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Review Article

STUDY ON PRESCRIPTION PATTERN AND DRUG UTILIZATION IN DIABETIC PATIENTS (A PRELIMINARY STUDY)

Sanket R. Sakhare^{1*}, Prof. Venkatesh S. Nagare², Dr. Swati P. Deshmukh³^{1*}Student, Shraddha institute of pharmacy, kondala zambre, Washim-444505²Assistant Professor, Department of industrial pharmacy, Shraddha institute of pharmacy
kondala zambre, Washim -444505³Principal, Shraddha institute of pharmacy, Department of pharmacology pharmacy kondala
zambre, Washim -444505

Abstract:

Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by hyperglycemia and glucose intolerance, leading to increased risk of complications and mortality.^{1,2} Rational use of anti-diabetic medications is essential to improve patient outcomes and optimize healthcare resources.⁵ Drug Utilization Research (DUR) provides a framework to assess prescribing practices, medication adherence, and cost-effectiveness, guiding The present preliminary study aimed to evaluate prescription patterns and drug utilization among diabetic patients in a semi-urban population of Western India, assess adherence to clinical guidelines, and analyze prescribing practices using WHO core drug indicators.

A retrospective cross-sectional analysis was conducted on prescriptions from patients attending the outpatient department of a tertiary care teaching hospital. Data on anti-diabetic drugs, comorbidities, polypharmacy, dosage, and adherence were collected and evaluated. Key parameters included the number of drugs per prescription, generic prescribing rates, use of essential medicines, antibiotic and injection prescriptions, and average drug cost per encounter. Patient care and facility indicators, such as consultation time, dispensing time, and availability of essential drugs, were also assessed.

Preliminary findings revealed variability in prescription patterns influenced by factors including patient age, comorbidities, HbA1c targets, hypoglycemia risk, and medication costs. Polypharmacy was common, particularly among patients with coexisting hypertension or hyperlipidemia. DUR analysis highlighted areas of irrational prescribing, opportunities for generic substitution, and adherence gaps, emphasizing the need for guideline-based interventions to optimize therapy.

KEYWORDS: Metformin, Biguanid, Glimepiride-Metformin combination, Type 2 Diabetes Mellitus (T2DM), Antidiabetic drugs, Drug utilization study Prescribing pattern, Rational drug use.

Corresponding author:

Sanket R. Sakhare,

Student,

Shraddha institute of pharmacy,
kondala zambre, Washim-444505

QR CODE



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INTRODUCTION:

The clinical management of patients with Diabetes Mellitus (DM) remains one of the most complex challenges in 21st-century pharmaco-therapeutics.¹ DM is a group of metabolic disorders characterized by chronic hyperglycemia and glucose intolerance² and is described as “a distinct kind of accelerated aging,” increasing susceptibility to degenerative changes.³ Globally, approximately 382 million people suffer from diabetes, projected to reach 592 million by 2035.¹ Current estimates suggest at least 150 million individuals live with diabetes worldwide, two-thirds of whom reside in developing countries. In India, prevalence rose from 31.7 million in 2000 to 65.1 million in 2013 and may exceed 79.4 million by the next decade.⁴

Type 2 diabetes mellitus (T2DM) is the predominant form, representing 85–95% of cases, and is primarily driven by insulin resistance and relative insulin deficiency.² Its increasing prevalence is attributed to lifestyle changes, urbanization, dietary modifications, physical inactivity, and population aging.¹ The rising prevalence, expected to reach 5.5% of the population by 2025,⁴ correlates with increased use of anti-diabetic medications. Timely pharmacological interventions can improve quality of life and reduce morbidity and mortality, underscoring the need for rational drug use.⁵

