

# Self-reported Adherence to Medication among Patients with Type II Diabetes Mellitus attending a Tertiary Care Hospital of Delhi

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## Abstract

**Introduction:** Diabetes mellitus (DM) is becoming a potential epidemic in India with more than 62 million diagnosed diabetics and an increase of nearly 2 million per year. Poor adherence to medication regimens increases the probability of adverse outcomes in type 2 diabetes patients. Therefore, improving medication adherence is a growing priority to control this epidemic. Hence, this study was conducted to determine the level of adherence to medication in Type II diabetic patients and to study the various factors affecting adherence to medication and the relationship between the severity of diabetes with the adherence categories.

**Methods:** A cross-sectional study was conducted at medicine outpatient department (OPD) of a tertiary care hospital, New Delhi among 200 type 2 diabetic patients for duration of 2 months using a predesigned and pretested semi-structured interview schedule and diabetes medication adherence was assessed by Morisky's medication adherence scale questionnaire.

**Results:** Out of 200 participants, 32.5% were found to have high adherence while 34.5% and 33% had moderate and low adherence. Factors found to be associated with adherence were age, educational status, longer duration of disease and presence of glucometer. Almost four-fifths of the patients (79.5%) had poor plasma glucose control.

**Conclusion:** There is a need to focus on improving adherence among type 2 diabetes patients and strengthening health care systems for regular supply of medicines and provide health education to the patients and their families emphasising the need of adherence to medications.

to maintain a good glycaemic control thereby reducing the micro and macro-vascular complications of Type 2 DM.<sup>3</sup> Non-adherence or non-compliance, poverty, lack of knowledge and poor follow ups are the main factors observed in poor glycaemic control.<sup>4</sup> Poor adherence to medication regimens increases the probability of adverse outcomes in type 2 diabetes patients.

In order to address this growing concern about medication adherence, this study was conducted to determine the level of adherence to medication in Type II diabetics and to study various factors affecting adherence to medication and the relationship between the severity of diabetes with the adherence categories.

## Methods

A hospital based cross-sectional study was conducted at the medicine outpatient department (OPD) of a tertiary care hospital in New Delhi for duration of 2 months. The study subjects were diagnosed Type II diabetic patients on medication for one or more than one year (oral hypoglycaemic drugs/insulin) aged 18 years and

## Introduction

Diabetes mellitus (DM) is fast becoming a major global health problem as total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030.<sup>1</sup> By 2030, India's diabetics' population

is expected to cross the 100 million mark.<sup>2</sup> Aim of diabetes management is

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**Table 1: Socio-demographic profile of the participants (N=200)**

Characteristics		Number (Percentage)
Age (yrs)	18-40	45 (22.5)
	41-60	122 (61)
	>60	33 (16.5)
Sex	Male	74 (37)
	Female	126 (63)
Religion	Hindu	173 (86.5)
	Muslim	21 (10.5)
	Sikh	6 (3)
Education	Illiterate	60 (30)
	Just literate	14 (07)
	Primary	33 (16.5)
	Middle	34 (17)
	High/Intermediate	42 (21)
	Graduate/Post-graduate	17 (8.5)
Employment	Unemployed / retired	11 (5.5)
	Employed	88 (44)
	Homemaker	101 (50.5)
Per capita annual income	Less than 20,000	39 (19.5)
	20,001 – 40,000	72 (36)
	40,001 – 80,000	44 (22)
	More than 80,000	45 (22.5)
Socio-economic status	Upper / upper middle	53 (26.5)
	Middle	45 (22.5)
	Upper lower	91 (45.5)
	Lower	11 (5.5)

above. A convenience sample of 200 patients with confirmed diagnosis of Diabetes mellitus was selected for the study. All those patients who did not give consent were excluded from the study. Diabetic clinic is held once a week on Wednesday in the tertiary hospital. The patients attending the diabetic clinic and fulfilling the inclusion criteria were enrolled consecutively. The study tools used were a predesigned and pretested semi-structured interview schedule to study the level of adherence to medication and factors influencing it. Diabetes medication adherence was measured by Morisky's medication adherence scale (MMAS Questionnaire).<sup>5</sup> It is a 8-item structural scale. The end score of the scale >8 indicates high adherence, 6-8 medium adherence and less than 6 low adherence. Also, HbA1c levels of the adhered and non adhered patients were compared to observe the severity of diabetes in both the groups and its effect on adherence to medication.

#### Ethical consideration and confidentiality

Ethical clearance for the study was

obtained from Institutional Ethical Committee. Confidentiality of the participants was ensured and a written consent was obtained from the subjects after explaining the objectives of the study.

#### Data analysis

Data analysis was done using SPSS version 16. All observations were in terms of percentage and proportions. Test of significance were applied for comparisons wherever required. P value less than 0.05 was considered to be statistically significant at 95% confidence level.

#### Results

A total of 200 patients were included in the study out of which 74 (37%) were males and 126 (63%) were females. The mean age of the participants was 49.8 ±10.5 yrs with majority (61%) of participants belonging to 41 to 60 years age group. Nearly half of the participants (51%) belong to lower socio-economic class and one third of the participants (30%) were illiterate. Table 1 shows the socio-demographic characteristics of study participants.

