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Study of prescription pattern of antidiabetic drugs in patients with Type 2 Diabetes Mellitus in a tertiary care teaching hospital of central India:An observational, cross-sectional study

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A B S T R A C T

Aim and Objective: To study the prescription patterns in patients receiving treatment for Type 2 Diabetes mellitus at a tertiary care teaching hospital by analysing the medication trends.

Materials and Methods: A cross-sectional, observational study was conducted in a tertiary care teaching hospital with Institutional Ethics Committee approval. Data were systematically gathered from patient case files in the medicine wards, medicine outpatient department (OPD), diabetes OPD, and the dispensary, using a custom-designed proforma after obtaining necessary permissions. The study included patients diagnosed with type 2 Diabetes mellitus under treatment at the hospital.

Results and Discussion: A study of 170 type 2 diabetes patients showed the predominant use of metformin, with glimepiride as the primary add-on for 96 patients. Other add-ons like glipizide, teneligliptin, and vildagliptin were used by one patient each. Six patients required triple therapy, typically combining teneligliptin, vildagliptin, or voglibose as second add-ons. Four patients were receiving insulin, but it was not included in the hospital formulary. The treatment approach largely depended on metformin and glimepiride. A cost-effectiveness analysis comparing glimepiride to dapagliflozin found an incremental cost of ₹73 per year for a reduction of 1 mmol/mol HbA1C with dapagliflozin.

Conclusion: The study suggests a predominant reliance on Metformin and Glimepiride for the management of type 2 Diabetes Mellitus. The incremental cost-effective ratio (ICER) indicates that substituting Dapagliflozin as a second-line agent will increase yearly costs minimally for HbA1C improvements.

Key words- Type 2 Diabetes Mellitus, Prescription patterns, Cost-effectiveness analysis

INTRODUCTION

Diabetes mellitus(DM) presents a significant healthcare challenge on a global scale, necessitating a personalised approach to patient care. According to the International Diabetes Federation (IDF), India had approximately 77 million adults aged between 20 to 79 living with diabetes in 2021, and projected to rise to 101.2 million by 2030 as per the current trends (IDF Diabetes Atlas, 10th edn,2021). A study published in the Indian Journal of Endocrinology and Metabolism revealed a diabetes prevalence rate of 10.9% in urban areas of Central India (Gupta A et al,2014). The key parameter while management as per the guidelines is the Glycosylated haemoglobin based on which the treatment is initiated and monitored. Understanding the prescribing patterns of anti-diabetic medications is crucial for optimising

treatment outcomes and ensuring adherence to established guidelines for the management of type 2 diabetes mellitus. The treatment includes various oral anti-diabetic drugs like Biguanides, Sulfonylureas (SU), Alpha glucosidase inhibitors, Meglitinides, Thiazolidinedione (TZD), Dipeptidyl Peptidase 4 Inhibitors (DDP-4 inhibitors), and Sodium Glucose Co-transport 2 Inhibitors (SGLT-2 inhibitors) (Keezhipadathil J,2019).

As per the American Diabetes Association (ADA) 2024 guidelines for the management of type 2 DM, after inadequate response to lifestyle modification, oral anti-diabetic drugs are prescribed in which metformin is usually the first drug to be initiated. The next choice of drug is based on the risk factors and concomitant illness in which either Glucagon-like peptide 1 analogues (GLP-1 analogues) or SGLT-2 inhibitors are to be given (ADA,*Standards of Care in Diabetes,2024)*.

Nevertheless, in a lower-middleincome country setting like India, sulfonylureas remain a frequently prescribed second-line therapy, accounting for a substantial proportion (35.6%) of prescriptions after metformin. They maintain clinical relevance as effective insulin secretagogues with a well-established history of glycemic control. Their strong glucose-lowering efficacy, particularly as an add-on therapy to metformin, remains advantageous for specific patient populations. In the Indian context, SUs could be considered a pragmatic choice for patients without atherosclerotic cardiovascular disease (ASCVD), chronic kidney disease (CKD), or heart-failure like comorbidities where newer agents demonstrate superior organ protection (Das AK et al,2023).

However many of the long term complications of diabetes include Diabetic Kidney Disease (Zanchi A et al,2014) or ASCVD (Li Y et al,2014) where sulfonylurea does not prevent its development. Sulfonylurea is also notorious for causing hypoglycemia and beta cell exhaustion which leads to worsening of Type II Diabetes in future (Costello RA et al,2025).

Building upon these insights, our research aims to investigate the prescribing patterns of anti-diabetic drugs among diabetic patients at a tertiary care hospital in central India. Through a comprehensive analysis of prescribing trends, our study seeks to improve the quality of care provided to diabetic patients, ultimately striving for better health outcomes and optimise the management of diabetes in central India.

