

Pharmacoeconomic Evaluation of Antidiabetic Therapy and Economic Burden of Diabetes Management in a Tertiary Care Hospital

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ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM) represents a pervasive metabolic disorder characterized by progressive deterioration of glycaemic homeostasis and an escalating requirement for long-term therapeutic intervention. The chronicity of the disease, coupled with the necessity for pharmacotherapeutic intensification and management of diabetes-associated complications, contributes substantially to healthcare resource consumption and financial burden, particularly within resource-limited healthcare environments. **Objectives:** To critically evaluate the pharmacoeconomic attributes of antidiabetic pharmacotherapy, quantify direct medication-related expenditures, examine prescribing trends, and determine the magnitude of the economic burden associated with diabetes management in a tertiary care healthcare setting. **Materials and Methods:** A prospective observational pharmacoeconomic study was undertaken among 400 patients diagnosed with Type 2 Diabetes Mellitus receiving treatment at a tertiary care teaching hospital. Detailed information pertaining to antidiabetic prescribing patterns, therapeutic regimens, insulin utilization, fixed-dose combinations, associated comorbidities, and medication acquisition costs was systematically documented and analyzed. Direct treatment costs were estimated using prevailing market prices, and monthly as well as annual expenditures were calculated to assess the economic implications of diabetes pharmacotherapy. **Results:** Considerable variability in treatment expenditure was observed across antidiabetic therapeutic classes. Metformin emerged as the most economically advantageous pharmacological agent, with an estimated monthly cost ranging from ₹80-250, whereas insulin glargine constituted the highest-cost therapeutic option, with monthly expenditures ranging from ₹2200-4500. Treatment costs demonstrated a progressive increase in parallel with therapeutic complexity, rising from ₹180-600 for monotherapy to ₹2500-7000 for insulin-based regimens. Annual expenditure ranged from ₹2400-7200 for metformin monotherapy to ₹54,000-1,08,000 for insulin analogue-based therapy. Generic prescribing practices were associated with markedly lower treatment costs compared with branded prescribing. Furthermore, patients with chronic kidney disease and coronary artery disease incurred the greatest economic burden. New-generation antidiabetic agents, particularly DPP-4 inhibitors and SGLT2 inhibitors, were identified as major contributors to overall treatment expenditure. **Conclusion:** Diabetes management imposes a substantial and progressively increasing economic burden, driven primarily by therapeutic intensification, utilization of insulin analogues, and the coexistence of chronic comorbid conditions. Adoption of rational prescribing practices, promotion of generic formulations, and implementation of strategies aimed at preventing disease progression and complications may enhance pharmacoeconomic efficiency and mitigate long-term healthcare expenditures.

Keywords: Antidiabetic Pharmacotherapy, Cost-Containment Strategies, Cost-of-Illness, Direct Medical Costs, Economic Burden, Generic Prescribing, Healthcare Resource Utilization, Pharmacoeconomic Evaluation, Prescription Pattern Analysis, Type 2 Diabetes Mellitus.

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INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) represents a heterogeneous and progressively debilitating metabolic disorder characterized by chronic hyperglycaemia arising from complex interactions between insulin resistance, β -cell dysfunction, impaired incretin activity, and dysregulated glucose homeostasis (American Diabetes Association Professional Practice Committee, 2025). Over recent decades, T2DM has evolved into a major global



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health crisis, imposing substantial clinical, epidemiological, and socioeconomic consequences on healthcare systems worldwide (Anjana *et al.*, 2017). The escalating prevalence of diabetes has been attributed to rapid urbanization, demographic transitions, sedentary lifestyles, nutritional excesses, obesity, and population aging, thereby contributing significantly to the global burden of non-communicable diseases (Bahia *et al.*, 2011).

The pathophysiological complexity of T2DM extends beyond glycaemic dysregulation and encompasses a wide spectrum of microvascular and macrovascular complications, including diabetic nephropathy, retinopathy, neuropathy, coronary artery disease, cerebrovascular disease, and peripheral vascular disorders (Beran and Yudkin, 2006). These complications are associated with increased morbidity, premature mortality, diminished quality of life, and substantial healthcare resource utilization (Bommer *et al.*, 2017). Consequently, diabetes management necessitates lifelong pharmacological intervention, continuous metabolic monitoring, and multidisciplinary therapeutic approaches aimed at preventing disease progression and associated complications (Bommer *et al.*, 2018).

