

A Study to investigate the Drug Utilization Pattern of Antidiabetic Drugs in patients with Type 2 Diabetes Mellitus at Anugrah Narayan Magadh Medical College Gaya ji Bihar

Nawlesh Singh¹, Sharad Kumar², MD Zamiruddin³

¹Associate Professor, Department of Pharmacology, Anugrah Narayan Magadh Medical College, Gaya ji, Bihar, India

²Associate Professor and HOD, Department of Pharmacology, Anugrah Narayan Magadh Medical College, Gaya ji, Bihar, India

³Associate professor, Department of Pharmacology, Anugrah Narayan Magadh Medical College, Gaya ji, Bihar, India

Received: 10-05-2026 / Revised: 25-05-2026 / Accepted: 23-06-2026

Corresponding Author: Dr. Nawlesh Singh

Conflict of interest: Nil

Abstract:

Background: Type 2 Diabetes Mellitus (T2DM) is a major chronic disorder and an increasing public health concern worldwide. Appropriate utilization of antidiabetic drug is essential for achieving good glycemic control and preventing long-term complications. Drug utilization studies help in assessing prescribing trends and rationality of therapy.

Aim: To investigate the drug utilization pattern of antidiabetic drug in patients with Type 2 Diabetes Mellitus attending a tertiary care teaching hospital

Methodology: A prospective, observational, cross-sectional study was conducted among 86 patients diagnosed with T2DM in the Medicine Outpatient Department of Pharmacology, Anugrah Narayan Magadh Medical College, Gaya ji, Bihar, India. Data regarding socio-demographic details, clinical characteristics, and prescribing patterns were collected using a structured proforma and analyzed using descriptive statistics.

Result: The mean age of patients was 55.2 ± 9.8 years, with females constituting 58.1% of the study population. Weakness/fatigue was the most common symptom (76.7%). Metformin was the most frequently prescribed drug (86.0%), followed by sulfonylureas (65.1%). Glimepiride + Metformin was the most commonly prescribed combination therapy (48.8%).

Conclusion: The study showed that prescribing practices were largely rational and consistent with standard treatment guidelines, with metformin being the preferred first-line antidiabetic drug.

Keywords: Type 2 Diabetes Mellitus, Drug Utilization Pattern, Antidiabetic Drugs, Metformin, Prescription Pattern, Rational Drug Use.

DOI: 10.25258/ijpqa.17.6.38

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Diabetes Mellitus (DM) is a significant global public health issue, especially in emerging nations such as India, where its incidence is escalating swiftly. It is a chronic metabolic condition marked by sustained hyperglycemia due to deficiencies in insulin production, insulin action, or both. Type 2 Diabetes Mellitus (T2DM) is the most prevalent form of diabetes, constituting the majority of global diabetes cases. The escalating prevalence of T2DM markedly enhances morbidity, death, and healthcare expenditures [1].

The World Health Organization (WHO) predicts that the number of persons with diabetes in India was around 31.7 million in 2000 and is expected to increase significantly in the forthcoming decades.

This concerning increase underscores the necessity for efficient disease management techniques and judicious medication utilisation. Inadequately managed diabetes can result in severe consequences, including cardiovascular illnesses, neuropathy, nephropathy, and retinopathy, hence necessitating effective treatment [2].

The therapy of T2DM encompasses both non-pharmacological strategies, including lifestyle adjustment, dietary regulation, physical exercise, and pharmaceutical treatments utilising antidiabetic medications. A diverse array of oral hypoglycemic medicines and insulin formulations is available for therapy. Commonly recommended pharmacological groups include biguanides (e.g., metformin), sul-

fonylureas, thiazolidinediones, and newer medicines such as DPP-4 inhibitors and SGLT2 inhibitors. The selection of therapy is contingent upon several aspects, including patient attributes, illness severity, concomitant comorbidities, and clinical recommendations [3].