METHODOLOGY

This observational, cross-sectional study was conducted at the Department of Medicine and Department of Pharmacology of a tertiary care teaching hospital in Central India in accordance with Declaration of Helsinki as per ICH-GCP guidelines after obtaining approval from the Institutional Ethics Committee. The study was carried out over 3 months. The study population consisted of patients of all genders above 18 years of age diagnosed with type 2 Diabetes Mellitus (T2DM) receiving treatment at the hospital. Inclusion criteria comprised patients prescribed medications for T2DM during their hospitalization or outpatient visits and were willing to provide informed consent. Patients unwilling to provide informed consent or with incomplete medical records were excluded.

Data were systematically gathered from patient case files in the medicine wards, medicine outpatient department (OPD), diabetes OPD, and the dispensary, using a custom-designed proforma. Patient prescriptions were analysed for the drugs, their frequency, route, and duration. Details regarding HbA1c levels were also taken if available with the patient. A total of 170 prescriptions were analysed for the study. Descriptive statistics, including means, medians, standard deviations, and proportions, were calculated to summarise the characteristics of the study population and prescription patterns.

RESULTS

A total of 212 patients were screened of which 170 prescriptions were found to be eligible and were included in the study. This study included an equal number of male and female patients, each having 85 patients. Most of the patients belonged to the age group of 41-60 years. The demographic profile of the patients is summarised in Table 1.

Table 1: Demographic distribution of study subjects

Demographic distribution	**Number of patients (%) (n=170)**
Age (In years)	
20-40	28 (16.5)
41-60	112 (65.9)
>60	30 (17.7)
Gender	

Male Female	85 (50) 85 (50)

Metformin was prescribed to 169 (99%) patients and one patient was prescribed insulin therapy alone. 70 (41.2 %) of the patients were on monotherapy of metformin. 96 (56.4 %) patients were on a combination of metformin and glimepiride. Three(1.7 %) patients received either Glipizide, Teneligliptin, or Vildagliptin as the first add-on drug with metformin. Six (3.5 %) patients were on either Teneligliptin, Vildagliptin, or Voglibose as the second add-on drug along with Metformin and Glimepiride. The prescribed medications are illustrated in Figure 1.

Figure 1: Prescribing pattern of Oral anti-diabetic agents in study patients(n=169)

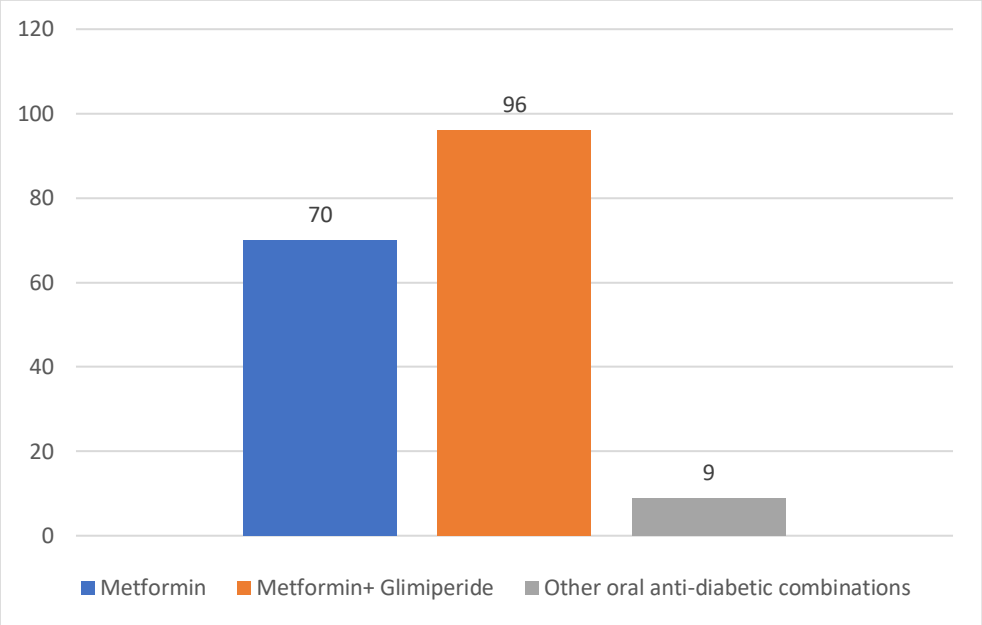

Figure 2 illustrates different daily dosages of Metformin patients with different daily dosage of metformin, 79% of patients from 169 were prescribed 1000mg of daily dosage of metformin, and 1% of the patients were prescribed 3000mg of metformin divided into three doses.

