

Medication adherence and determinants of non-adherence among south Indian diabetes patients

Ravi Kumar Medi¹, Uday Venkat Mateti^{1,2}, Krishna Reddy Kanduri³, Shiv Sagar Konda²

¹Department of Pharmacy Practice and Pharm D, St. Peter's Institute of Pharmaceutical Sciences, Kakatiya University, Warangal, Andhra Pradesh, ²Manipal College of Pharmaceutical Sciences, Manipal University, Manipal, Karnataka, ³Department of General Medicine, Rohini Super Specialty Hospital, Warangal, Andhra Pradesh, India

ABSTRACT

Objectives: The objective of the study is to determine the adherence and determinants of non-adherence among diabetes patients. **Materials and Methods:** A cross-sectional observation study was conducted for a period of six months in both inpatients and outpatients of diabetic clinic at a super speciality hospital. The structured medication adherence questionnaire (MAQ) was administered to the eligible diabetic patients to assess the adherence rate and determinants of non-adherence. **Results:** During the study period, a total of 140 patients were enrolled. Out of 140 patients, most of them were females ($n = 79, 56.57\%$), than males ($n = 61, 43.57\%$). Among them ($n = 49, 35\%$) patients were in the age group greater than or equal to 61 years followed by ($n = 42, 30\%$) patients between 51-60 years and others. The overall medication adherence rate was found to be 47.85%. The main factors for non-adherence were lack of finance ($n = 43, 55.84\%$), forgetfulness ($n = 36, 46.75\%$), being busy ($n = 34, 44.15\%$), medicines inaccessibility ($n = 15, 19.48\%$) and others. **Conclusion:** The overall medication adherence rate was found to be unsatisfactory. The main challenging factors affecting medication adherence were lack of finance, forgetfulness, being busy, medicines inaccessibility and side effects of drugs.

Key words: Adherence, determinants, diabetes, India

INTRODUCTION

Medication adherence is a leading issue and a huge burden in our current healthcare system. In the limited resource-country like India, the preponderance of economic instability, low literacy level, and restricted access to healthcare facilities might have led to the increase incidence of medication non-adherence. Medication compliance has been defined by the International Society for Pharmacoeconomics and Outcomes Research as the “extent to which a patient acts in accordance with

the prescribed interval and dose of a dosing regimen”.^[1] Diabetes related morbidity and mortality are becoming more prevalent in India.^[2] Medication adherence in diabetic patients significantly varies from 36% to 93%.^[3] Treatment effectiveness decreases with non-adherence to prescribed medications thereby, increasing healthcare costs of diabetes.^[4-8] Globally, full compliance to the treatment for chronic illness is 50%, and this is far less in case of developing countries like India.^[9] With every 10% increase in medication adherence there is a decrease in HbA1c by 0.16%.^[5] Elderly patients are more likely to be non-compliant and so educational programs on diabetes self management should be conducted for which there is a growing need for more research in this area.^[7] To the best of our knowledge, there is a scarcity of literature appraising medication adherence and determinants of non-adherence among type 2 diabetes patients in India. Thus, the need of this study is to assess medication adherence of diabetes patients in south Indian hospital.

Access this article online

Quick Response Code:



Website:
www.joshd.net

DOI:
10.4103/2321-0656.140892

Corresponding Author: Dr. Uday Venkat Mateti, Manipal College of Pharmaceutical Sciences, Manipal University, Manipal, Karnataka, India.
E-mail: udayvenkatmateti@gmail.com

MATERIALS AND METHODS

A cross-sectional observation study was conducted including both inpatients and outpatients for a period of 6 months (February-July 2012), in diabetic clinic at a superspeciality hospital. Diabetic patients of both sex and age above 18 years were included in the study. The study was approved by the hospital committee prior to the study initiation. The structured medication adherence questionnaires (MAQ) was framed and validated by committee of experts of healthcare providers such as two physicians who are experts in the field of diabetology and three pharmacists who are experienced in diabetes pharmacotherapy. The structured MAQ was designed in English and translated into Telugu language, and was administered to the patients. Patients were asked to answer the questionnaire in point of view of their previous medication usage pattern. The MAQ mainly consists of socio-demographics such as age, gender, height, weight, education, occupation, smoking habit, medical and social history, determinants of non-adherence with drug therapy like pattern of drug use, reason for missed dose, factors for non-adherence, type of daily medication remainder, knowledge of complications due to poor glycemic control, regular home blood glucose measurement, knowledge of optimal blood glucose target, and identification of medications. The collected data was entered into

Microsoft© Excel to a Microsoft Excel worksheet to obtain the result, which was expressed as number and percentage.