The World Health Organization (WHO) defines ‘Drug Utilization’ as the distribution, prescription, and use of drugs, encompassing pharmacoepidemiology, pharmacosurveillance, and pharmacovigilance, along with their medical, social, and economic impacts.⁵ Drug Utilization Research (DUR) assists healthcare systems in optimizing prescribing practices, evaluating medication efficacy, and guiding budget allocation.⁶ Studies on anti-diabetic drug utilization provide insights into prescribing patterns, complications, and irrational drug combinations, which may lead to non-compliance, uncontrolled blood sugars, and escalating healthcare costs. The Cost of Diabetes in India (CODI) study indicated antidiabetic drugs constitute 17% of direct medical expenses, while other studies suggest 30–50% of costs.⁸ DUR supports rational drug use by informing physicians, policymakers, and therapeutic committees.⁹

Polypharmacy is common in diabetic patients due to coexisting systemic diseases such as hypertension, often resulting in irrational prescriptions.⁹ Variability in anti-diabetic drug prescriptions is influenced by factors like target HbA1c, hypoglycemia risk, patient weight, drug side effects, cost, comorbidities, and adherence to polytherapy.¹⁰ Retrospective DUR evaluates therapy during ongoing treatment. This study aims to examine drug prescription patterns in a semi-urban Western Indian population, evaluate

adherence to clinical guidelines, and analyze prescriptions according to WHO core indicators.

Prescription practice in outpatient settings is a critical component of patient care. Properly executed prescriptions facilitate recovery, whereas improper prescribing and patient non-compliance are widespread, with over half of medicines globally prescribed or taken incorrectly, and one-third of the population lacking access to essential medicines.^{13,14} The WHO emphasizes DUR to promote rational medicine use, ensuring evidence-based, appropriately dosed, and affordable treatments.^{11,12} Regular DUR studies in hospitals help assess current drug policies and recommend improvements, especially in resource-limited settings like India.¹⁵ Prescription indicators measure healthcare providers’ performance regarding rational drug use.¹⁶

Drug utilization encompasses prescribing, dispensing, administering, and ingesting medications, including associated outcomes. DUR quantitatively and qualitatively evaluates patient populations, reasons for drug use, treatment duration, dosages, prior therapies, and adherence. Quantitative analyses inform cost assessment and medical-social impact, forming the basis for further qualitative research.

Key DUR parameters include:

Core drug use indicators – average number of drugs per prescription, average antidiabetic drugs per prescription, percentage prescribed by generic name, encounters with antibiotics or injections, drugs from essential drug lists (NLEM 2011), average drug cost.

Patient care indicators – average consultation and dispensing time, percentage of drugs actually dispensed, patient knowledge of correct dosage.

Facility indicators – availability of essential drug lists or formulary, availability of key drugs¹⁷

OBJECTIVE

- 1) To assess the prescribing patterns of antidiabetic medications in diabetic patients at the study hospital.
- 2) To study the demographic profile of diabetic patients on treatment.
- 3) To determine the forms and categories of antidiabetic medications (insulin, oral hypoglycemics), which were administered to the patients.
- 4) To measure irrationality of prescribing by the standard treatment protocols and WHO prescribing indicators.
- 5) To determine the frequency of polypharmacy among diabetics.

Types of diabetes

Type 1 diabetes

Type 1 diabetes, previously called insulin-dependent diabetes mellitus (IDDM) or juvenile-onset diabetes, may account for 5 percent to 10 percent of all diagnosed cases of

diabetes. Risk factors are less well defined for Type 1 diabetes than for Type 2 diabetes, but autoimmune, genetic, and environmental factors are involved in the development of this type of diabetes.¹⁸

Type 2 diabetes

Type 2 diabetes was previously called non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes. Type 2 diabetes may account for about 90 percent to 95 percent of

all diagnosed cases of diabetes. Risk factors for Type 2 diabetes include older age, obesity, and family history of diabetes, prior history of gestational diabetes, impaired glucose tolerance, physical inactivity, and race/ethnicity. African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Pacific Islanders are at particularly high risk for type 2 diabetes¹⁹

