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Cost-Effectiveness Analysis of Teneligliptin V/S Glimepiride as an Add-on to Metformin in Type 2 Diabetes Mellitus

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Highlights

- The metformin-glimepiride combination demonstrated superior cost-effectiveness compared to metformin-teneligliptin for managing type 2 diabetes.
- Both therapies provided satisfactory blood glucose reduction, but the glimepiride-based regimen achieved this at a significantly lower drug acquisition cost.
- For cost-conscious patients without contraindications, metformin and glimepiride is recommended as the more economically efficient initial combination therapy.

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ABSTRACT

Background: Diabetes is a major lifestyle disorder. Proper glycemic control is needed to prevent the development of patients with Type 2 diabetes. Glimepiride is a second-generation sulphonyl urea with better safety and efficacy, and is commonly prescribed compared to other drugs of that class. teneligliptin is a relatively newer dipeptidyl peptidase inhibitor with proven clinical efficacy with metformin. A more cost-effective treatment option is important in the case of people with a poor economic background for better adherence and thereby preventing complications and economic burden.

Methods: A prospective observation study was conducted in a tertiary care hospital to assess and compare the cost-effectiveness of glimepiride 1mg and teneligliptin 20 mg when added to metformin 500 mg. a total of 112 patients were selected as per the inclusion criteria, 56 of them allocated to group A are taking glimepiride 1 mg and metformin 500 mg once daily. Group B patients are those who are on teneligliptin 20 mg and metformin 500 mg once daily. Fasting blood glucose and post-prandial blood glucose of each patient in both groups were recorded as baseline.

Results: The average cost-effectiveness ratio is calculated using the average cost of therapy for 4 months and the average reduction in effectiveness for 4 months. In this study, cost data included direct costs of purchasing the drugs. cost-effectiveness analysis revealed that glimepiride metformin combination showed better effectiveness in terms of both FBG and PPBG reduction. Teneligliptin and metformin therapy have shown satisfactory reduction in blood glucose levels, but it is much costlierCompared to teneligliptin, glimepiride is a better choice as an add-on drug in the absence of any contraindication in patients who are highly concerned about cost, to reduce economic burden, and to improve adherence, when used as an initial combination in patients with Type 2 diabetes mellitus. .

Keywords: Diabetes mellitus, Cost effectiveness, Metformin hydrochloride, Glimepiride, Teneligliptin

Introduction

Diabetes mellitus is a lifestyle disorder and a cause of premature mortality due to cardiovascular conditions and renal failure1. The development and progression of diabetes related complications can be minimized by good glycemic control2. The purpose of pharmacotherapy in the management of type 2 diabetes mellitus is to control hyperglycemia and prevent hyperglycemia-related complications3. Evidence suggests that combined therapy with oral hypoglycemics is more effective than single drug therapy4. Metformin is the first drug of choice for diabetes control because of cardiovascular safety, low chance of hypoglycemia, durability, no incidence of weight gain, advantages in weight reduction, blood pressure reduction, and low cost5. Along with metformin, other classes of oral antidiabetics are added to attain better glycemic control6. The second-generation sulphonyl urea glimepiride is commonly added with metformin since it has having relatively better safety and efficacy profile among its group7. Teneligliptin is a dipeptidyl peptidase inhibitor that has got clinical benefits along with metformin[8].

Being a chronic condition, diabetes needs lifelong treatment. Economic burden is also a factor of consideration while prescribing medications9. chronicity of diabetes affects the financial status of the individual and family. The prevalence of diabetes mellitus is increasing day by day, so a great deal of expenditure for the country is also increasing10. For long-term therapy of diseased, along with the safety of medications, cost also becomes a major concern[11].