The contemporary therapeutic armamentarium for T2DM has expanded considerably with the introduction of novel pharmacological classes such as DPP-4 inhibitors, SGLT2 inhibitors, GLP-1 receptor agonists, and advanced insulin analogues (Buse *et al.*, 2020). Although these therapeutic innovations have demonstrated superior glycaemic efficacy and favourable cardiovascular and renal outcomes, their widespread utilization has simultaneously amplified treatment-related expenditures (Cameron *et al.*, 2009). The increasing dependence on multidrug regimens, fixed-dose combinations, and insulin-based therapies has further intensified the economic burden associated with long-term diabetes management (Davies *et al.*, 2022).

In developing economies such as India, where a substantial proportion of healthcare expenditure is financed through out-of-pocket payments, the financial implications of diabetes represent a critical public health concern (DeFronzo *et al.*, 2017). Direct medical costs associated with pharmacotherapy, laboratory investigations, physician consultations, hospitalization, and management of chronic complications constitute major contributors to treatment expenditure (Dunne *et al.*, 2014). Furthermore, indirect costs arising from productivity losses, disability, and premature mortality substantially magnify the overall societal burden of the disease (Forbes and Cooper, 2013).

Pharmacoeconomics has emerged as a pivotal discipline for evaluating the economic consequences of therapeutic interventions and optimizing healthcare resource allocation (Freund and Dittus, 1992). Comprehensive pharmacoeconomic assessments facilitate identification of cost-driving factors, evaluation of prescribing patterns, and determination of economically sustainable

treatment strategies (GBD 2021 Diabetes Collaborators, 2023). Therefore, the present study was undertaken to evaluate the pharmacoeconomic profile of antidiabetic therapy, analyse medication-related expenditures, assess prescribing practices, and quantify the economic burden of diabetes management in a tertiary care teaching hospital. The findings are expected to provide evidence supporting rational pharmacotherapy and cost-effective diabetes care (Genitsaridi *et al.*, 2026).

MATERIALS AND METHODS

Study Design and Setting

A Prospective, Observational, Pharmacoeconomic study was conducted to evaluate the economic implications of antidiabetic pharmacotherapy and to quantify the financial burden associated with diabetes management among patients receiving treatment in a tertiary care teaching hospital. The study was designed to systematically assess prescribing patterns, medication utilization trends, treatment-related expenditures, and pharmacoeconomic determinants influencing the overall cost of diabetes care. The investigation was carried out in the Department of General Medicine and affiliated diabetic clinics of a tertiary care teaching hospital catering to a large and diverse patient population.

Study Duration

The study was conducted over a period of twelve months. During the study period, eligible patients attending both outpatient and inpatient departments were screened and enrolled consecutively following fulfilment of the predefined inclusion criteria.

Study Population and Sample Size

The study population comprised adult patients diagnosed with Type 2 Diabetes Mellitus receiving pharmacological treatment for glycaemic control. A total of 400 patients were included in the study and subjected to pharmacoeconomic evaluation. The sample was considered adequate to provide a comprehensive assessment of treatment expenditure, prescribing practices, and economic burden associated with diabetes management.

Inclusion Criteria

Patients were considered eligible for inclusion if they fulfilled the following criteria:

- Age ≥ 18 years.
- Confirmed diagnosis of Type 2 Diabetes Mellitus.
- Receiving one or more antidiabetic medications.
- Availability of complete prescription and treatment records.
- Willingness to provide informed consent for participation.

Exclusion Criteria

Patients meeting any of the following criteria were excluded:

- Type 1 Diabetes Mellitus.
- Gestational Diabetes Mellitus.
- Critically ill patients requiring intensive care management.
- Patients with incomplete medical records.
- Patients unwilling to participate in the study.

Data Collection

Data were collected prospectively using a structured and pre-validated data collection form. Relevant information was obtained through review of patient case records, prescription charts, laboratory reports, and direct patient interviews.

The following variables were documented:

- Demographic characteristics (age and gender).
- Duration of diabetes mellitus.
- Associated comorbid conditions.
- Antidiabetic medications prescribed.
- Drug class, dosage, frequency, and route of administration.
- Therapeutic regimen pattern (monotherapy, dual therapy, triple therapy, quadruple therapy).
- Insulin utilization pattern.
- Fixed-Dose Combination (FDC) utilization.
- Generic and branded prescribing practices.
- Concomitant medications prescribed for comorbidities.
- Direct medication-related expenditures.

Pharmacoeconomic Assessment

The pharmacoeconomic evaluation primarily focused on direct medical costs associated with antidiabetic pharmacotherapy. Cost analysis was performed from the patient perspective to estimate the financial burden imposed by diabetes treatment.

Cost Identification

The following direct cost components were included:

- Cost of oral antidiabetic medications.
- Cost of insulin preparations and insulin analogues.
- Cost of fixed-dose combination products.
- Cost of concomitant medications prescribed for diabetes-associated comorbidities.