Drug utilisation studies are essential for assessing prescription trends in clinical practice. These investigations offer critical insights into the rationale behind medication use, facilitate the identification of improper prescribing practices, and evaluate compliance with established treatment standards, including those advocated by the WHO and other regulatory authorities. Irrational prescription, including polypharmacy, wrong medication selection, or erroneous dose, can result in diminished patient adherence, heightened risk of adverse drug responses, uncontrolled blood glucose levels, and escalated healthcare expenses [4].

Individuals with Type 2 Diabetes Mellitus frequently present with concomitant comorbidities, notably hypertension and cardiovascular disorders, which exacerbate treatment complexities and elevate the probability of polypharmacy. This elevates the danger of polypharmacy and possible medication interactions, underscoring the necessity of overseeing prescription practices. Consequently, drug utilization studies are vital for ensuring safe, effective, and cost-efficient treatment [5].

Furthermore, analysing the utilisation patterns of antidiabetic medications aids in determining if physicians comply with evidence-based guidelines and if current prescribing trends are conducive to optimal patient care. Such studies can aid healthcare professionals, policymakers, and drug and therapeutic committees in enacting essential modifications to foster rational medication utilisation [6].

This study seeks to examine the drug utilisation patterns of antidiabetic medications in individuals with Type 2 Diabetes Mellitus. The results of this study aim to furnish valuable insights into contemporary prescription practices, pinpoint prospective areas for enhancement, and facilitate improved diabetes control through judicious medication.

Methodology

Study Design: The present study was a prospective, observational, cross-sectional study conducted to evaluate the drug utilization pattern of antidiabetic drugs in patients with Type 2 Diabetes Mellitus.

Study Duration: The study was carried out over one year period

Study Area: The study was conducted in the Department of Pharmacology at Anugrah Narayan Magadh Medical College, Gaya ji, Bihar, India.

Sample Size: A total of 86 patients diagnosed with Type 2 Diabetes Mellitus were included in the study.

Sampling Technique: A convenient sampling technique was employed, wherein all eligible patients attending the OPD during the study period and fulfilling the inclusion criteria were recruited consecutively until the required sample size was achieved.

Inclusion Criteria

- Patients diagnosed with Type 2 Diabetes Mellitus.
- Patients aged ≥ 18 years.
- Patients on antidiabetic drug therapy for at least one month.
- Patients who were willing to provide informed consent.

Exclusion Criteria

- Patients with Type 1 Diabetes Mellitus or gestational diabetes.
- Patients with severe complications require immediate hospitalization.
- Patients who were not on any pharmacological treatment.
- Patients are unwilling or unable to provide complete information.

Data Collection: Data were collected using a pre-designed and structured data collection form (proforma). Information regarding socio-demographic details (age, gender), clinical characteristics (duration of diabetes, comorbidities), and prescription details (type and number of antidiabetic drugs, dosage forms, frequency, and associated medications) was recorded. Additional data such as fasting and postprandial blood glucose levels were also documented wherever available from patient records.

Procedure: Eligible patients attending the medicine OPD were identified and approached during their visit. After explaining the purpose of the study, informed consent was obtained. Patient details and prescription information were recorded from medical records and direct patient interviews. Each prescription was analyzed to identify the pattern of antidiabetic drug use, including monotherapy, combination therapy, and co-prescribed drugs. The prescribing patterns were further evaluated based on standard treatment guidelines to assess rationality.

Ethical Consideration: The study was conducted after obtaining approval from the Institutional Ethics Committee (IEC) of the respective institution. All procedures followed were in accordance with ethical standards for biomedical research involving human subjects. Confidentiality and privacy of patient information were strictly maintained, and data were used solely for research purposes. Written informed consent was obtained from all participants prior to their inclusion in the study.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using appropriate statistical software such as SPSS version

20. Descriptive statistics including mean, standard deviation, frequencies, and percentages were used to summarize the data. The drug utilization pattern was assessed using WHO prescribing indicators, and results were presented in the form of tables and charts for better interpretation”.

