

Original Research Article

Medication pattern and adherence to type II diabetes treatment at university hospital of Central India

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ABSTRACT

Background: The estimated number of diabetics in India was 62.4 million in 2011 projected to rise 101.2 million by 2030. Rational medication pattern and adherence to treatment are key components of diabetes control. Study purpose is to evaluate medication pattern and assess adherence to treatment.

Methods: Prospective, observational and questionnaire-based study. Medication pattern evaluated from prescriptions and adherence assessed with Morisky medication adherence scale.

Result: Total 200 prescriptions were studied. 98 (49%) and 102 (51%) were male and female respectively. Majority were above 60 years of age. Co-morbid conditions were found in 175 (87%) patients with hypertension (72%), being more common. Patients were prescribed 1216 medications. The average number of drugs per prescription was 6.20. Oral hypoglycemic drugs were 22.69%. Commonly prescribed drugs were anti-hypertensive (15.70%), drugs for coronary artery disease (10.36%), antibiotics, NSAID, PPI, vitamins and minerals (31.99%). High, medium and low adherence were observed in 47%, 38% and 15% of patients. Males (61%) adherence more than females in high adherence group.

Conclusions: This study demonstrates the variability of drug utilization in diabetics. More than fifty percent patient have medium and low adherence which affects control of diabetes. Factors leading to poor adherence should be studied for better control of diabetes.

Keywords: Medication pattern, Adherence, Diabetes mellitus

INTRODUCTION

The 21st century has seen some major epidemiological transition. The communicable diseases are decreasing due to better health facilities and on the other hand there is a boom of non-communicable diseases like diabetes which are also called as lifestyle diseases which slowly kill a person from within. In India, the diabetes is presenting at 10 years earlier than in the west.

Diabetes is a complex chronic metabolic illness which requires life-long management. Approximately 537 million adults (20-79 years) are living with diabetes. The total number of people living with diabetes is projected to

rise to 643 million by 2030 and 783 million by 2045, 3 in 4 adults with diabetes live in low- and middle-income countries Almost 1 in 2 (240 million) adults living with diabetes are undiagnosed. Diabetes caused 6.7 million deaths.¹

The estimates in 2019 showed that 77 million individuals had diabetes in India, which is expected to rise to over 134 million by 2045. Approximately 57% of these individuals remain undiagnosed.²

Drug utilisation studies may be defined as studies of the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical,

social and economic consequences. It provides highly valuable information, at a reasonable price, on the costs and effects (harmful and beneficial) of drugs.³

Drug utilization studies that is assessment of medication pattern gives insight about current pattern and to identify the irrational pattern. Consequence of irrational prescribing pattern includes non-adherence. The various co-morbidities associated also may lead to non-adherence. The inappropriate drugs and the adverse drug reactions if any may also give rise to non-adherence.⁴ The Non-adherence then leads to uncontrolled diabetes mellitus and hence further complications which further results in an increased cost of drugs and also an increased cost of healthcare.⁵

Hence, the present study was designed to study the medication pattern and adherence to type -2 diabetes treatment at university hospital of central India.

METHODS

It was a prospective, observational, questionnaire-based study initiated after approval from institutional ethics committee (Reg. No. ECR/ 1155/Inst/MH/2018). It was conducted in diabetic clinics of university hospital of government medical college, Chandrapur from March 2016 to November 2016. Inclusion criteria of study was adult type 2 diabetics of either gender and patients having malignancy or pregnancy were excluded from the study.

A total of 200 prescriptions were studied. The data was obtained from the patients by direct interviews as well as from the prescriptions. The demographic details and co-morbidities were noted. The medication pattern was evaluated from prescription.

Face to face interview of the patients were conducted by using the assessment of Morisky 4-items medication adherence questionnaires.⁶

Statistical analysis

The statistical analysis were done by using descriptive statistics (percentage, mean, standard deviation).

RESULTS

A total of 200 prescriptions were studied, out of which 98 were males and 102 were females, 1.03% were in the age group of 18-30. 2.06% were in the age group of 31-40, 14% were in the age group of 41-50, 35.5% were in the age group of 51-60, majority of patients i.e., 39.5% belonged to the age group 61-70 while 7.73% were from 71-80 years (Table 1).

The following were the co-morbidities: Hypertension-72%, dyslipidemia-44%, coronary artery disease-34%, neuropathy-3.6% and nephropathy-2.57%. The number of patients having no co-morbidities were 12.58%, single

were 31%, more than 1 were 56% and more than 2 were 39% (Table 1).

The following were the medication prescribed to the patients: Oral hypoglycemic agents (22.69%), insulin (0.16%), anti-hypertensives (15.7%), drugs for coronary artery disease (10.36%), hypolipidemic (7.73%), drugs for neuropathy (0.8%) and miscellaneous like non-steroidal anti inflammatory drugs, proton Pump I, vitamins, antibiotics, minerals (31.99%). The total number of prescribed drugs were 1216 and the average number of drugs per prescription were 6.204 (Table 2).

