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Original Research Article

Assessment of antidiabetic drug utilization and prescribing trends in outpatient care at a district general hospital in central Maharashtra

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ABSTRACT

Background: Diabetes mellitus is a growing global health challenge with substantial morbidity, particularly in low- and middle-income countries like India. Rational prescribing of antidiabetic medications is essential to optimize glycemic control and reduce complications.
Methods: A prospective observational study was conducted involving 605 diabetic patients. Prescriptions were analyzed using World Health Organization (WHO) prescribing indicators focusing on monotherapy versus combination therapy, drug classes prescribed, and adherence to essential medicines and generic prescribing.
Results: The majority of patients were males (69.4%) aged 60-69 years (38%). The average number of antidiabetic drugs per prescription was 1.7. Monotherapy was prescribed in 31.4% of cases, while 68.6% received combination therapy. Metformin was the most commonly prescribed drug (95.9%), followed by Glimepiride (47.1%). Combination therapy of Glimepiride + Metformin was the most frequent regimen (43.3%). Insulin was prescribed in 6.6% of cases, predominantly biphasic insulin. All drugs were prescribed by generic names, with 98.3% from the National List of Essential Medicines (NLEMs).
Conclusions: Metformin remains the cornerstone of antidiabetic therapy, with a clear preference for combination regimens, particularly Metformin plus Glimepiride, reflecting guideline-based practice for intensified glycemic control. The high rate of generic prescribing and use of essential medicines demonstrates adherence to rational prescribing principles. Ongoing prescription monitoring and patient-centered therapy adjustments are recommended to further optimize diabetes management.

Keywords: Antidiabetic drugs, Prescribing patterns, Rational drug use, Drug utilization review

INTRODUCTION

Diabetes mellitus represents a significant and growing global health challenge, with its prevalence nearly doubling from 7% in 1990 to 14% in 2022 among adults worldwide. Currently, over 500 million adults live with diabetes, and low- and middle-income countries bear the greatest burden, accounting for over 80% of cases. Despite its growing prevalence, many patients remain untreated or poorly controlled, leading to severe complications such as cardiovascular disease, kidney failure, neuropathy, and retinopathy. These complications result in substantial morbidity, mortality, and healthcare costs globally.[1]

India is among the countries most affected, with an estimated 90 million adults diagnosed with diabetes, ranking second worldwide. The increasing urbanization, lifestyle changes, and genetic factors contribute to this rising incidence. Poor glycemic control remains a critical issue, influencing the risk of both microvascular and macrovascular complications in patients.[2]

Metformin remains the cornerstone of type 2 diabetes management due to its efficacy, safety profile, and affordability. It primarily lowers hepatic glucose production and improves insulin sensitivity, with minimal risk of hypoglycemia. Sulfonylureas such as Glimepiride and Gliclazide—second-generation agents—are

commonly prescribed as add-on therapies to metformin, stimulating insulin secretion from pancreatic beta cells. Among sulfonylureas, Gliclazide is noted for its relatively lower hypoglycemia risk and additional antioxidative benefits.[3,4]

Rational drug use, as defined by the World Health Organization, emphasizes appropriate drug selection, dosage, and cost-effectiveness to optimize patient outcomes. Prescription pattern monitoring studies are vital tools to evaluate real-world adherence to clinical guidelines and to identify irrational or suboptimal prescribing behaviors. In diabetes management, such studies help tailor therapy, improve glycemic control, and reduce adverse effects.[5]

Given the complexity of diabetes treatment and the evolving pharmacotherapeutic options, analyzing prescribing patterns in specific populations provides insights into current clinical practice and informs strategies for improved care delivery. This study aims to examine the prescribing patterns of anti-diabetic drugs in patients attending the outpatient department at a District General Hospital, thereby contributing to the promotion of rational drug use and enhanced diabetes management at the community level.

METHODS

A prospective observational study was conducted at the outpatient department of the District General Hospital to evaluate the prescribing patterns of anti-diabetic drugs. A total of 605 diabetic patients attending the outpatient clinic were enrolled after obtaining informed written consent.