Result

Table 1 presents the socio-demographic characteristics of the research participants, revealing a mean

age of 55.2 ± 9.8 years, suggesting that Type 2 Diabetes Mellitus is more prevalent among middle-aged and older adults. Female patients represented a greater percentage, 50 (58.1%), in contrast to male patients, 36 (41.9%). The majority of participants were married, with 64 (74.4%) individuals, and 48 (55.8%) patients attained schooling only up to the school level, indicating a middle educational position within the study group.

Table 1: Socio-demographic characteristics (N = 86)

Parameter	Value
Age (Mean $\pm$ SD)	55.2 $\pm$ 9.8 years
Gender	Male: 36 (41.9%) Female: 50 (58.1%)
Education (Up to school level)	48 (55.8%)
Married	64 (74.4%)

Table 2 illustrated the clinical factors of the patients. Weakness/fatigue was the most presenting symptom in 66 (76.7%) individuals, followed by tingling/numbness in 48 (55.8%) and polyuria in 40

(46.5%) patients. Furthermore, 60 (69.8%) individuals had three or more symptoms related to diabetes mellitus, signifying inadequate glycaemic regulation and chronic disease advancement.

Table 2: Clinical variables (N = 86)

Clinical Variable	Frequency (%)
≥ 3 symptoms	60 (69.8%)
Weakness/Fatigue	66 (76.7%)
Polyuria	40 (46.5%)
Tingling/Numbness	48 (55.8%)

Table 3 depicted the trend of antidiabetic medication usage among study participants. Biguanides, predominantly metformin, were the most commonly given medications in 74 (86.0%) patients, followed by sulfonylureas in 56 (65.1%) individuals. Insulin treatment was administered to 18 (20.9%) patients,

whereas alpha-glucosidase inhibitors and DPP-4 inhibitors were utilised in 16 (18.6%) and 10 (11.6%) patients, respectively. The results demonstrate that metformin continues to be the favoured first-line antidiabetic medication, whether used independently or in combination treatment.

Table 3: Antidiabetic drug utilization (N = 86)

Drug Group	Frequency (%)
Biguanides (Metformin)	74 (86.0%)
Sulfonylureas	56 (65.1%)
Insulin	18 (20.9%)
α -glucosidase inhibitors	16 (18.6%)
DPP-4 inhibitors	10 (11.6%)

Table 4 illustrated the utilisation patterns of antidiabetic medication combinations. The predominant prescription combination was Glimepiride + Metformin in 42 (48.8%) patients, succeeded by Metformin + Voglibose in 6 (7.0%) patients and Metformin + Pioglitazone in 6 (7.0%) patients. Metformin and

Sitagliptin were administered in 4 patients (4.6%). These data indicate that combination medication was frequently utilised to attain improved glycaemic control in individuals insufficiently controlled with monotherapy.

Table 4: Antidiabetic combinations

Combination	Frequency (%)
Glimepiride + Metformin	42 (48.8%)
Metformin + Voglibose	6 (7.0%)
Metformin + Pioglitazone	6 (7.0%)
Metformin + Sitagliptin	4 (4.6%)

Discussion

This study aimed to assess the drug utilisation patterns of antidiabetic medications in patients with Type 2 Diabetes Mellitus in a tertiary care teaching hospital. Diabetes mellitus is a persistent metabolic condition necessitating prolonged pharmacological treatment and continuous monitoring. Drug utilisation studies are essential for analysing prescribing patterns, analysing the rational use of medications, and enhancing patient outcomes [7].