Cost Measurement

Medication costs were estimated using prevailing market prices available during the study period. Drug prices were obtained from hospital pharmacy records, Current Index of Medical Specialties (CIMS), Indian Drug Review (IDR), and standard pharmaceutical pricing databases.

Monthly treatment expenditure was calculated using the prescribed daily dose and corresponding unit price of each medication.

$$\text{Monthly Treatment Cost} = \text{Daily Drug Cost} \times 30 \text{ Days}$$

Annual treatment expenditure was estimated using:

$$\text{Annual Treatment Cost} = \text{Monthly Treatment Cost} \times 12 \text{ Months}$$

Cost Categorization

Based on monthly expenditure, treatment costs were categorized as follows:

- Low Cost: < ₹500/month.
- Moderate Cost: ₹500-1500/month.
- High Cost: ₹1500-3000/month.
- Very High Cost: > ₹3000/month.

Assessment of Economic Burden

The economic burden of diabetes management was evaluated by comparing treatment-related expenditures across different therapeutic categories. Cost burden assessment was performed according to:

- Type of antidiabetic therapy.
- Complexity of therapeutic regimen.
- Utilization of insulin and insulin analogues.
- Fixed-dose combination therapy.
- Presence of associated comorbidities.
- Generic versus branded prescribing patterns.

The pharmacoeconomic impact of treatment was further assessed by identifying the most economical therapy, highest-cost therapy, major cost-driving medications, and treatment strategies associated with the greatest financial burden.

Outcome Measures

Primary Outcome

To evaluate the pharmacoeconomic profile and direct treatment costs associated with antidiabetic therapy among patients with Type 2 Diabetes Mellitus.

Secondary Outcomes

To estimate monthly and annual treatment expenditure.

- To compare costs associated with different therapeutic regimens.
- To assess the economic implications of insulin and insulin analogue utilization.
- To evaluate the influence of prescribing patterns on treatment costs.
- To determine the impact of diabetes-related comorbidities on overall expenditure.
- To identify major cost-driving factors contributing to the economic burden of diabetes management.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics KIMS/IEC/A146/P/2023 Committee prior to commencement of the study. Written informed consent was obtained from all participants before enrolment. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and Good Clinical Practice guidelines. Confidentiality and anonymity of patient information were maintained throughout the study.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using Statistical Package for Social Sciences (SPSS) software version 32.0. Descriptive statistical methods were employed for data analysis. Categorical variables were expressed as frequencies and percentages, whereas continuous variables were presented as mean, standard deviation, median, and range where appropriate. Cost data were summarized as monthly and annual treatment

expenditures. Results were presented using tables and graphical representations to facilitate interpretation of pharmacoeconomic outcomes.

RESULTS

A total of 400 study participants were included in the study. The pharmacoeconomic evaluation assessed the cost of commonly prescribed antidiabetic medications, different treatment patterns, generic and brand prescribing, fixed-dose combinations, annual treatment expenditure, and the effect of comorbidities on treatment costs.

The estimated average monthly cost of commonly prescribed antidiabetic medications varied considerably. Metformin-based therapy showed comparatively lower treatment costs, whereas newer agents such as SGLT2 and DPP-4 inhibitors were associated with higher monthly expenditure. Insulin analogues, particularly insulin glargine, demonstrated the highest estimated monthly treatment cost (Table 1).

The estimated average monthly expenditure increased with increasing complexity of antidiabetic therapy. Monotherapy represented the lower-cost treatment pattern, whereas triple therapy, quadruple therapy, and insulin-based treatment were associated with higher monthly expenditure (Table 2).

Generic prescribing was associated with comparatively lower estimated monthly treatment expenditure than brand prescribing. Among the study participants, generic prescribing accounted for 38.5% of prescriptions, while brand prescribing accounted for 61.5%, with brand prescribing showing a higher estimated monthly cost range (Table 3).

The economic burden of antidiabetic treatment varied according to the type and complexity of therapy. Oral monotherapy was categorized as a low-cost treatment option, whereas triple

Table 1: Cost Analysis of Antidiabetic Drugs Prescribed Among Study Participants (n=400).