Among the oral hypoglycemic agents, metformin (89.17%) was the most commonly prescribed drug followed by glimepiride (41.77%), glibenclamide (6.18%), glipizide (4.63%). Also, in DPP4 inhibitors, sitagliptin was prescribed commonly (13.91%). Only 1.03% patients were prescribed insulin. 31.5% patients were on monotherapy, 68.5% patients were on combination therapy. Average number of anti-diabetic drugs prescribed per patient was 1.42% (Table 3).

Adherence was calculated by asking the patients questions like if they forget to take the medicines, were careless, stopped if felt better or vice versa. High adherence was 0 score while low adherence meant a score of 3-4, 47% patients had high adherence, 38% had medium adherence while 15% had low adherence. Males (61%) adherence more than females in high adherence group (Figure 1 and 2).

Table 1: Distribution of patients as per demographic characteristics, (n=200).

Characteristic	N	Percentage (%)
Age groups (In years)		
18-30	2	01.03
31-40	4	02.06
41-50	29	14.5
51-60	71	35.5
61-70	79	39.5
71-80	15	07.73
Gender		
Male	98	49
Female	102	51
Number of co-morbidities		
Zero	25	12.88
Single	62	31
More than one	112	56
More than two	78	39
Co-morbidities, (n=175)		
Hypertension	146	72
Dyslipidemia	89	44
Coronary artery disease	69	34
Neuropathy	7	3.6
Nephropathy	5	2.57

Table 2: Distribution of medication as per prescribing pattern, (n=1216).

Drugs category	Number of drugs, n (%)
Oral hypoglycemic drugs	272 (22.69)
Insulin	002 (0.16)
Anti-hypertensive	191 (15.70)
Drugs for coronary artery disease	126 (10.36)
Hypolipidemics	094 (7.73)
Drugs for Neuropathy	017 (0.799)
Miscellaneous: NSAID,* PPI,** vitamins, antibiotics and the minerals	389 (31.99)

*NSAID- Non steroidal anti-inflammatory drugs, **PPI- Proton pump inhibitors, Total number of prescribed drugs: 1216, Average number of drugs per prescription: 6.204

Table 3: Medication pattern of anti-diabetics.

Class	Drugs	N (%)
Biguanides	Metformin	173 (89.17)
	Glimepiride	81 (41.77)
Sulfonylurea	Gilbenclamide	12 (6.18)
	Glipizide	9 (4.63)
DPP-4 inhibitors	Sitagliptin	27 (13.91)
Insulin	Insulin	2 (1.03)

Monotherapy: 63 patients (31.5%), Combination therapy: 137 patients (68.5%), Average number of anti-diabetic drugs prescribed: 1.42

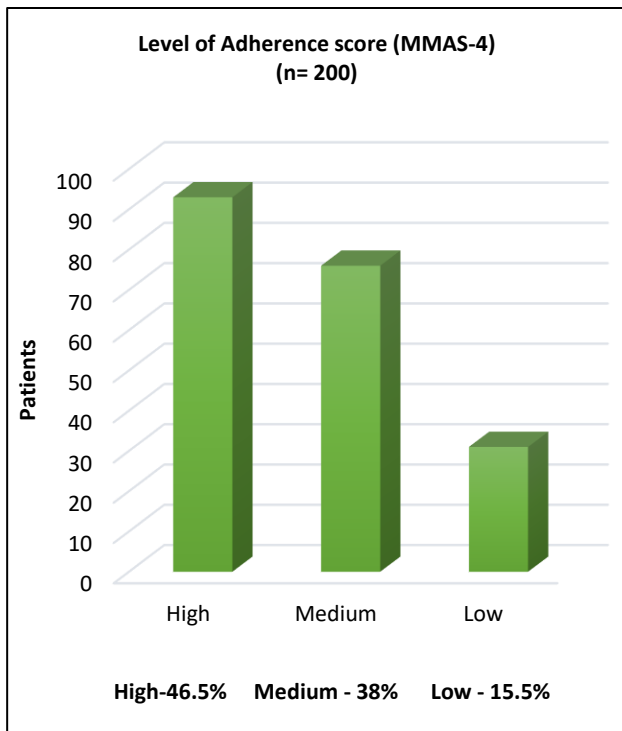


Figure 1: Levels of adherence score.