Class	Mechanism of Action	Example(s)
Biguanides	Decreases liver glucose production and increases insulin sensitivity in muscles.	Metformin (Glucophage)
Sulfonylureas	Stimulates the pancreas to release more insulin.	Glipizide, glyburide, glimepiride
Thiazolidinediones (TZDs)	Improves insulin sensitivity in fat and muscle tissue.	Pioglitazone, rosiglitazone
Alpha-glucosidase inhibitors	Slows down the digestion of carbohydrates in the intestines.	Acarbose, miglitol
Meglitinides	Stimulates the pancreas to release insulin, particularly after meals.	Repaglinide, nateglinide
DPP-4 inhibitors	Increases the levels of incretins, which stimulates insulin release and suppresses glucagon.	Sitagliptin, saxagliptin
SGLT2 inhibitors	Causes the kidneys to excrete glucose through urine.	Dapagliflozin, canagliflozin
Bile acid sequestrants	Lowers blood sugar by affecting bile acids.	Not specified, but includes colesevelam.
Dopamine agonists	Helps with blood sugar control.	Bromocriptine (Cycloset)

MATERIALS AND METHOD:

Type of study: A Prescription pattern analysis and one-time patient interview.

Ethics

Institute Ethical committee approval was taken prior to the study.

Consent of patient taken only after giving full information about study

Patients were assured that his/her reports were kept confidential.

The present study was performed on a cross-sectional observation which was attempted to find out the frequently prescribed drugs by the doctors in different diabetic patient.

Place of study

The study was conducted in patients visiting OPD of General Medicine Dept. & Hospitals/Clinic at a tertiary care teaching hospital in urban area of Washim & Anjangaon Surji, Maharashtra, India.

- 1) Dr. Vaibhav M. Deshamuk sir, Diabetes Speciality clinical, washima 444505.

- 2) Dr. Shantanu P. dokane sir, MBBS, Anjangaon surji, 444705.

- 3) Distric hospital washim 444505.

Inclusion Criteria:

- a) Old cases of type 2 Diabetes Mellitus prescribed on at least one Oral Anti-Diabetic drug(s) (at least for one year).
- b) Patients above 18yrs of age and of either sex.
- c) Sufficiently oriented to communicate with the study personnel and giving a written consent for the same.
- d) Diabetic patients presenting with micro vascular complications like retinopathy, neuropathy and nephropathy.

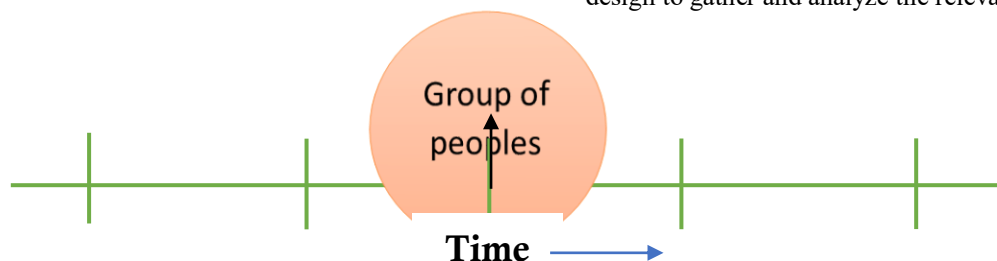
Exclusion criteria:

- a) All cases of type 1 Diabetes Mellitus.
- b) Patients of Gestational Diabetes Mellitus (GDM).
- c) Patients suffering from acute metabolic disorders like diabetic ketoacidosis or hyperosmolar coma

Study design: Cross sectional study

A cross-sectional study is a type of [research design](#) in which you collect data from many different individuals at a single point in time. In cross-sectional research, you observe [variables](#) without influencing them.

Researchers in economics, psychology, medicine, epidemiology, and the other social sciences all make use of cross-sectional studies in their work. For example, epidemiologists who are interested in the current prevalence of a disease in a certain subset of the population might use a cross-sectional design to gather and analyze the relevant data.⁸⁰

**Study population**

In this study, patients of all types, regardless of gender, aged between 1 and 82, were included. These patients were from different backgrounds and had various types of diabetes, as diagnosed by hospital doctors.