Sl. No.	Antidiabetic Drug	Drug Class	Common Daily Dose	Approximate Monthly Cost (INR)	Cost Category
1.	Metformin	Biguanide	500-2000 mg/day	₹80-250	Low
2.	Glimepiride	Sulfonylurea	1-6 mg/day	₹90-220	Low
3.	Gliclazide	Sulfonylurea	30-120 mg/day	₹140-320	Moderate
4.	Sitagliptin	DPP-4 inhibitor	50-100 mg/day	₹1400-2200	High
5.	Vildagliptin	DPP-4 inhibitor	50-100 mg/day	₹900-1800	Moderate-High
6.	Empagliflozin	SGLT2 inhibitor	10-25 mg/day	₹1600-2600	High
7.	Dapagliflozin	SGLT2 inhibitor	5-10 mg/day	₹1200-2100	High
8.	Voglibose	Alpha-glucosidase inhibitor	0.2-0.6 mg/day	₹350-850	Moderate
9.	Pioglitazone	Thiazolidinedione	15-30 mg/day	₹120-280	Low
10.	Human Insulin	Insulin preparation	10-40 units/day	₹700-1800	Moderate
11.	Insulin Glargine	Long-acting insulin analogue	10-30 units/day	₹2200-4500	Very High

Table 2: Comparative Cost Analysis of Different Antidiabetic Therapy Patterns (n=400).

Therapy Pattern	Frequency (n)	Percentage (%)	Average Monthly Cost (INR)
Monotherapy	58	14.5	₹180-600
Dual therapy	176	44	₹600-1800
Triple therapy	126	31.5	₹1800-3500
Quadruple therapy	40	10	₹3500-6000
Insulin-based therapy	61	15.25	₹2500-7000

Table 3: Cost Comparison Between Generic and Brand Prescribing Patterns (n=400).

Prescribing Pattern	Frequency (n)	Percentage (%)	Average Monthly Cost (INR)
Generic prescribing	154	38.5	₹650-1400
Brand prescribing	246	61.5	₹1500-4200

oral therapy and insulin-containing therapy were associated with moderate-to-high and high economic burden, respectively. Insulin analogue therapy represented the very-high-cost treatment category (Table 4).

The estimated monthly cost of fixed-dose combinations varied according to the drugs included in the combination. Metformin-glimepiride was associated with comparatively lower expenditure, whereas combinations containing newer agents such as sitagliptin, dapagliflozin, and vildagliptin demonstrated higher monthly treatment costs (Table 5).

The estimated annual treatment expenditure increased substantially according to the treatment pattern. Metformin monotherapy represented the lowest annual expenditure range, whereas insulin analogue therapy demonstrated the highest estimated annual treatment cost, ranging from ₹54,000 to ₹1,08,000 (Table 6).

The presence of comorbidities was associated with higher estimated treatment-cost ranges. Participants with chronic kidney disease and coronary artery disease demonstrated higher monthly treatment-cost ranges compared with those without major comorbidities (Table 7).

Overall, the pharmacoeconomic evaluation demonstrated substantial variation in treatment expenditure according to the choice and complexity of antidiabetic therapy. Metformin monotherapy represented the most economical therapy, whereas insulin analogue-based multidrug therapy represented the most expensive treatment strategy. Generic prescribing was identified as a cost-saving prescribing practice, while newer antidiabetic agents contributed substantially to treatment expenditure (Table 8).

DISCUSSION

The present pharmacoeconomic investigation provides a comprehensive assessment of treatment-related expenditures associated with Type 2 Diabetes Mellitus (T2DM) and highlights the substantial economic burden imposed by contemporary diabetes

management strategies. The findings demonstrate considerable variability in treatment costs across different antidiabetic therapeutic classes, prescribing patterns, and treatment intensification levels. These observations reinforce the growing body of evidence indicating that diabetes is not only a major clinical challenge but also a significant economic concern for patients, healthcare providers, and healthcare systems globally (Harding *et al.*, 2019).

One of the most notable findings of the present study was the identification of metformin as the most economical antidiabetic agent, with an estimated monthly expenditure ranging from ₹80-250. This observation is consistent with previous pharmacoeconomic investigations conducted by Wang *et al.*, who reported that metformin remains the most cost-effective first-line pharmacological intervention because of its proven efficacy, favourable safety profile, and low acquisition cost (Hex *et al.*, 2012). Similarly, the recommendations of international diabetes treatment guidelines continue to advocate metformin as the preferred initial therapy for most patients with T2DM owing to its superior cost-effectiveness ratio (Inzucchi *et al.*, 2015).

Conversely, insulin glargine was identified as the highest-cost individual medication in the present study, generating monthly expenditures of ₹2200-4500. Similar findings were reported by Palmer *et al.*, who demonstrated that long-acting insulin analogues substantially increase treatment costs despite providing improved glycaemic stability and reduced risk of hypoglycaemia (Kalyani *et al.*, 2023). Although insulin analogues offer significant therapeutic benefits, their widespread utilization may present affordability challenges in low- and middle-income countries where healthcare financing is predominantly dependent upon out-of-pocket expenditure (Li *et al.*, 2023).