Inclusion criteria

Adult patients diagnosed with diabetes mellitus who were receiving treatment with oral hypoglycemic agents or insulin were included.

Exclusion criteria

Patients with incomplete prescriptions or unable to provide consent were excluded.

Patient prescriptions were collected and systematically analyzed over the study period. The prescribing pattern of anti-diabetic drugs was assessed based on the World Health Organization (WHO) prescribing indicators, which include evaluating the number of drugs prescribed, the proportion of essential medicines prescribed, and the frequency of specific classes of anti-diabetic medications utilized.

Data collected included patient demographics, type and number of anti-diabetic drugs prescribed (monotherapy versus combination therapy), and use of fixed-dose combinations. Data were entered into a standardized data collection form and analyzed using descriptive statistical methods to identify prescribing trends.

RESULTS

A total of 605 diabetic patients attending the outpatient department were included in this study. The demographic distribution showed that the majority of patients (38%) were in the age group of 60 to 69 years (Figure 1), with males constituting 69.4% of the study population (Figure 2).

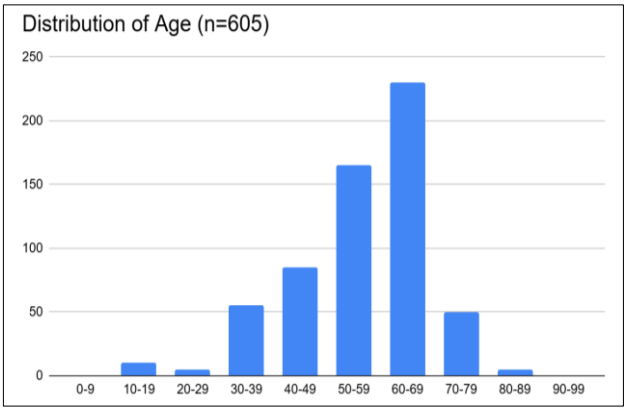

Figure 1: Distribution of age (n=605).

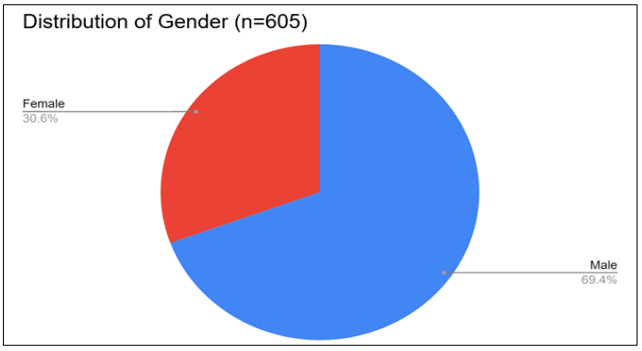

Figure 2: Distribution of gender (n=605).

The average number of anti-diabetic drugs prescribed per patient was 1.7. Monotherapy was prescribed in 31.4% of patients, while 68.6% of prescriptions involved combination therapy with two or more drugs. Generic prescribing was strictly followed, with 100% of drugs prescribed by their generic names. Additionally, 98.3% of prescribed drugs were from the National List of Essential Medicines (NLEM), reflecting adherence to standard treatment guidelines.

In the study of 605 patients, Metformin emerged as the most commonly prescribed oral hypoglycemic agent, being included in 95.9% of prescriptions. Glimepiride, a sulfonylurea, was the second most frequently prescribed drug, appearing in 47.1% of cases. This distribution highlights the predominant reliance on Metformin as a first-line therapy, with a significant proportion of patients

also receiving Glimepiride, either as monotherapy or in (Table 1).

Table 1: Common oral hypoglycaemic drugs prescribed (n=605).