RESULTS

Sociodemographic details of the patients

During the study period, a total of 140 patients were enrolled. Out of 140 patients, most of them were females ($n = 79$, 56.57%), than males ($n = 61$, 43.57%). Among them ($n = 49$, 35%) patients were in the age group greater than or equal to 61 years, followed by ($n = 42$, 30%) patients between 51–60 years and others. In the present study, ($n = 77$, 55%) patients were illiterates, duration of diabetic history was in the range of one to five years ($n = 69$, 49.28%), and hypertension ($n = 100$, 71.42%) were the most common co-morbid conditions. The detailed summary of sociodemographic details of the patients presented in Table 1.

Medication adherence rate and determinants of non-adherence

In the present study of 140 patients, 69.28% are aware of optimal blood glucose levels, but only 7% of patients regularly check their blood sugars at home. When questioned regarding medication identification, 47.14% of patients identify their medications with brand or generic names, 38.57% identify with color, shape and size, while 14.28% with medication wrapper. It was found

Table 1: Sociodemographic details of the patients

Demographic details	No. patients (%)			Demographic details	No. patients (%)		
	Inpatients (n = 43)	Out patients (n = 97)	Overall (n = 140)		Inpatients (n = 43)	Out patients (n = 97)	Overall (n = 140)
Age (years)				Duration of Diabetes			
18-30	2 (4.65)	-	2 (1.42)	Less than 1 year	-	-	-
31-40	2 (4.65)	05 (5.15)	7 (5)	1-5 years	25 (58.13)	44 (45.36)	69 (49.28)
41-50	9 (20.93)	31 (31.95)	40 (28.57)	5-10 years	10 (23.25)	40 (41.23)	50 (35.71)
51-60	14 (32.55)	28 (28.86)	42 (30)	More than 10 years	08 (18.60)	13 (13.40)	21 (15)
≥61	16 (37.02)	33 (34.02)	49 (35)	Co-morbid condition			
Gender				Hypertension	28 (65.11)	72 (74.22)	100 (71.42)
Males	28 (65.11)	33 (34.02)	61 (43.57)	Ischemic stroke	02 (4.65)	30 (30.92)	32 (23.85)
Females	15 (34.88)	64 (65.97)	79 (56.42)	Dyslipidemia	09 (20.93)	35 (36.08)	44 (31.42)
Educational status				Ischemic heart disease	01 (2.32)	01 (1.03)	2 (1.42)
Illiterate	16 (37.20)	61 (62.88)	77 (55)	Chronic renal failure	01 (2.32)	-	1 (0.71)
High school	19 (44.18)	27 (27.83)	46 (32.08)	Retinopathy	10 (23.25)	3 (3.09)	13 (9.28)
Board of Intermediate	03 (6.97)	07 (7.21)	10 (7.14)	Urinary tract infection	-	11 (11.34)	11 (7.85)
U.G & P.G	05 (11.62)	02 (2.06)	7 (5)	Monthly income (INR)			
Body mass index (kg/m²)				2000-5000	27 (62.79)	60 (61.86)	87 (62.14)
Under weight (<18.50)	02 (4.65)	09 (9.27)	11 (7.85)	5001-7500	06 (13.95)	14 (14.43)	20 (14.28)
Normal weight (18.51 - 24.99)	30 (69.76)	58 (59.79)	88 (62.85)	>7500	10 (23.25)	23 (23.71)	33 (23.57)
Over weight (25.00 - 29.99)	09 (20.93)	28 (28.86)	37 (26.42)	Community			
Obese (≥30)	02 (4.65)	02 (2.06)	4 (2.85)	Rural	29 (67.44)	59 (60.82)	88 (62.85)
Social habits				Urban	14 (32.55)	38 (39.17)	52 (37.14)
Smokers	10 (23.25)	14 (14.43)	24 (17.14)				
Alcoholics	05 (11.62)	07 (7.21)	12 (8.5)				
Both smokers and Alcoholics	09 (20.93)	50 (51.54)	59 (42.14)				

that 47.85% patients never missed doses; 28.57% patients missed daily dose sometimes (less than 5 doses per week), whereas 23.57% of patients frequently missed daily doses (more than 5 doses per week). It was found that 47.85% patients were adherent to medications. The main factors for non-adherence were lack of finance ($n = 43$, 55.84%), forgetfulness ($n = 36$, 46.75%), being busy ($n = 34$, 44.15%), medicines inaccessibility ($n = 15$, 19.48%) and others. The detailed summary of determinants of non-adherence is presented in Table 2.