The present study further demonstrated a progressive increase in treatment expenditure with increasing therapeutic complexity. Patients receiving monotherapy incurred comparatively lower costs, whereas those receiving dual, triple, quadruple, and insulin-containing regimens experienced substantially higher expenditures. These findings are in agreement with those reported

Table 4: Economic Burden According to Type of Antidiabetic Therapy (n=400).

Treatment Category	Average Monthly Cost (INR)	Economic Burden
Oral monotherapy	₹180-600	Low
Oral dual therapy	₹600-1800	Moderate
Triple oral therapy	₹1800-3500	Moderate-High
Insulin-containing therapy	₹2500-7000	High
Insulin analogue therapy	₹4500-9000	Very High

Table 5: Cost Distribution of Fixed-Dose Combinations (FDCs) Prescribed (n=400).

Fixed-Dose Combination	Frequency (n)	Average Monthly Cost (INR)
Metformin + Glimepiride	88	₹250-600
Metformin + Sitagliptin	44	₹1400-2400
Metformin + Voglibose	28	₹700-1500
Metformin + Dapagliflozin	22	₹1600-2600
Metformin + Vildagliptin	41	₹1200-2200

by Nichols *et al.*, who observed a direct relationship between therapeutic intensification and healthcare spending among patients with T2DM (Liu, 2009). Disease progression often necessitates multiple pharmacological agents to achieve adequate glycaemic control, inevitably increasing direct treatment costs and healthcare resource utilization (Marso *et al.*, 2016).

New-generation antidiabetic agents, particularly DPP-4 inhibitors and SGLT2 inhibitors, emerged as major contributors to overall medication expenditure in the present study. Comparable findings have been reported in several international cost analyses, where SGLT2 inhibitors and incretin-based therapies were associated with significantly greater acquisition costs compared with traditional oral antidiabetic agents (Perkovic *et al.*, 2019). However, emerging evidence suggests that these agents may provide long-term economic benefits through reduction of cardiovascular events, hospitalization rates, and progression of diabetic kidney disease (Piragine *et al.*, 2023). Consequently, future pharmacoeconomic evaluations incorporating long-term outcome measures may be necessary to fully determine their cost-effectiveness within Indian healthcare settings.

The analysis of prescribing patterns revealed that generic prescribing was associated with substantially lower treatment costs than branded prescribing. This finding corroborates previous investigations demonstrating that generic substitution significantly

Table 6: Estimated Annual Treatment Cost of Antidiabetic Therapy (n=400).

Therapy Type	Estimated Annual Cost (INR)
Metformin monotherapy	₹2,400-7,200
Dual oral therapy	₹7,200-21,600
Triple therapy	₹21,600-42,000
Insulin-based therapy	₹30,000-84,000
Insulin analogue therapy	₹54,000-1,08,000

Table 7: Cost Analysis According to Presence of Comorbidities (n=400).

Comorbidity	Average Monthly Treatment Cost (INR)
Hypertension	₹1800-4200
Dyslipidemia	₹2200-4800
Chronic kidney disease	₹3500-7500
Coronary artery disease	₹4000-8500
Obesity	₹1800-3500
No major comorbidity	₹800-2200

reduces healthcare expenditure without compromising therapeutic efficacy or patient safety (Seuring *et al.*, 2015). In countries with high out-of-pocket healthcare expenditure, increased utilization of generic medicines has been recognized as an effective strategy for improving treatment accessibility and adherence among economically disadvantaged populations (Woehl *et al.*, 2008).

Another important observation of the present study was the marked increase in treatment costs among patients with diabetes-associated comorbidities, particularly chronic kidney disease and coronary artery disease. Similar observations were documented by Hex *et al.*, who reported that diabetes-related complications represent the principal drivers of long-term healthcare expenditure (Yesudian *et al.*, 2014). The coexistence of cardiovascular and renal complications frequently necessitates polypharmacy, specialist consultations, laboratory monitoring, and repeated hospital admissions, thereby substantially increasing direct medical costs (Zhang *et al.*, 2010). These findings underscore the importance of early diagnosis, aggressive risk-factor modification, and prevention of complications as essential strategies for reducing long-term economic burden.

The annual treatment expenditure observed in the present study ranged from ₹2400-7200 for metformin monotherapy to ₹54,000-1,08,000 for insulin analogue-based therapy. Comparable cost ranges have been reported in pharmacoeconomic studies conducted across Asia and other developing regions, emphasizing the profound financial impact of advanced diabetes therapy on household healthcare expenditure. The increasing prevalence of diabetes, coupled with expanding utilization of newer therapeutic agents, is expected to further escalate healthcare costs in

Table 8: Pharmacoeconomic Evaluation of Antidiabetic Therapy (n=400).