Drugs	Number of prescriptions	Percentage
Metformin only	234	38.6
Glimiperide+ Metformin	262	43.3
Metformin + Gliclazide	76	12.6
Gliclazide only	28	4.7
Glimiperide + Metformin + Gliclazide	5	0.8
Total	605	100

The most frequently prescribed regimen was the combination of Glimepiride and Metformin (43.3%), followed closely by Metformin monotherapy (38.6%). The combination of Metformin with Gliclazide was less common (12.6%), while Gliclazide monotherapy accounted for only 4.7% of prescriptions.

Triple drug therapy was extremely rare, observed in just 0.8% of cases. Overall, Metformin—whether used alone or in combination—served as the cornerstone of treatment in more than 95% of patients. The predominance of combination therapy in over half the cases (>50%) suggests that a substantial proportion of patients required more intensive glycemic control than could be achieved with monotherapy.

Oral hypoglycemic agents accounted for the majority of treatments, being prescribed in 93.4% of cases. Injectable therapies, primarily insulin, were used in 6.6% of patients. Among those receiving insulin, 15 patients were treated with Regular insulin, while 25 patients were prescribed Biphasic insulin (Figure 3).

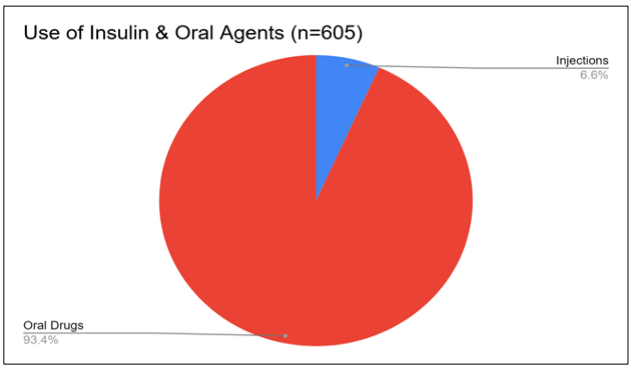

Figure 3: Use of insulin and oral hypoglycemic agents (n=605).

DISCUSSION

The present study provides valuable insights into the prescribing patterns of antidiabetic drugs in an outpatient setting at a district general hospital, revealing important trends in diabetes management and adherence to evidence-based guidelines.

Demographic characteristics

The study population predominantly consisted of males (69.4%) and patients aged 60-69 years (38%), which aligns with epidemiological data showing higher diabetes prevalence in middle-aged adults. The male predominance observed in our study is consistent with several similar studies conducted in Indian healthcare settings, though this may partly reflect healthcare-seeking behavior patterns rather than true disease prevalence differences.[6-9]

Prescription pattern analysis

Metformin dominance

Our findings demonstrate that metformin was prescribed in 95.9% of patients, either as monotherapy or in combination, which strongly aligns with current diabetes management guidelines. This high utilization rate is comparable to studies by Chhetri et al (87.56%), Satpathy et al (84%), and slightly higher than reported by Raj et al (66%). The widespread use of metformin reflects appropriate adherence to evidence-based guidelines that recommend metformin as first-line therapy due to its proven cardiovascular benefits, weight neutrality, and low hypoglycemia risk.[7,9–11]

Combination therapy trends

The predominance of combination therapy (68.6%) over monotherapy (31.4%) in our study is consistent with contemporary diabetes management approaches. Similar findings were reported by Chhetri et al (66.67%), Satpathy et al (70%), and Raj et al (54%). This trend likely reflects the progressive nature of type 2 diabetes and the need for intensified therapy to achieve glycemic targets in patients with established disease.[7,9,12]

The most common combination was Glimepiride + Metformin (43.3%), which matches findings from multiple studies. This combination is pharmacologically rational, combining metformin's insulin-sensitizing effects with glimepiride's insulin secretagogue properties, providing complementary mechanisms for glycemic control.[6,8,13]

Sulfonylurea selection patterns

Glimepiride emerged as the preferred sulfonylurea (47.1% of prescriptions), while gliclazide was less commonly used (17.3% when including combinations). This preference differs from some international studies where gliclazide is more frequently prescribed. The preference for glimepiride in our setting may reflect clinician familiarity, availability, or cost considerations, though both agents are considered safe and effective second-generation sulfonylureas.[14-17]