The mean age of patients in this research was 55.2 ± 9.8 years, suggesting a higher prevalence of Type 2 Diabetes Mellitus among middle-aged and older adults. Ramachandran et al. found same findings, noting a heightened prevalence of diabetes in adults over 50 years of age attributable to a sedentary lifestyle, obesity, and age-related insulin resistance. The observed female preponderance in this study aligns with findings from Sharma et al. and Patel et al., where women represented a somewhat greater percentage of diabetes patients visiting outpatient clinics. This may be ascribed to hormonal variables, obesity, and increased healthcare-seeking behaviour among females [8].

Weakness and weariness were the predominant symptoms reported in this research, succeeded by tingling, numbness, and polyuria. These findings align with the traditional signs of uncontrolled diabetic mellitus. Gupta et al. also observed that weariness and neuropathic sensations are prevalent complaints among diabetes patients. The significant number of individuals exhibiting various symptoms suggests a delayed diagnosis or insufficient glycaemic management, thereby elevating the risk of long-term consequences [9].

The current investigation revealed that metformin was the most often prescribed antidiabetic medication. This conclusion aligns with worldwide and national treatment guidelines that endorse metformin as the primary therapy for Type 2 Diabetes Mellitus, owing to its efficacy, safety profile, cost-effectiveness, and beneficial impact on body weight. Comparable prescription patterns were seen in the studies conducted by Acharya et al. and Sultana et al., indicating that metformin was administered to over 80% of diabetes patients. The significant use of metformin in this investigation demonstrates compliance with evidence-based treatment protocols [10].

Sulfonylureas constituted the second most often prescribed class of medications. These medications are frequently employed when glycaemic control is not attained with metformin monotherapy. Their extensive utilisation may be attributed to affordability, accessibility, and efficacy in lowering blood glucose levels. Prolonged usage of sulfonylureas may elevate the risk of hypoglycemia

and weight gain, particularly in older individuals. Consequently, consistent monitoring is essential during therapy [11].

Insulin treatment was administered to 20.9% of patients, predominantly among individuals with inadequate glycaemic control or chronic diabetes. Comparable insulin utilisation patterns have been documented in prior Indian research. Despite insulin's efficacy, apprehension around injections, financial constraints, and inadequate patient adherence sometimes restrict its application in outpatient environments. The reduced utilisation of DPP-4 inhibitors and alpha-glucosidase inhibitors noted in this investigation may stem from elevated treatment expenses and restricted availability in resource-limited environments [12].

Combination treatment was often administered in this research, with Glimepiride and Metformin being the predominant combination. This combination has synergistic modes of action by enhancing insulin sensitivity and augmenting insulin secretion. Comparable results were observed in investigations by Kumar et al. and Ramesh et al., wherein dual therapy utilising metformin and sulfonylureas emerged as the favoured treatment approach. Combination medication is advantageous for attaining improved glycaemic control and mitigating disease development when monotherapy proves inadequate [13].

The study results demonstrate that prescribing methods were predominantly reasonable and substantially aligned with established treatment standards. The occurrence of polypharmacy in certain individuals underscores the necessity for ongoing prescription evaluation and patient counselling to reduce adverse drug responses and enhance medication adherence [14].

This study offers significant insights into contemporary antidiabetic medication practices in a tertiary care hospital. Drug utilisation studies are crucial for fostering rational pharmacotherapy, enhancing treatment results, and alleviating the economic burden linked to diabetes mellitus.

Conclusion

This study offers significant insight into the prescribing patterns of antidiabetic medications for patients with Type 2 Diabetes Mellitus in a tertiary care teaching hospital. The results indicated that metformin was the predominant antidiabetic medication provided, whether alone or in conjunction with other pharmaceuticals, underscoring its recognised position as the first-line treatment per recognised therapeutic recommendations. Among combination medications, Glimepiride + Metformin was the most commonly given regimen, reflecting the increasing desire for combination therapy to attain ac-

ceptable glycaemic control in patients inadequately responding to monotherapy. The study revealed that a considerable percentage of patients had symptoms like weakness, weariness, polyuria, and tingling/numbness, indicating the chronic nature of diabetes and the necessity for ongoing monitoring and efficient care. The prescription behaviours identified in the study were predominantly sensible and aligned with established guidelines. The existence of many medication regimens in certain individuals underscores the necessity for routine prescription evaluation, patient education, and vigilance for adverse drug responses and interactions. Drug utilisation studies, like the current one, are essential for assessing contemporary treatment trends, fostering rational medication usage, strengthening patient adherence, decreasing healthcare expenses, and ultimately improving the quality of diabetes care and patient outcomes.

