration of illness (OR = 1.8 [1.0–3.2]). Patients having good knowledge of diabetes were more likely to adhere to medications. [OR=1.8(1.1-3.1). Diabetes medicine-adherent patients had a higher perceived understanding of the disease, felt having lesser negative consequences of the disease, and were less concerned about the illness than their counterparts [Table 1].

DISCUSSION

The present study found that a high proportion of diabetics adhered to treatment (79.5%). A nearly similar finding has been reported in a study conducted in Ethiopia, wherein using BMQ, 75% of diabetic patients were found adherent to medication.^[12] A meta-analysis of studies reported that adherence to diabetic medicine ranged from 38.5% to 93.1%.^[13] A study from

Table 1: Predictors of medication adherence among the study participants

	Adherent n=318	Nonadherent n=82	Odds ratio with 95% CI	P value
Age group				
>50 years	206 (83.1)	42 (16.9)	1.8 (1.1–2.9)	0.02*
18–50 years	112 (73.7)	40 (26.3)	R	
Gender				
Male	147 (79.5)	38 (20.5)	0.9 (0.6–1.6)	0.99
Female	171 (79.5)	44 (20.5)	R	
Marital status				
Married	264 (78.1)	74 (21.9)	0.5 (0.2–1.2)	0.11
Unmarried/divorced/widowed	54 (87.1)	8 (12.9)	R	
Type of family				
Nuclear	220 (80.6)	53 (19.4)	1.2 (0.7–2.0)	0.43
Joint	98 (77.2)	29 (22.8)	R	
Duration of diabetes				
>10 years	107 (85.6)	18 (14.4)	1.8 (1.0–3.2)	0.04*
Upto10 years	211 (76.7)	64 (23.3)	R	
Current substance use				
Yes	86 (78.9)	23 (21.1)	0.9 (0.6–1.6)	0.86
No	232 (79.7)	59 (20.3)	R	
Comorbidity				
Yes	178 (81.3)	41 (18.7)	1.3 (0.8–2.1)	0.33
No	140 (77.3)	41 (22.7)	R	
Knowledge				
Good	253 (81.9)	56 (18.1)	1.8 (1.1–3.1)	0.03*
Poor	65 (71.4)	26 (28.6)	R	
Illness perception	Mean (SD)	Mean (SD)		P value
Consequence	6.3 (1.4)	5.9 (1.5)	-	0.04*
Timeline	8.1 (1.2)	7.9 (1.6)	-	0.47
Personal control	3.6 (1.7)	3.9 (2.2)	-	0.09
Treatment control	3.1 (1.6)	3.4 (1.7)	-	0.22
Identity	6.3 (1.6)	6.1 (2.3)	-	0.59
Concern	7.1 (1.6)	6.7 (2.2)	-	0.04*
Understanding	3.9 (2.1)	4.6 (2.5)	-	0.01*
Emotional	2.2 (2.2)	2.6 (2.3)	-	0.41

CI=confidence interval

Bangladesh using a structured, eight-item questionnaire reported that the prevalence of low medication adherence was 46.3%.^[14] Mishra used the Medication Adherence Rating Scale (MARS) and reported that 44% had a good adherence level.^[15] Studies conducted by Mishra in New Delhi showed that the prevalence of drug adherence among people with diabetes using the recall and pill count method was 39%.^[16] A study from a tertiary care hospital in New Delhi using the Morisky scale reported that 32.5% were found to have high adherence, while 34.5% and 33% had moderate and low adherence, respectively.^[17] This wide variation of prevalence figures reported across different studies might be due to the diverse study populations, study timing, and the varied scales used for measuring adherence.

The present study found that relatively higher age and more duration of illness were associated with better medication adherence. The possible reason may be that with time, there are more interactions with the health-care system and a better understanding of the treatment regimen and its benefits, ultimately increasing adherence. In congruence with our study finding, Ahmed in Malaysia and Islam in Bangladesh reported that younger age was associated with nonadherence to diabetes medication.^[18,19] A study reported that good medication adherence was associated with longer diabetes duration.^[20] Contrary findings have been reported by Marinho in his study, wherein it was reported that younger age was associated with better medication adherence.^[21] In our study, comorbid conditions had no relation to medication adherence. Contrary to our result, a study reported a relation between medication adherence and the number of associated comorbidities.^[20]

Knowledge about diabetes encourages patients to seek treatment, enhances disease control, and minimizes associated complications. The present study result reveals that most participants had good knowledge about the disease (77.3%). Thus there is a need to focus more on diabetes education for diabetics, especially on complications of the disease and signs and symptoms of hypoglycemia. A study conducted in Saudi Arabia reported that most patients (66.1%) had average diabetes knowledge.^[22] In our study, good knowledge was significantly associated with medication adherence. Similar to this finding, studies done by Chavan in Maharashtra, India,^[23] Alshayban in Saudi Arabia,^[24] and Sweileh in Palestine^[25] have reported that diabetic patients with better knowledge are more likely to have high adherence.

In our study, three domains of illness perception, consequences, concern, and understanding, had a significant relationship with medication adherence. This finding implies that adherent patients, because of regularly taking medicines, perceive that there will not be many harmful effects of the disease, and thus are not much concerned. A better-perceived understanding of disease means that patients feel more responsible for their health and thus take medicines regularly. In a study by Bilondi, two components of B-IPQ, namely, personal control and

understanding, had a significant relationship with medication adherence.^[26]

There are a few limitations of our study. Firstly, we did not measure fasting blood sugar to assess glycemic control, and hence could not study the correlation between adherence and control. Secondly, we did not explore how many developed disease complications, if any. The convenience sampling methodology is another limitation of this study as it may lead to bias. Another limitation of our study is that data on medication adherence was obtained by self-report and thus may be limited by underreporting or overreporting. These limitations may be addressed in future research to add rigor to diabetes medication adherence studies.

CONCLUSION

In conclusion, a high proportion of study participants adhered to the medications. This should, however, be further scaled up by regularly organizing diabetes awareness campaigns with a particular focus on comparatively younger diabetics, those with less duration of illness, and those having poor knowledge of the disease. Health-care workers, in partnership with all stakeholders such as media and nongovernment organizations, should address the medication adherence barriers, educate diabetics to improve their knowledge and maintain a positive perception of this disease. In addition, the access barrier can be addressed by linking diabetic patients to existing government facilities under the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases, and Stroke (NPCDCS), wherein diabetic patients have free quality medical care.

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Conflicts of interest

There are no conflicts of interest.

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