Insulin utilization

Insulin was prescribed in 6.6% of patients, with biphasic insulin being more common than regular insulin. This relatively low insulin utilization rate is consistent with the outpatient setting and the fact that most patients had type 2 diabetes manageable with oral agents. The preference for biphasic insulin reflects its convenience in providing both basal and prandial coverage.[18]

Generic prescribing and essential medicines

The finding that 100% of drugs were prescribed by generic names represents excellent adherence to rational prescribing practices and contrasts sharply with studies reporting poor generic prescribing. Additionally, 98.3% of drugs were from the NLEM, indicating strong compliance with national drug policy guidelines.[6,9]

Comparison with clinical guidelines

The prescribing patterns observed in our study largely align with American Diabetes Association and other international guidelines that recommend metformin as first-line therapy, followed by the addition of sulfonylureas for patients not achieving glycemic targets. The average of 1.7 drugs per prescription suggests appropriate step-wise intensification of therapy.[13]

Clinical implications

The high prevalence of combination therapy suggests that many patients in our population have established diabetes requiring multiple agents for adequate control. This underscores the importance of early diagnosis and intervention to potentially delay the need for combination therapy.

Limitations

Several limitations should be acknowledged such as single-center study design may limit generalizability to other healthcare settings, cross-sectional nature prevents assessment of treatment outcomes and long-term effectiveness, lack of clinical data such as HbA1c levels, BMI, and comorbidities limits correlation with treatment appropriateness, no follow-up data on treatment adherence or glycemic control outcomes, absence of cost-effectiveness analysis of different treatment combinations, limited assessment of adverse effects and treatment tolerability, no evaluation of patient satisfaction or quality of life measures.

Future research directions

Future studies should include longitudinal follow-up to assess treatment effectiveness, incorporate clinical parameters for better correlation with prescribing appropriateness, and evaluate patient-reported outcomes to provide a more comprehensive understanding of diabetes management in similar healthcare settings.

CONCLUSION

Our study highlights that in the outpatient setting of a District General Hospital, the predominant antidiabetic prescribing pattern conforms with international and national guidelines. Metformin, either alone or in combination, forms the backbone of therapy in over 95% of patients. A majority of patients receive combination therapy, chiefly Glimepiride plus Metformin, indicating the progressive nature of type 2 diabetes requiring intensified treatment. The low proportion of insulin use aligns with the outpatient context and stage of disease. The practice of 100% generic prescribing and nearly complete reliance on essential medicines underscores a commitment to rational, cost-effective therapy. These prescribing trends support optimal management of diabetes but also call for ongoing evaluation to balance glycemic targets with safety, patient adherence, and emerging therapeutic options. Future studies incorporating clinical outcomes and long-term follow-up are warranted to further enhance diabetes care quality.

Recommendations

Based on the findings, some recommendations were continued emphasis on metformin as first-line therapy while ensuring appropriate contraindication screening, regular review of combination therapy appropriateness to optimize glycemic control while minimizing adverse effects, enhanced patient education on medication adherence and lifestyle modifications, periodic evaluation of prescribing patterns to ensure continued adherence to evolving guidelines, consider individualized therapy based on patient characteristics, comorbidities, and risk factors training programs for healthcare providers on optimal diabetes management and rational prescribing.

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REFERENCES

1. World Health Organization. Urgent action needed as global diabetes cases increase four-fold over past decades. Available at: https:/ /www. who.int/news/ item/13-11-2024-urgent-action-needed-as-global-diabetes-cases-increase-four-fold-over-past-decades. Accessed on 07 August 2025.
2. Diabetes Atlas. Home. Available at: https:// diabetesatlas.org/. Accessed on 07 August 2025.