Table 2 shows the clinical characteristics and adherence to medication among the diabetic patients. Out of 200 participants, 32.5% were found to have high adherence, 34.5% had moderate adherence and 33% had low adherence to diabetes medications where adherence was assessed using Morisky Medication Adherence Scale (MMAS). In this study, moderate and high adherence was considered as adherent and low adherence was considered as non-adherent.

Nearly one-third of the patients (62.5%) were diagnosed to be diabetics within last 5 years while 12% patients had diabetes for more than 10 years. All the patients were taking oral hypoglycaemic agents while 19.5% patients were taking insulin therapy as well. 55.5% patients had one or more co-morbidities with hypertension being the most common co-morbidity (49.5%) followed by neuropathy. Nearly one-fifths (22.5%) of patients were found to have normal body mass index while 20.5% patients were overweight and 57% were obese.

The socio-demographic factors that were found to be significantly associated with adherence to medications among Type II Diabetes mellitus patients

were age more than 40 years and educational status of high school and above (Table 3). Among the clinical factors, those having longer duration of disease more than 5 years had higher medication adherence and this association was statistically significant ( $p = 0.002$ ). Among the therapy related factors, presence of glucometer was found to be significantly associated with good medication adherence ( $p < 0.001$ ). Those patients spending more than Rs. 1000 per month on diabetic medications (68.7%) were found to have good medication adherence than those patients who were spending less or no amount (16.7%). Regarding health seeking behaviour, those patients who stayed at a distance of more than half an hour from hospital (80.6%) had good medication adherence as compared to those who stayed near (56%).

Table 4 shows the association between adherence to medications and status of plasma glucose control. Among 200 patients, nearly one-fifths of the patients (20.5%) had good plasma glucose control while 79.5% patients had uncontrolled plasma glucose. Those patients having good adherence (32.5%) were found to have better plasma glucose control than those having low and medium adherence and this association was found to be statistically significant ( $p = 0.015$ ).

#### Discussion

Adherence to prescribed medications is essential for metabolic control and reduced complications. The present study showed that nearly 1/3<sup>rd</sup> (32.5%) patients were adherent while the remaining two thirds (34.5% and 33%) were moderately adherent and non-adherent to anti-diabetic medications which is similar to the findings reported from a hospital in Pune where 40.95% patients had good adherence whereas 37.14% had medium adherence and 21.90% had low adherence.<sup>[5]</sup> A study on medication adherence conducted in a tertiary hospital of South India in 2015 reported non-adherence in 54.6% patients which was higher than our study findings.<sup>[6]</sup> Another study conducted in a diabetic clinic in Bangalore reported a non-adherence rate of 61% while 21% were adherent and 18% were moderately adherent.<sup>[7]</sup> Humera Sarwar *et al.* in their study conducted in different hospitals of Hyderabad reported that 14.3% patients were adherent while 45.7% and 40%

**Table 2: Clinical characteristics and adherence to medication among diabetic patients (N= 200)**

Disease related parameter	Total N (%)	High adherence (N = 65)	Medium adherence (N = 69)	Low adherence (N = 66)	
Duration of disease since diagnosis (yrs)	< 5	125 (62.5)	43	44	38
	6-10	51 (25.5)	13	17	21
	> 10	24 (12)	9	8	7
Treatment taken	Oral	200 (100)	65	69	66
	Hypoglycaemic agents (OHA)				
	OHA + Insulin	39 (19.5)	15	18	6
Family history of diabetes	Yes	96 (48)	26	35	35
	No	104 (52)	39	34	31
Glycaemic control (HbA1c)	<6.5 gm/dl	15 (7.5)	7	6	2
	6.5-8.0 gm/dl	76 (38)	26	26	24
	8.0-10.0 gm/dl	75 (37.5)	24	28	23
	>10 gm/dl	34 (17)	8	9	17
Co-morbidities	Hypertension (HTN)	99 (49.5)	32	37	30
	Ischemic heart disease (IHD)	02 (1)	02	00	00
	HTN + IHD	07 (3.5)	03	02	02
	Retinopathy	03 (1.5)	00	01	02
	Neuropathy	23 (11.5)	09	06	08
	Others	02 (1)	00	02	00
	None	89 (44.5)	27	28	34
Number of hospitalisation due to DM	None	177 (88.5)	60	59	58
	One	20 (10)	5	7	8
	>1	3 (1.5)	0	3	0
Body mass index (kg/m <sup>2</sup> )	18.5 – 22.9	45 (22.5)	15	18	12
	23 – 24.9	41 (20.5)	15	12	14
	>25	114 (57)	35	39	40

**Table 4: Association between adherence to medication and plasma glucose control (N = 200)**

Adherence pattern	Number of patients	Plasma Glucose status	
		Controlled (N, %)	Not controlled (N, %)
Good	65	20 (30.8)	45
Medium	69	14	55
Low	66	7	59
Total	200	41 (20.5)	159 (79.5)

$\chi^2 = 8.17, p = 0.017$

patients were moderately adherent and non-adherent to medications.<sup>8</sup> Another study by Shobhana *et al.* reported a very high rate of non-adherence of 75% and this difference from our study findings could be due to improved patient awareness and availability of anti-diabetic medications over the years.<sup>9</sup> Improved adherence reported in our study could also be due to the fact that half of the study population belonged to middle and upper middle class with good purchasing power and in case of non-availability of medicines in government hospital, adherence was maintained by buying the medications.