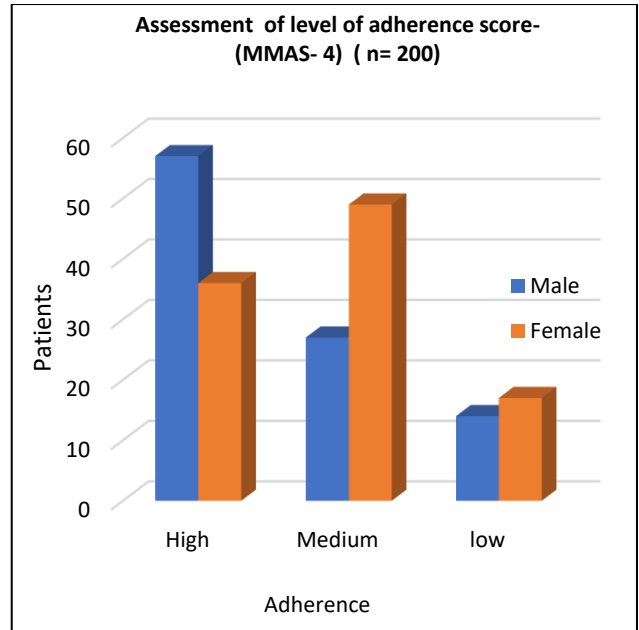


Figure 2: Assessment of level of adherence score.

DISCUSSION

The benefits of drug therapy to diabetic patients in terms of glycemic control, microvascular complications, cardiovascular event risk, mortality, and quality of life have been well established by clinical trial data.⁷⁻⁹ However, it has been a challenge to quantify the relationship between adherence and outcomes such as glycemic control, disease-related events, hospitalizations, cost, and quality of life.⁵

Diabetes being chronic debilitating disease requires lifelong management.¹⁰ Diet, exercise and life style modifications remains mainstay of diabetes management, regular treatment with the drugs is essential to dela anticipated long term complications of diabetes.¹¹

In our study, majority of the patients (39%) were between 61-70 years of age group with a mean age of 57.98 years. These finding are in concurrence with the study conducted by Brahmhatt et al and Alex et al.^{4,12}

The present study showed that 87% of patients had co-morbidities and the hypertension, being the major one followed by dyslipidemia. Previous study have reported a similar observation with regard to the comorbidity in patients with diabetes. However, prevalence of hypertension has ranged from 31 to 70%.¹²⁻¹⁴

Among the Oral hypoglycemic agents, biguanides were the preferred anti diabetic agents, of which metformin (89.17%) was the most commonly prescribed drug in present study.

Metformin indeed is the first line drug in type 2 diabetics, as it is very effective, cheap and does not cause

hypoglycemia like sulfonylureas. Similarly, other studies have reported similar findings.^{4,11,14,15} The most commonly prescribed sulfonylureas were glimepiride (41.77%) followed by glibenclamide (6.18%) and glipizide (4.63%). Whereas of, dipeptidyl-peptidase 4 (DPP-4) inhibitors, sitagliptin was prescribed in (13.91%). Only 1.03% patients prescribed insulin. 31.44% patients on monotherapy, 68.56% patients on combination therapy.

Concomitant drug prescribed, 15.70% antihypertensive followed by 10.36% were drugs for coronary artery disease. As major comorbidities associated with diabetes mellitus was hypertension. Among miscellaneous group, NSAID, proton pump inhibitors, vitamins and minerals were 31.99% of total drugs. Hence, comorbidity has been shown to intensify health care utilization and to increase medical care costs for diabetes patients.

Average number of anti-diabetic drugs prescribed per patient was 1.42% and average number of drugs per prescription was 6.02, indicates polypharmacy. Similar observation was found in study conducted by Kumar MA et al. The possible reason for polypharmacy could be due to comorbidity in diabetic mellitus and generally treated with many pharmacological agents which may leads to polypharmacy and drug related problems. The study of prescribing pattern and evaluation of the prescribing practice may recommend necessary modifications to achieve rational and cost effective medical care by practitioners for making medical care rational.¹⁶

In the present study, level of adherence to anti diabetic medication suggested that 46.5% patients had high adherence, 38% had medium adherence while 15.5% patients had low adherence. The adherence was almost same in both the genders. Adherence to oral hypoglycemic agents in the current study was similar to cross-sectional study conducted by Ahmad et al.¹⁷ However, 51.3% of patients were adherent to anti diabetic medication was observed in another study conducted in Ethiopia.¹⁸ The adherence differences stated in various studies observed could be due to differences in study settings and adherence scales used. The self-reported measurement of adherence has the tendency of overestimating adherence.

Forgetfulness is one of major contributing factors for non adherence to antidiabetic medication.^{19,20} Hence, there is need for regular follow-up visits, counselling sessions involving family member and even patient group campaigns. Healthcare workers home visits are likely to significantly improve adherence to antidiabetic medication, improve glycemic control and overall health outcomes.