DISCUSSION

In the present study, the overall medication adherence rate was found to be 47.85%, which was less than the study conducted by Wabe *et al.*, and Grant *et al.*^[10,11] About 30.71% patients have no knowledge about optimal blood glucose levels; 95% patients were not aware of Self Monitoring of Blood Glucose (SMBG) at home. Thirty-five percent of patients were from age group greater than or equal to 61 years; 46.75% patients had difficulty in remembering time of dosing, and this could be due to forgetfulness, which is most common in this age group. As most of the patients belong to a rural community (62.85%), the percentage of illiterate patients were found to be more (55%), and 33% of patients had a problem in accessing medicines. The average cost per diabetic patient with and without complications in a south Indian hospital during their hospital stay is 16,956 INR (314.15 USD) and 1622 INR (29.91USD), respectively.^[2] The lack of finance, which is evident from their monthly income falling between 2000 to 5000 INR, could be the reason for non-adherence to medications in 55.84% patients, whereas the results of a study conducted by Santhosh *et al.* shows that almost same percent of patients are in the same age group and percentage of illiterate patients were low.^[12] Hypertension (71.42%) and dyslipidemia (31.42%) were the co-morbidities frequently present among our study population, while hypertension and obesity were the most frequent co-morbidities in studies done by Wabe *et al.* and Isomaa *et al.*^[10,13] Challenging factors like lack of finance (55.84%), forgetfulness (46.75%), being busy (44.15%), inaccessibility of medicines (19.48%), attribute to poor adherence to anti-diabetics, whereas the results of a similar kind of study conducted in Ethiopia shows that study forgetfulness (50.2%), lack of finance (37.1%), side-effect of drug (29.2%), inaccessibility of medicines (5.6%) are influencing the medication adherence.^[10] About 52.14% of patients use Daily Medication Reminder (DMR), to remind them to take their prescribed medication; among them most of the patients (58.90%) use it as morning and meal time doses. These likely increase the chance

Table 2: Determinants of non-adherence with drug therapy

Questions	Inpatients N (%)	Out patients N (%)	Overall n = 140 N (%)
Knowledge of optimal blood glucose target	[IP n = 43; OP n = 97]		n = 140
Yes	31 (72.09)	66 (68.04)	97 (69.28)
No	12 (27.90)	31 (31.95)	43 (30.71)
Regular home blood glucose measurement	[IP n = 43; OP n = 97]		n = 140
Yes	6 (13.95)	1 (1.03)	7 (5)
No	37 (86.06)	96 (98.96)	133 (95)
Knowledge of complications due to poor glycemic control	[IP n = 43; OP n = 97]		n = 140
Poor visibility	37 (86.04)	70 (72.16)	107 (76.42)
Foot ulcer	1 (2.32)	2 (2.06)	3 (2.14)
Others	5 (11.62)	25 (25.77)	30 (21.42)
How will you identify your medicines?	[IP n = 43; OP n = 97]		n = 140
By brand name/drug name	23 (53.48)	43 (44.32)	66 (47.14)
By medication wrapper	6 (13.95)	14 (14.43)	20 (14.28)
By colour, shape and size	14 (32.55)	40 (41.23)	54 (38.57)
Cannot identify	–	–	–
Pattern of drug use	[IP n = 43; OP n = 97]		n = 140
Never missed	8 (18.6)	59 (60.82)	67 (47.85)
Missed daily dose sometimes	12 (27.9)	28 (28.86)	40 (28.57)
Missed daily dose frequently	23 (53.4)	10 (10.30)	33 (23.57)
Reason for missing dose	[IP n = 35; OP n = 38]		n = 73
Lack of finance	19 (54.28)	24 (57.14)	43 (55.84)
Forgetfulness	21 (60)	15 (35.71)	36 (46.75)
Being busy	11 (31.42)	23 (54.76)	34 (44.15)
Medicines inaccessibility	7 (20)	8 (19.04)	15 (19.48)
Side effect of drug	6 (17.14)	5 (11.90)	11 (14.28)
Multiple drug therapy	3 (8.57)	5 (11.90)	8 (10.39)
Decision to omit	2 (5.71)	02 (4.76)	4 (5.19)
Others	1 (2.85)	02 (4.76)	3 (3.8)
Type of daily medication reminder	[IP n = 26, OP n = 47]		n = 73
Morning time	–	2 (4.25)	2 (2.74)
Meal time	3 (11.53)	3 (6.38)	6 (8.21)
Bed time	3 (11.53)	5 (10.63)	8 (10.95)
Both morning and meal Time	15 (57.69)	28 (59.57)	43 (58.90)
Three times a day	5 (19.23)	9 (19.14)	14 (19.17)
Special instructions from doctor taking medications	[IP n = 43; OP n = 97]		n = 140
Yes	38 (88.37)	67 (69.07)	105 (75)
No	5 (11.62)	30 (30.92)	35 (25)
If Yes, then how often do you follow them?	[IP n = 38; OP n = 67]		n = 105
Some times	25 (65.78)	36 (53.73)	61 (58.08)
Most of the times	8 (21.05)	21 (31.34)	29 (27.61)
All the times	5 (13.15)	10 (14.92)	15 (14.28)

of achieving high patient adherence with prescribed medications and subsequent optimal glycemic control.