Figure 2: Patients with different daily dosages of metformin(n=169)

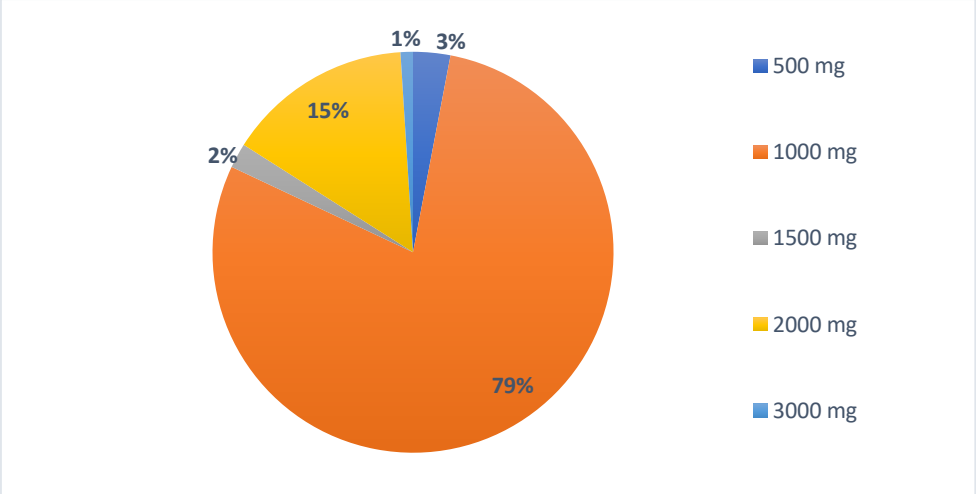

Table 2 presents the number of study patients who have received Insulin preparation. Among the 170 patients, four were receiving insulin preparations, two were on Degludec/Actrapid and two were on Human Mixtard insulin. Among these four, one patient was on Human mixtard insulin without any oral anti-diabetic agent prescribed.

Table 2: Prescribing pattern of Insulin received by patients

Insulin prescribed	Number of patients(n=170)
Patients with no Insulin	166
Patients on Degludec/Actrapid Insulin	2
Patients on Human mixtard Insulin	2

DISCUSSION

This cross-sectional study of prescription patterns in patients with type 2 diabetes mellitus (T2DM) at a tertiary care teaching hospital in Central India reveals several key findings. The prominent observation is the overwhelming reliance on Metformin as the primary antidiabetic medication, with 99% of the study patients receiving it. This aligns with established guidelines, including the ADA 2024 recommendations, which advocate for Metformin as the first-line drug in managing T2DM(4). Metformin's efficacy in lowering HbA1c levels, affordability, and generally favourable safety profile contribute to its broad utilisation. In our study, 41.2% of patients were treated with Metformin monotherapy, highlighting its effectiveness as a primary treatment strategy for a substantial proportion of patients.

However, our findings also highlight a predominant reliance on Glimepiride as the first add-on drug to Metformin, with 56.4% of patients receiving this combination. While sulfonylureas like Glimepiride are effective in lowering blood glucose levels, their use is associated with a higher risk of hypoglycemia and potential weight gain compared to newer antidiabetic agents. This is a key consideration, particularly in long-term diabetes management, where minimizing adverse effects is essential.

The observed prescribing pattern may reflect several factors, including the availability and affordability of different antidiabetic medications. In our study, Metformin and Glimepiride were the only oral antidiabetic drugs available in the hospital formulary, which may have influenced prescribing choices.

Notably, insulin prescriptions were relatively low in our study, with only 4 out of 170 patients (2.4%) receiving insulin therapy. This is despite some patients having elevated HbA1c levels that would normally justify considering insulin as a treatment option. This low rate of insulin prescribing could be attributed to the unavailability of insulin preparations in the hospital formulary, as clearly stated in the results. The unavailability of insulin may have compelled clinicians to depend more on oral antidiabetic agents, even in cases where insulin would have been the preferred choice.

An Incremental cost-effectiveness ratio (ICER) analysis conducted using the “Target trial” (Bidulka P et al,2024) suggests that substituting Dapagliflozin, an SGLT-2 inhibitor, as a second-line agent could offer potential benefits. The ICER indicated a minimal increase of 73 INR (Indian rupee) in yearly costs for a reduction in HbA1c levels by 1 mmole/mol per patient when using Dapagliflozin compared to Glimepiride. Beyond glycemic control, SGLT-2 inhibitors like Dapagliflozin have demonstrated cardiovascular and renal benefits in clinical trials, making them an attractive alternative to sulfonylureas, particularly in patients with established cardiovascular disease, heart failure, or chronic kidney disease. Furthermore, SGLT-2 inhibitors are associated with a lower risk of hypoglycemia compared to sulfonylureas, which is a significant advantage in preventing adverse events and improving patient safety.