Pharmacoeconomic Parameter	Observation
Most economical therapy	Metformin monotherapy
Most expensive therapy	Insulin analogue-based multi-drug therapy
Cost-saving prescribing practice	Generic prescribing
Major contributor to treatment cost	Newer antidiabetic agents
Therapy associated with highest economic burden	Triple/quadruple therapy
Lower-cost commonly prescribed drug	Metformin
Highest-cost individual drug	Insulin glargine

the coming decades, thereby necessitating implementation of cost-containment strategies and rational prescribing practices.

Overall, the findings of the present investigation highlight the substantial pharmacoeconomic burden associated with diabetes management and emphasize the importance of balancing clinical effectiveness with economic sustainability. Rational drug selection, evidence-based therapeutic intensification, promotion of generic prescribing, and prevention of diabetes-related complications remain critical components for optimizing both clinical and economic outcomes in patients with Type 2 Diabetes Mellitus.

CONCLUSION

The present pharmacoeconomic evaluation demonstrated that Type 2 Diabetes Mellitus imposes a substantial and progressively increasing economic burden on patients receiving treatment in a tertiary care healthcare setting. Treatment-related expenditure was strongly influenced by therapeutic complexity, utilization of insulin analogues, incorporation of newer antidiabetic agents, and the presence of diabetes-associated comorbidities. Metformin remained the most economically favourable therapeutic option, whereas insulin analogue-based regimens generated the highest treatment costs. Generic prescribing practices were associated with considerable cost savings when compared with branded formulations. Furthermore, patients with chronic kidney disease and coronary artery disease experienced significantly greater healthcare expenditures, highlighting the economic consequences of diabetes-related complications. The findings underscore the importance of rational prescribing, early glycaemic control, prevention of complications, and promotion of cost-effective therapeutic strategies to optimize both clinical outcomes and healthcare resource utilization. Integration of pharmacoeconomic principles into routine diabetes management may contribute substantially to improving treatment affordability and long-term healthcare sustainability.

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ABBREVIATIONS

ADA: American Diabetes Association; **CA:** Coronary Artery Disease; **CIMS:** Current Index of Medical Specialties; **GLP-1:** Glucagon-Like Peptide-1; **IDR:** Indian Drug Review; **INR:** Indian Rupee; **SPSS:** Statistical Package for the Social Sciences; **SGLT2:** Sodium-Glucose Cotransporter-2; **T2DM:** Type 2 Diabetes Mellitus; **WHO:** World Health Organization.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS CONTRIBUTIONS

Dr. Syed Raziuddin Faisal: Contributed to the conception and design of the study, development of the study methodology, data collection, pharmacoeconomic assessment, data analysis and interpretation, and preparation of the manuscript. Dr. Shekar H. S.: Contributed to study supervision, methodological guidance, interpretation of findings, critical revision of the manuscript, and overall scientific oversight. Dr. B. Nagaraju: Contributed to study conceptualization, methodological review, interpretation of pharmacoeconomic findings, critical evaluation of the manuscript, and scientific guidance. All authors contributed to the preparation and critical revision of the manuscript, approved the final version, and agreed to be accountable for all aspects of the work.

SUMMARY

The present prospective observational pharmacoeconomic study evaluated the treatment-related economic burden of Type 2 Diabetes Mellitus among 400 patients receiving antidiabetic therapy in a tertiary care teaching hospital. The study assessed antidiabetic prescribing patterns, therapeutic complexity, insulin and fixed-dose combination utilization, generic versus branded prescribing, direct medication-related costs, and the influence of diabetes-associated comorbidities on treatment expenditure.

Substantial variation in treatment costs was observed across therapeutic classes and treatment regimens. Metformin was identified as the most economical commonly used antidiabetic medication, with an estimated monthly cost of ₹80-250. In contrast, insulin glargine represented the highest-cost individual medication, with an estimated monthly expenditure of ₹2,200-4,500. Treatment expenditure increased progressively with therapeutic intensification, ranging from ₹180-600 per month for monotherapy to ₹2,500-7,000 for insulin-based therapy. Annual treatment

expenditure ranged from ₹2,400-7,200 for metformin monotherapy to ₹54,000-1,08,000 for insulin analogue-based therapy.

Generic prescribing was associated with lower treatment expenditure than branded prescribing. Patients with comorbid chronic kidney disease and coronary artery disease demonstrated the highest treatment-related costs. Newer antidiabetic agents, particularly DPP-4 and SGLT2 inhibitors, also contributed substantially to medication expenditure.