Limitation

We could not assess diet, physical activity, self-monitoring of blood glucose (SMBG), life-style changes

which may affect adherence to treatment. Follow-up of the patients was not possible and hence the effectiveness of the anti-diabetic agents could not be assessed.

CONCLUSION

Metformin stands as an important oral hypoglycemic agent in management of type II diabetes mellitus as a monotherapy and in combination therapy. However whatever number of novel therapies are designed, the adherence to therapy is mandatory for complete control of disease and improvement in quality of life. This study has shown that the patients has poor adherence to anti-diabetic medication.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. International Diabetes federation. Diabetes facts and figure. IDF Diabetes Atlas, 10th edition 2021. Available at: www.diabetesatlas.org. <https://idf.org/aboutdiabetes/what-is-diabetes/facts-figures.html>. Accessed on 25 September. 2023.
2. Pradeepa R, Mohan V. Epidemiology of type 2 diabetes in India. *Indian J Ophthalmol.* 2021;69(11):2932-8.
3. Sacristán JA, Soto J. Drug utilisation studies as tools in health economics. *Pharmacoeconomics.* 1994;5(4):299-312.
4. Brahmabhatt SV, Sattigeri BM, Nil AK, Parikh DP, Shah HS. A prospective study on drug utilization pattern and rationality in treatment of type II diabetes mellitus: a population based analysis. *IJRMS.* 2014;2(3):983-87.
5. Asche C, LaFleur J, Conner C. A review of diabetes treatment adherence and the association with clinical and economic outcomes. *J Clin Therapy.* 2011;33(1):74-109.
6. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich).* 2008;10:348-54.
7. Zinman B, Hoogwerf BJ, Duran Garcia S. The effect of adding exenatide to a thiozolidinedione in suboptimally controlled type 2 diabetes: A randomized trial. *Ann Intern Med.* 2007;146:477-85.
8. Saenz A, Fernazandez EI, Mataix A. Metformin monotherapy for type 2 diabetes mellitus. *Cochrane Database Syst Rev.* 2005;CD002966.
9. Secnik BK, Matzal S, Oglesby A. Patient reported outcome in a trial of exenatide and insulin glargine for the treatment of type 2 diabetes. *Health Qual Life Outcome.* 2006;4:80.
10. Nathan DM, Buse JB, Davidson MB, Heine RJ. Management of hyperglycemia in type 2 diabetes: a

- consensus algorithm for the initiation and adjustment of therapy. *Diabet Care.* 2006;29(8):1963-72.
11. Upadhyay DK, Palaian S, Ravi Shankar P, Mishra P, Sah AK. Prescribing pattern in diabetic outpatients in a tertiary care teaching hospital in Nepal. *J Clin Diag Res.* 2007;3:248-55.
 12. Alex SM, Sreelekshmi BS, Smita S, Jiji KN, Menon AS, Uma DP. Drug utilization pattern of anti-diabetic drugs among diabetic outpatients in a tertiary care hospital. *Asian J Pharm Clin Res.* 2015;8(2):144-6.
 13. John LJ, Arifulla M, Sreedharan J, Muttappallymyalil J, Das R, John. Age and gender-based utilization pattern of antidiabetic drugs in Ajman, United Arab Emirates. *Malay J Pharm Sci.* 2012;10:79-85.
 14. Patel B, Oza B, Patel KP, Malhotra SD, Patel VJ. Pattern of antidiabetic drugs use in type-2 diabetic patients in a medicine outpatient clinic of a tertiary care teaching hospital. *Int J Basic Clin Pharmacol.* 2013;2(4):485-91.
 15. Sultana G, Kapur P, Aqil M, Alam MS, Pillai KK. Drug utilization of oral hypoglycemic agents in a university teaching hospital in India. *J Clin Pharm Ther.* 2010;35(3):267-77.
 16. Kumar MA, Nizar A, Shailaja K, Jayasutha J, Ramasamy C. A study on prescribing pattern and potentials drug-drug interactions in type-2 diabetes mellitus (inpatients) in a tertiary care teaching hospitals. *Der Pharmacia Lettre.* 2011;3(4):13-9.
 17. Ahmad NS, Ramli A, Islahudin F, Paraidathathu T. Medication adherence in patients with type 2 diabetes mellitus treated at primary health clinics in Malaysia. *Patient Prefer Adherence.* 2013;7:525-30.
 18. 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.
 19. Iqbal Q, Bashir S, Iqbal J, Iftikhar S, Godman B. Assessment of medication adherence among type 2 diabetic patients in Quetta city, Pakistan. *Postgrad Med.* 2017;129:637-43.
 20. Bagonza J, Rutebemberwa E, Bazeyo W. Adherence to anti-diabetic medication among patients with diabetes in eastern Uganda; a cross sectional study. *BMC Heal Services Res.* 2015;15:168.

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