Various studies advocate that people with diabetes have difficulty

managing their medication regimens - oral hypoglycaemic agents or insulin, as well as other aspects of self-management.<sup>10</sup> In our study, roughly 20% of respondents were prescribed injectable medication along with oral therapy which makes it even more difficult for the patient to comply with, thereby leading to ineffective plasma glucose control. 55.5% patients suffered from a co-morbid condition such as hypertension accounting for 89.1% of the total complications which is slightly higher than the study findings reported in Nepal where hypertension accounted for 70.62% of the total complication.<sup>11</sup>

The effect of age on adherence was found in our study population with significantly higher rate of adherence among patients aged more than 40 years which is similar to the findings of study conducted by Sander D. Borgsteede *et al.*<sup>12</sup> However, in a study conducted in Egypt, higher adherence was found in younger age group with less adherence in elderly and middle age group.<sup>13</sup>

Some of the factors thought to influence compliance include social and psychological components

**Table 3: Relationship between socio-demographic, clinical and medication characteristics and adherence to anti-diabetic medication (N = 200)**

Factors	Adherent (134) N (%)	Non-adherent (66) N (%)	P-value <sup>*</sup>
Socio-demographic			
Age > 40 years	118 (88.1)	49 (74.2)	0.013
Sex – Male	54 (40.3)	20 (30.3)	0.169
Education – High school and above	48 (35.8)	11 (16.7)	0.005
Socio-economic status - Upper	61 (45.5)	37 (56.1)	0.161
Clinical			
Duration of disease > 5 years	87 (64.9)	28 (42.4)	0.002
Positive family history	61 (45.5)	35 (53)	0.318
Overweight and obesity	34 (25.4)	18 (27.2)	0.773
Health seeking behaviour			
Time taken to reach hospital > 0.5 h	108 (80.6)	37 (56)	0.000
Frequency of hospital visits in last 1 month < 2	120 (89.6)	46 (69.7)	0.000
Any emergency visit in last 3 months	10 (7.5)	5 (7.6)	0.977
Therapy related factors			
Presence of glucometer	67 (50)	14 (21.2)	0.000
Monthly cost of medications > 1000	92 (68.7)	11 (16.7)	0.000
Mean expenditure on medications	1025.22 + 1528.49	633.33 + 748.62	0.015 <sup>*</sup>

#calculated using chi-square test; \*calculated using t-test

like knowledge and understanding including communication, quality of the patient – healthcare provider interaction and patient satisfaction, social isolation and social support including the effect of the family, health beliefs and attitudes and factors associated with the illness and the treatment including the duration and the complexity of the regimen.<sup>14</sup> In our study, it was found that a strong association exists between compliance to medications and literacy levels. Illiteracy can interfere with understanding of the disease and medication to some extent and various studies show that the risk of non-adherence is very high when patients cannot read and understand basic written medical instructions.<sup>15</sup> Other factor found to promote adherence was presence of glucometer at home which helps in maintaining plasma glucose control.

According to our study findings, plasma glucose control was better among patients that adhered with their antidiabetic medication compared with their non-adherent counterparts and this finding is similar to the findings of Sajith *et al.*<sup>5</sup> Hence, it can be concluded

that if diabetic patients adhere with their appropriately prescribed anti-diabetic medication, glycaemic outcome will be improve. Hence, clinicians attending to type 2 diabetic patients should inquire rationally for medication adherence at every clinical encounter with diabetic patients. This will prevent the clinician from attributing lack of response to medications as therapeutic failure rather than medication adherence problems.<sup>5</sup>

The present study had some limitations. Adherence was assessed using self-reported questionnaire, so there could be potential inaccuracies in patients' responses. The patients included in the study had diabetes mellitus for different duration of time which may affect their perceptions and response to questions on treatment adherence. The study was conducted in a single clinic and caution should be exercised in extrapolating the results. However, ours is a leading tertiary care centre and if poor adherence rates are seen here, then situation would be worse in other centres.

### Conclusion

From this study, it is seen that adherence to medication was poor and as a result, plasma glucose control was poor in majority of patients. Hence, there is a need to focus on improving

adherence among type 2 diabetes patients as it leads to better clinical outcomes and less complications in such patients. The factors found to be associated with non-adherence were younger age (<40 years), low education status, lesser duration of disease and absence of glucometer. It was found that those patients who were dependent on government healthcare system for medications were less adherent to medications. Thus, there is a definite need to improve health care systems for regular supply of medicines and provide health education to the patients and their families emphasising the need of adherence to medications. Other factors related to side-effects or unavailability of drugs leading to non-adherence should be looked into and solutions should be found to improve adherence among diabetic patients.

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