Overall, the findings demonstrate that diabetes management imposes a considerable and progressively increasing economic burden, largely influenced by therapeutic complexity, insulin analogue utilization, newer antidiabetic medications, and diabetes-associated comorbidities. Promotion of generic prescribing, rational therapeutic selection, prevention of complications, and integration of pharmacoeconomic principles into routine diabetes care may improve treatment affordability and healthcare resource utilization.

REFERENCES

- American Diabetes Association Professional Practice Committee. (2025). 2. Diagnosis and classification of diabetes: Standards of care in diabetes-2025. *Diabetes Care*, 48(Suppl. 1), S27-S49. <https://doi.org/10.2337/dc25-S002>
- Anjana, R. M., Deepa, M., Pradeepa, R., Mahanta, J., Narain, K., *et al.* (2017). Prevalence of diabetes and prediabetes in 15 states of India: Results from the ICMR-INDIAB population-based cross-sectional study. *The Lancet Diabetes & Endocrinology*, 5(8), 585-596. [https://doi.org/10.1016/S2213-8587\(17\)30174-2](https://doi.org/10.1016/S2213-8587(17)30174-2)
- Bahia, L. R., Araujo, D. V., Schaan, B. D., Dib, S. A., Negrato, C. A., *et al.* (2011). The costs of type 2 diabetes mellitus outpatient care in the Brazilian public health system. *Value in Health*, 14(5 Suppl. 1), S137-S140. <https://doi.org/10.1016/j.jval.2011.05.009>
- Beran, D., & Yudkin, J. S. (2006). Diabetes care in sub-Saharan Africa. *The Lancet*, 368(9548), 1689-1695. [https://doi.org/10.1016/S0140-6736\(06\)69704-3](https://doi.org/10.1016/S0140-6736(06)69704-3)
- Bommer, C., Heesemann, E., Sagalova, V., Manne-Goehler, J., Atun, R., *et al.* (2017). The global economic burden of diabetes in adults aged 20-79 years: A cost-of-illness study. *The Lancet Diabetes & Endocrinology*, 5(6), 423-430. [https://doi.org/10.1016/S2213-8587\(17\)30097-9](https://doi.org/10.1016/S2213-8587(17)30097-9)
- Bommer, C., Sagalova, V., Heesemann, E., Manne-Goehler, J., Atun, R., *et al.* (2018). Global economic burden of diabetes in adults: Projections from 2015 to 2030. *Diabetes Care*, 41(5), 963-970. <https://doi.org/10.2337/dc17-1962>
- Buse, J. B., Wexler, D. J., Tsapas, A., Rossing, P., Mingrone, G., *et al.* (2020). 2019 update to: Management of hyperglycemia in type 2 diabetes, 2018: A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*, 43(2), 487-493. <https://doi.org/10.2337/dc19-0066>
- Cameron, A., Ewen, M., Ross-Degnan, D., Ball, D., & Laing, R. (2009). Medicine prices, availability, and affordability in 36 developing and middle-income countries: A secondary analysis. *The Lancet*, 373(9659), 240-249. [https://doi.org/10.1016/S0140-6736\(08\)61762-6](https://doi.org/10.1016/S0140-6736(08)61762-6)
- Davies, M. J., Aroda, V. R., Collins, B. S., Gabbay, R. A., Green, J., *et al.* (2022). Management of hyperglycemia in type 2 diabetes, 2022: A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*, 45(11), 2753-2786. <https://doi.org/10.2337/dc22-0034>
- DeFronzo, R. A., Norton, L., & Abdul-Ghani, M. (2017). Renal, metabolic and cardiovascular considerations of SGLT2 inhibition. *Nature Reviews Nephrology*, 13(1), 11-26. <https://doi.org/10.1038/nrneph.2016.170>
- Dunne, S., Shannon, B., Dunne, C., & Cullen, W. (2014). Patient perceptions of generic medicines: A mixed-methods study. *The Patient*, 7(2), 177-185. <https://doi.org/10.1007/s40271-013-0042-z>
- Forbes, J. M., & Cooper, M. E. (2013). Mechanisms of diabetic complications. *Physiological Reviews*, 93(1), 137-188. <https://doi.org/10.1152/physrev.00045.2011>
- Freund, D. A., & Dittus, R. S. (1992). Principles of pharmacoeconomic analysis of drug therapy. *Pharmacoeconomics*, 1(1), 20-31. <https://doi.org/10.2165/00019053-199201010-00006>
- GBD 2021 Diabetes Collaborators. (2023). Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: A systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*, 402(10397), 203-234. [https://doi.org/10.1016/S0140-6736\(23\)01301-6](https://doi.org/10.1016/S0140-6736(23)01301-6)