References

1. Cannon A, Handelsman Y, Heile M, Shannon M. Burden of illness in type 2 diabetes mellitus. *Journal of managed care & specialty pharmacy*. 2018 Sep;24(9-a Suppl):S5-13.
2. Fatima T, Naseer B. Diabetes prevalence in India and its management through Indian system of medicines. *International Journal of Unani and Integrative Medicine*. 2018 Jan 1;2(2):36-42.
3. Raveendran AV, Chacko EC, Pappachan JM. Non-pharmacological treatment options in the management of diabetes mellitus. *European endocrinology*. 2018 Sep 10;14(2):31.
4. Jain S, Upadhyaya P, Goyal J, Kumar A, Jain P, Seth V, Moghe VV. A systematic review of prescription pattern monitoring studies and their effectiveness in promoting rational use of medicines. *Perspectives in clinical research*. 2015 Apr 1;6(2):86-90.
5. Hussain S, Chowdhury TA. The impact of comorbidities on the pharmacological management of type 2 diabetes mellitus. *Drugs*. 2019 Feb 1;79(3):231-42.
6. Butt MD, Ong SC, Rafiq A, Malik T, Sajjad A, Batool N, Chughtai AU, Wahab MU, Abdullah M, Babar ZU. An observational multi-center study on type 2 diabetes treatment prescribing pattern and patient adherence to treatment. *Scientific reports*. 2023 Dec 27;13(1):23037.
7. Jain S, Upadhyaya P, Goyal J, Kumar A, Jain P, Seth V, Moghe VV. A systematic review of prescription pattern monitoring studies and their effectiveness in promoting rational use of medicines. *Perspectives in clinical research*. 2015 Apr 1;6(2):86-90.
8. Parameswarappa DC, Rajalakshmi R, Mohamed A, Kavya S, Munirathnam H, Manayath G, Kumar MA, Raman R, Vignesh TP, Ramasamy K, Mani S. Severity of diabetic retinopathy and its relationship with age at onset of diabetes mellitus in India: A multicentric study. *Indian Journal of Ophthalmology*. 2021 Nov 1;69(11):3255-61.
9. Brown RS, Goldfarb-Rumyantzev A. Symptoms, Signs, and Differential Diagnosis. *Clinical Handbook of Nephrology-E-Book*. 2023 Aug 3:5.
10. Grammatiki M, Sagar R, Ajjan RA. Metformin: is it still the first line in type 2 diabetes management algorithm?. *Current Pharmaceutical Design*. 2021 Mar 1;27(8):1061-7.
11. Gross JL, Kramer CK, Leitão CB, Hawkins N, Viana LV, Schaan BD, Pinto LC, Rodrigues TC, Azevedo MJ, Diabetes and Endocrinology Meta-analysis Group (DEMA)*. Effect of anti-hyperglycemic agents added to metformin and a sulfonylurea on glycemic control and weight gain in type 2 diabetes: a network meta-analysis. *Annals of internal medicine*. 2011 May 17;154(10):672-9.
12. World Health Organization. Guidelines on second-and third-line medicines and type of insulin for the control of blood glucose levels in non-pregnant adults with diabetes mellitus. World Health Organization; 2018.
13. Lavrador M, Cabral AC, Castel-Branco M, Figueiredo IV, Fernandez-Llimos F. Polypharmacy and medication adherence. In *Aging* 2023 Jan 1 (pp. 435-453). Academic Press.