As evident from various studies, medication adherence can be improved by dosage simplification, educating the patients on aspects of drugs, disease state and lifestyle modifications, using reminder systems like weekly pill boxes and packaged

calendars, telephonic and pager reminder.^[14-17] Newly developed smart phone applications can improve medication adherence, but their reliability is not yet studied.^[18]

CONCLUSION

This study is helpful in understanding non-adherence in diabetic patients in South Indian Hospital. Most of the patients from rural areas are not properly educated about diabetes and its debilitating long-term complications; due to which morbidity and mortality are increased as seen from other studies. The overall medication adherence rate was unsatisfactory. Most of the patients in our study do not monitor sugars at home. Diabetic patients must be aware of SMBG, as it has significant effect in achieving glycemic targets. Medical community needs health professionals to educate the patients about their disease states and compliance to prescribed medications.

REFERENCES

1. Cramer JA, Roy A, Burrell A, Fairchild CJ, Fuldeore MJ, Ollendorf DA, *et al.* Medication compliance and persistence: Terminology and definitions. *Value Health* 2008;11:44-7.
2. Akari S, Mateti UV, Kunduru BR. Health-care cost of diabetes in South India: A cost of illness study. *J Res Pharm Pract* 2013;2:114-7.
3. Cramer JA. A systematic review of adherence with medications for diabetes. *Diabetes Care* 2004;27:1218-24.
4. Lawrence D, Ragucci KR, Long LB, Parris BS, Helfer LA. Relationship of oral antihyperglycemic (sulfonylurea or metformin) medication adherence and hemoglobin A1C goal attainment for HMO patients enrolled in a diabetes disease management program. *J Manag Care Pharm* 2006;12:466-71.
5. Schectman JM, Nadkarni MM, Voss JD. The association between diabetes metabolic control and drug adherence in an indigent population. *Diabetes Care* 2002;25:1015-21.
6. Krapek K, King K, Warren SS, George KG, Caputo DA, Mihelich K, *et al.* Medication adherence and associated hemoglobin A1C in type 2 diabetes. *Ann Pharmacother* 2004;38:1357-62.
7. Lee WC, Balu S, Cobden D, Joshi AV, Pashos CL. Prevalence and economic consequences of medication adherence in diabetes: A systematic literature review. *Manag Care Interface* 2006;19:31-41.
8. Sokol MC, McGuigan KA, Verbrugge RR, Epstein RS. Impact of medication adherence on hospitalization risk and healthcare cost. *Med Care* 2005;43:521-30.
9. World Health Organization, diabetes mellitus fact sheet, number 238, 2002. Available from: http://www.who.int/chp/knowledge/publications/adherence_full_report.pdf [Last Accessed on 2012 Nov 10].
10. Wabe NT, Angamo MT, Hussein S. Medication adherence in diabetes mellitus and self management practices among type-2 diabetics in Ethiopia. *N Am J Med Sci* 2011;3:418-23.
11. Grant RW, Devita NG, Singer DE, Meigs JB. Polypharmacy and medication adherence in patients with type 2 diabetes. *Diabetes Care* 2003;26:1408-12.
12. Santhosh YL, Naveen MR. Medication adherence behavior in chronic diseases like asthma and diabetes mellitus. *Int J Pharm Pharm Sci* 2011;3:238-40.
13. Isomaa B, Almgren P, Tuomi T, Forsén B, Lahti K, Nissén M, *et al.* Cardiovascular morbidity and mortality associated with the metabolic syndrome. *Diabetes Care* 2001;24:683-9.
14. Haynes RB, McKibbon KA, Kanani R. Systematic review of randomized trials of interventions to assist patients to follow prescriptions for medications. *Lancet* 1996;348:383-6.
15. Graves MM, Roberts MC, Rapoff M, Boyer A. The efficacy of adherence interventions for chronically ill children: A meta-analytic review. *J Pediatr Psychol* 2010;35:368-82.
16. Rolnick S, Pawloski P, Bruzek R, Hedblom B, Asche S, Fustgaard M, *et al.* PS2-32: Barriers and facilitators for medication adherence. *Clin Med Res* 2011;9:157.
17. Vervloet M, Linn AJ, van Weert JC, de Bakker DH, Bouvy ML, van Dijk L. The effectiveness of interventions using electronic reminders to improve adherence to chronic medication: A systematic review of the literature. *J Am Med Inform Assoc* 2012;19:696-704.
18. Dayer L, Heldenbrand S, Anderson P, Gubbins PO, Martin BC. Smartphone medication adherence apps. *J Am Pharm Assoc* 2013;53:172-81.

How to cite this article: Medi RK, Mateti UV, Kanduri KR, Konda SS. Medication adherence and determinants of non-adherence among south Indian diabetes patients. *J Soc Health Diabetes* 2015;3:48-51.

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