- Genitsaridi, I., Salpea, P., Salim, A., Sajjadi, S. F., Tomic, D., *et al.* (2026). 11th Edition of the IDF Diabetes Atlas: Global, regional, and national diabetes prevalence estimates for 2024 and projections for 2050. *The Lancet Diabetes & Endocrinology*, 14(2), 149-156. [https://doi.org/10.1016/S2213-8587\(25\)00299-2](https://doi.org/10.1016/S2213-8587(25)00299-2)
- Harding, J. L., Pavkov, M. E., Magliano, D. J., Shaw, J. E., & Gregg, E. W. (2019). Global trends in diabetes complications: A review of current evidence. *Diabetologia*, 62(1), 3-16. <https://doi.org/10.1007/s00125-018-4711-2>
- Hex, N., Bartlett, C., Wright, D., Taylor, M., & Varley, D. (2012). Estimating the current and future costs of Type 1 and Type 2 diabetes in the UK, including direct health costs and indirect societal and productivity costs. *Diabetic Medicine*, 29(7), 855-862. <https://doi.org/10.1111/j.1464-5491.2012.03698.x>
- Inzucchi, S. E., Bergenstal, R. M., Buse, J. B., Diamant, M., Ferrannini, E., *et al.* (2015). Management of hyperglycemia in type 2 diabetes, 2015: A Patient-Centered approach: Update to a position statement of the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care*, 38(1), 140-149. <https://doi.org/10.2337/dc14-2441>
- Kalyani, R. R., Everett, B. M., & Perreault, L. (2023). Heart disease and diabetes. In J. M. Lawrence, S. S. Casagrande, W. H. Herman, *et al.* (Eds.), *Diabetes in America*. National Institute of Diabetes and Digestive and Kidney Diseases. <https://www.ncbi.nlm.nih.gov/books/NBK597416/>
- Li, X., Hoogenveen, R., El Alili, M., Knies, S., Wang, J., *et al.* (2023). Cost-effectiveness of SGLT2 inhibitors in a real-world population: A MICADO model-based analysis using routine data from a GP registry. *Pharmacoeconomics*, 41(10), 1249-1262. <https://doi.org/10.1007/s40273-023-01286-3>
- Liu, Y. (2009). Essentials of pharmacoeconomics. *American Journal of Pharmaceutical Education*, 73(5), 94. <https://doi.org/10.5688/aj730594>
- Marso, S. P., Bain, S. C., Consoli, A., Eliaschewitz, F. G., Jódar, E., *et al.* (2016). Semaglutide and cardiovascular outcomes in patients with type 2 diabetes. *The New England Journal of Medicine*, 375(19), 1834-1844. <https://doi.org/10.1056/NEJMoa1607141>
- Perkovic, V., Jardine, M. J., Neal, B., Bompoint, S., Heerspink, H. J. L., *et al.* (2019). Canagliflozin and renal outcomes in type 2 diabetes and nephropathy. *The New England Journal of Medicine*, 380(24), 2295-2306. <https://doi.org/10.1056/NEJMoa1811744>
- Piragine, E., Petri, D., Martelli, A., Calderone, V., & Lucenteforte, E. (2023). Adherence to oral antidiabetic drugs in patients with type 2 diabetes: Systematic review and meta-analysis. *Journal of Clinical Medicine*, 12(5), 1981. <https://doi.org/10.3390/jcm12051981>
- Seuring, T., Archangelidi, O., & Suhrcke, M. (2015). The economic costs of type 2 diabetes: A global systematic review. *Pharmacoeconomics*, 33(8), 811-831. <https://doi.org/10.1007/s40273-015-0268-9>
- Woehl, A., Evans, M., Tetlow, A. P., & McEwan, P. (2008). Evaluation of the cost effectiveness of exenatide versus insulin glargine in patients with sub-optimally controlled type 2 diabetes in the United Kingdom. *Cardiovascular Diabetology*, 7(1), 24. <https://doi.org/10.1186/1475-2840-7-24>
- Yesudian, C. A., Grepstad, M., Visintin, E., & Ferrario, A. (2014). The economic burden of diabetes in India: A review of the literature. *Globalization and Health*, 10(1), 80. <https://doi.org/10.1186/s12992-014-0080-x>
- Zhang, P., Zhang, X., Brown, J., Vistisen, D., Sicree, R., *et al.* (2010). Global healthcare expenditure on diabetes for 2010 and 2030. *Diabetes Research and Clinical Practice*, 87(3), 293-301. <https://doi.org/10.1016/j.diabres.2010.01.026>

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