Study period

The study period lasted one months, starting from October 2025.

To manage the study effectively, a detailed work schedule was made based on the different tasks involved. The first two weeks were used for choosing the topic and developing the study plan. The following weeks were dedicated to official communications, collecting data, analyzing it, writing the report, and submitting it.

Sample size and sampling technique

"Data were collected from anonymized electronic prescriptions provided by a registered medical practitioner, ensuring confidentiality and ethical compliance."

Data analysis

In this study, the sample size included 52 prescriptions, selected using a purposive sampling method. (A preliminary study)

Sample size (n): 52

Data collection method

Before starting the interview, the purpose of the study was explained to the participants, and their verbal consent was obtained.

The researcher interviewed all the participants in English and copied their prescriptions, which included lists of diseases and the drugs prescribed along with their dosing schedules and duration. Sample photographs of five prescriptions are provided below.

Once the data was collected, it was checked for accuracy.

Nov

07 Oct

+5

Vitals:
 BP : 110/70mmHg | Pulse : 110bpm | Height : 150cm | Weight : 59kg | BMI : 26.22Kg/m2 |
 SPO2 : 98% |

Chief Complaints:
 COUGH AND FEVER

Diagnosis:
 TYPE 2 DM
 HYPERTENSION

Rx:

#	Medicine	Dosage	When	Frequency	Duration	Note
1	GLIZID M TABLET Glizalide 80 MG + Metformin 500 MG	1-0-0	Before Food	daily	15 Days	HALF HOUR BF
2	GLIZID M XR 60 TABLET Glizalide 60 MG + Metformin 500 MG	0-0-1	Before Food	daily	15 Days	HALF HOUR BF
3	ALSITA M XR 100 / 500 MG TABLET Metformin 500 MG + Sitagliptin 100 MG	1-0-0	Before Food	daily	15 Days	HALF HOUR BF
4	MET XL 25MG TABLET Metoprolol 25 MG	1-0-0	Before Food	daily	15 Days	
5	OPOX 200MG TABLET Cefpodoxime 200 MG	1-0-1	After Food	daily	5 Days	
6	CALPOL 650MG TABLET Paracetamol 650 MG	1-0-1	After Food	daily	5 Days	
7	ZANKOOL D	1-0-0	Before Food	daily	5 Days	
8	SOLVIN DX 100ML SYRUP Chlorpheniramine 2 MG + Dextromethorphan...	5-5-5	After Food	daily	5 Days	THEN SOS

Advice: DIABETIC DIET, REGULAR EXERCISE, SMBG.

Then, it was entered into a computer, and the results were calculated using Microsoft Excel 2021 360. The results were presented in the form of columns, lines, bars, pies, and doughnuts.

RESULT:

Table 1: Socio demographic characteristics of study participants (N=114).

Parameter	Value
Age (years) (Mean $\pm$ SD) [Range]	56.8 $\pm$ 10.5 [35-78]
Gender n (%)	
Male	48 (42.1%)
Female	66 (57.9%)
Religion n (%)	
Hindu	58 (50.9%)
Muslim	56 (49.1%)
Marital status n (%)	
Married	84 (73.7%)
Single	8 (7%)
Widowed	22 (19.3%)
No. of children n (%)	[0-10]
[Range]	56 (49.1%)
0-3 $\geq$ 4	58 (50.9%)
Weight n (%)	
Normal/underweight	42 (36.8%)
Moderately obese	50 (43.9%)
Obese	22 (19.3%)
Educational status n (%)	
Uneducated	32 (28.1%)
Up to school level	64 (56.1%)
Graduate	10 (8.8%)
Postgraduate	8 (7%)
Occupational class n (%)	
White collar	8 (7%)
Self employed	8 (7%)
Blue collar	10 (8.8%)
Others (housewives, retired etc.)	88 (77.2%)

About 70% of the people interviewed had at least three symptoms. The most common symptom was weakness or fatigue, which was reported by 77.2% of them. The most frequent additional health condition was hypertension, affecting 70.2% of the participants, followed by ischemic heart disease, which was present in 31.6%. Around 43.8% of the patients were using non-pharmacological methods like reducing sugar intake, walking, exercising, and practicing yoga along with their medication.