3. Das S, Chappalagavi AS, Kalra S, Choudhury AK, Meher D, Sahu SK, et al. The Role of Gliclazide as a Preferred Modern Sulfonylurea. Curr Trends Intern Med. 2025;9(1).
4. Baker C, Retzik-Stahr C, Singh V, Plomondon R, Anderson V, Rasouli N. Should metformin remain the first-line therapy for treatment of type 2 diabetes? Ther Adv Endocrinol Metab. 2021;12:2042018820980225.
5. Chaturvedi VP, Mathur AG, Anand AC. Rational drug use – As common as common sense? Med J Armed Forces India. 2012;68(3):206-8.
6. Kumar PA, Kumar RR. Prescribing pattern of antidiabetic drugs in tertiary care hospital. Int J Basic Clin Pharmacol. 2021;10(3):251-4.
7. Karki N, Kandel K, Shah K, Prasad P, Khanal J. Combination Therapy in Diabetes Mellitus Patients Attending Outpatient Department in a Tertiary Care Centre: A Descriptive Cross-sectional Study. JNMA J Nepal Med Assoc. 2022;60(256):1016-20.
8. Pawar MP, Yuwnate AH, Umathe A, Abraham JP. Drug utilization study of anti-diabetic drugs in patients attending medicine outpatient department at a tertiary care hospital in Western Maharashtra. Int J Basic Clin Pharmacol. 2023;12(6):794-8.
9. Kakade A, Mohanty IR, Rai S, Kakade A, Mohanty IR, Rai S. Assessment of Prescription Pattern of Antidiabetic Drugs in the Outpatient Department of a Tertiary Care Hospital. Int J Clin Endocrinol Metab. 2017;3(1):001-7.
10. Andraos J, Smith SR, Tran A, Pham DQ. Narrative review of data supporting alternate first-line therapies over metformin in type 2 diabetes. J Diabetes Metab Disord. 2024;23(1):385-94.
11. Baker C, Retzik-Stahr C, Singh V, Plomondon R, Anderson V, Rasouli N. Should metformin remain the first-line therapy for treatment of type 2 diabetes? Ther Adv Endocrinol Metab. 2021;12:2042018820980225.
12. Sharma T, Sahai R, Bala S, Dhasmana DC, Kaeley N. Prescribing pattern of oral anti-diabetic agents in type 2 diabetes mellitus patients in a tertiary care hospital. Int J Basic Clin Pharmacol. 2018;7(5):956-60.
13. Tiwari K, Bisht M, Kant R, Handu SS. Prescribing pattern of anti-diabetic drugs and adherence to the American Diabetes Association's (ADA) 2021 treatment guidelines among patients of type 2 diabetes mellitus: A cross-sectional study. J Fam Med Prim Care. 2022;11(10):6159-64.
14. Yamazaki M, Takebe T, Hosokawa M, Saika T, Nakao Y, Ikeda S, et al. Sulfonylurea prescription patterns in elderly patients with type 2 diabetes mellitus: A comprehensive analysis of real-world data from pharmacies in Japan. J Diabetes Investig. 2024;15(11):1604-13.
15. Das AK, Saboo B, Chawla R, Aravind SR, Rajput R, Singh AK, et al. Time to reposition sulfonylureas in type 2 diabetes management in Indian context: A pragmatic practical approach. Int J Diabetes Dev Ctries. 2023;43(6):856-74.
16. Sahin I, Bakiner O, Demir T, Sari R, Atmaca A. Current Position of Gliclazide and Sulfonylureas in the Contemporary Treatment Paradigm for Type 2 Diabetes: A Scoping Review. Diabetes Ther. 2024;15(8):1687-716.
17. Khunti K, Hassanein M, Lee MK, Mohan V, Amod A. Role of Gliclazide MR in the Management of Type 2 Diabetes: Report of a Symposium on Real-World Evidence and New Perspectives. Diabetes Ther. 2020;11(2):33-48.
18. Dias DL, Gomes EJ. Insulin prescribing pattern in geriatric type 2 diabetic mellitus patients of different nutritional status at a tertiary level of health care: a retrospective study. Int J Basic Clin Pharmacol. 2019;8(3):584-8.

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