Given the potential advantages of Dapagliflozin over Glimepiride, it is important to consider strategies to promote its appropriate use as a second-line agent in managing T2DM. This could involve educating healthcare providers about the benefits of SGLT-2 inhibitors, updating hospital formularies to include these medications, and implementing clinical

guidelines that prioritize their use in selected patients. Further research is needed to evaluate the long-term clinical and economic impact of incorporating Dapagliflozin into the standard treatment algorithm for T2DM in the Indian healthcare setting.

Limitation

The single-center design limits the generalizability of the findings to other populations and healthcare settings. The Cross-sectional study structure prevents the establishment of causal relationships between prescribing patterns and clinical outcomes. The reliance on prescription data may not fully capture the complexity of diabetes management, including patient adherence to medications and lifestyle modifications.

CONCLUSION

This study highlights the predominant use of Metformin and Glimepiride in managing T2DM at a tertiary care teaching hospital in Central India. While this approach may be cost-effective in the short term, it may not fully address the long-term needs of patients with diabetes, particularly in terms of minimizing adverse effects and preventing cardiovascular and renal complications. The ICER analysis suggests that Dapagliflozin could be a valuable alternative to Glimepiride as a second-line agent, offering potential benefits in terms of glycemic control, cardiovascular and renal protection, and hypoglycemia risk. Future research should focus on evaluating the optimal strategies for incorporating newer antidiabetic agents into the treatment algorithm for T2DM in India, taking into account both clinical and economic considerations.

Conflicts of interest:

There are no conflicts of interest.

REFERENCES

1. International Diabetes Federation. IDF Diabetes Atlas, 10th edn. Brussels, Belgium: International Diabetes Federation; 2021. Available from: https://diabetesatlas.org/data/en/country/100/in.html
2. Gupta A, Gupta R, Sharma KK, Lodha S, Achari V, Asirvatham AJ, Bhansali A, Gupta B, Gupta S, Jali MV, Mahanta TG, Maheshwari A, Saboo B, Singh J, Deedwania PC. Prevalence of diabetes and cardiovascular risk factors in middle-class urban patients in India. BMJ Open Diabetes Res Care. 2014 Dec 4;2(1):e000048. doi: 10.1136/bmjdrc-2014-000048. PMID: 25489485; PMCID: PMC4256307.
3. Keezhipadathil J. Evaluation of suspected adverse drug reactions of oral anti-diabetic drugs in a tertiary care hospital for type ii diabetes mellitus. Indian Journal of Pharmacy Practice. 2019;12(2).
4. American Diabetes Association Professional Practice Committee; 9. Pharmacologic Approaches to Glycemic Treatment: *Standards of Care in Diabetes—2024. Diabetes Care* 1 January 2024; 47 (Supplement_1): S158–S178. https://doi.org/10.2337/dc24-S009
5. Das AK, Saboo B, Chawla R, Aravind SR, Rajput R, Singh AK, Mukherjee JJ, Jhingan A, Shah P, Deshmukh V, Kale S, Jaggi S, Sridhar GR, Dhediya R, Gaurav K. Time to reposition sulfonylureas in type 2 diabetes management in Indian context: A pragmatic practical approach. Int J Diabetes Dev Ctries. 2023 Apr 19:1-19. doi: 10.1007/s13410-023-01192-6. Epub ahead of print. PMID: 37360324; PMCID: PMC10113130.
6. Zanchi A, Lehmann R, Philippe J. Antidiabetic drugs and kidney disease. Swiss Med Wkly [Internet]. 2012 Sep. 9 [cited 2025 Mar. 15];142(3738):w13629. Available from: https://smw.ch/index.php/smw/article/view/1582
7. Li Y, Hu Y, Ley SH, Rajpathak S, Hu FB. Sulfonylurea use and incident cardiovascular disease among patients with type 2 diabetes: prospective cohort study among women. Diabetes Care. 2014 Nov;37(11):3106-13. doi: 10.2337/dc14-1306. Epub 2014 Aug 22. PMID: 25150157; PMCID: PMC4207206.
8. Costello RA, Nicolas S, Shivkumar A. Sulfonylureas. [Updated 2023 Jul 12]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK513225/?
9. Bidulka P, Lugo-Palacios DG, Carroll O, O'Neill S, Adler AI, Basu A, et al. Comparative effectiveness of second line oral antidiabetic treatments among people with type 2 diabetes mellitus: emulation of a target trial using routinely collected health data. BMJ [Internet]. 2024;e077097. Available from: http://dx.doi.org/10.1136/bmj-2023-077097