Table 2: Prescribing pattern in type 2 diabeticpatients (N = 114).

Drug group	Frequency (%)
Anti-diabetic drugs	
Biguanides	100 (87.7)
Sulphonylureas	78 (68.4)
Insulin	26 (22.8)
α glucosidase inhibitors	24 (21.1)
Dipeptidyl peptidase 4 inhibitors	12 (10.5)
Thiazolidinediones	12 (10.5)
Cardiovascular drugs	
Antiplatelets	70 (61.4)
HMG CoA reductase inhibitors	64 (56)
AT1 antagonists	54 (47.4)
β blockers	28 (24.6)
Calcium channel blockers	28 (24.6)
Nitrates	28 (24.6)
Diuretics	24 (21.1)
ACE inhibitors	22 (19.3)
Others	
Multivitamins, Folic acid, Iron	30 (26.3)
Proton pump inhibitors	22 (19.3)
Pregabalin + Methylcobalamin	20 (17.5)
Calcium	10 (8.8)
H2 receptor blockers	8 (7.0)
Antiemetics	6 (5.3)
AT1 – Angiotensin I	
ACE – Angiotensin Converting Enzyme	

Glimepiride + Metformin (50%) was most commonly prescribed combination followed by Metformin + Voglibose (7.02%). Table 3 shows distribution of antidiabetic combinations

Table 3: Distribution of antidiabetic combinations (N=114).

Combination (s)	Frequency (%)
Glimepiride + Metformin	57 (50)
Metformin + Voglibose	8 (7.02)
Glimepiride + Metformin + Pioglitazone	8 (7.02)
Metformin + Vildagliptin	4 (3.51)
Glibenclamide + Metformin	2 (1.75)
Sitagliptin + Metformin	2 (1.75)
Metformin + Methylcobalamin	2 (1.75)

DISCUSSION:

Diabetes mellitus is a serious public health issue around the world. Its occurrence is increasing in many developing regions, and India is also facing this problem. In the near future, India may become the country with the highest number of diabetes cases globally. People with Type 2 diabetes are especially important to focus on because they are at risk of developing complications quickly, and early detection and management can help prevent or slow down these complications.²⁰

The average age of the patients in this study was 56.8 years with a standard deviation of 10.5 years, which is similar to findings from other studies in India and other countries.^{21,22,23}

A large number of the diabetic patients in this study were women, which matches results from a study in the UAE²¹ but differs from some reports from India. In this study, women made up a slightly larger group, similar to what was found in a study by Sutharson L et al in 2003.²⁴ However, other studies have reported that men are more commonly affected.²⁵

CONCLUSION:

Metformin, belonging to the biguanide class, was the most frequently prescribed antidiabetic medication, accounting for approximately 87.7% of prescriptions for patients with type 2 diabetes. Among the combination therapies, the Glimepiride–Metformin regimen emerged as the most commonly utilized fixed-dose combination. The overall prescribing pattern observed in this study was found to be rational and largely consistent with the recommendations of the National Institute for Health and Care Excellence (NICE) guidelines.

Explanation of Improvements:

- “Most utilized”** → **“Most frequently prescribed”** — more formal and standard in scientific writing.
- Added “belonging to the biguanide class”** for clarity and smoother flow.
- Clarified the combination** with “Glimepiride–Metformin regimen” —

professional phrasing for a combination therapy.

- “This study revealed...”** → **“The overall prescribing pattern observed...”** — makes the tone more objective and academic.
- Expanded “NICE” to “National Institute for Health and Care Excellence”** — full name for first mention.

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