This study planned to compare cost cost-effectiveness of the combination therapy of teneligliptin 20 mg and metformin 500 mg, with the glimepiride 1 mg and metformin 500 mg combination. Both glimepiride and teneligliptin are used as add-on therapy with metformin, but the costs are different. For long-term therapy, the cost-effectiveness is a factor for economic considerations like resource allocation, insurance, and making health policy decisions. In resource-constrained settings like India, assessing the cost-effectiveness of antidiabetic therapies is crucial for rational prescribing. Scientific evaluation beyond just drug price helps physicians choose optimal regimens for socioeconomically disadvantaged patients. Although DPP-4 inhibitors are often preferred in Western studies, Indian data comparing them with sulfonylureas is limited. A recent study found that while both metformin-glimepiride and metformin-teneligliptin combinations showed similar glycaemic control, the former was significantly more cost-effective. Short-term effects on BMI were comparable. These findings stress the importance of local pharmacoeconomic evaluations and the need for larger, long-term studies in Indian populations[12].

A recent study comparing the efficacy and safety of Teneligliptin versus Glimepiride as add-on therapy to Metformin in patients with type 2 diabetes found that Teneligliptin was well tolerated and more effective in improving both glycaemic and lipid profiles. Patients receiving the Metformin-Teneligliptin combination demonstrated better overall metabolic control compared to those on the Metformin-Glimepiride regimen, indicating Teneligliptin as a superior second-line option. As a modern DPP-4 inhibitor, Teneligliptin offers notable advantages in terms of safety and efficacy, making it a promising choice in the evolving landscape of anti-diabetic therapies. However, given that the study included only 30 patients per group, larger-scale studies with extended follow-up are warranted to validate these findings[13].

Sitagliptin, a selective DPP-4 inhibitor, offers a novel approach in the management of type 2 diabetes mellitus. In a comparative study, the combination of metformin and sitagliptin was evaluated against metformin and glimepiride in 60 patients over 24 weeks. Both groups showed significant reductions in fasting blood glucose (FBG), postprandial blood glucose (PPBG), and HbA1c. However, the metformin-sitagliptin group showed a greater reduction in PPBg at the end of the study. The incidence of adverse effects such as hypoglycaemia and gastrointestinal discomfort was noted in both groups. These findings suggest that sitagliptin may be a safer and effective second-line agent alongside metformin14.

A study by John et al. (2021) highlighted that the majority of patients were managed with a combination of Metformin and Glimepiride,

which demonstrated effective control of HbA1c and random blood sugar (RBS) levels. This combination was found to be beneficial in achieving glycaemic targets in type 2 diabetes patients. Additionally, it showed a higher clinical effectiveness ratio (CER) compared to other combinations. The findings suggest that Metformin + Glimepiride therapy not only improves glycaemic control but is also a cost-effective option in diabetes management15.

A recent study evaluated the effects of Canagliflozin and Teneligliptin as third-line agents in patients with uncontrolled type 2 diabetes already on Metformin and Glimepiride. Both drugs demonstrated significant improvements in glycaemic parameters, including HbA1c, fasting, and postprandial glucose levels. Additionally, Canagliflozin showed greater benefits in reducing blood pressure and improving lipid profiles, particularly HDL-C levels. While both agents retained their glycaemic efficacy in this treatment position, Canagliflozin appeared more effective for patients with comorbid hypertension and diabetic dyslipidaemia. These findings support their potential pleiotropic roles beyond glucose control[16]. To assess and compare the cost-effectiveness of glimepiride and teneligliptin 20 mg when added to metformin 500 mg.

Methods

The study was an observational comparative one conducted over a period of 6 months in a tertiary care hospital. Newly diagnosed patients of type 2 diabetes mellitus of either sex with fasting blood glucose more than 126mg/dL were included. Pregnant and lactating patients were excluded.

Procedure

Patients were selected as per the inclusion criteria. Patients enrolled in group A are taking glimepiride 1 mg and metformin 500 mg once daily. Group B patients are those who are on teneligliptin 20 mg and metformin 500 mg once daily. Fasting blood glucose and post-prandial blood glucose of each patient in both groups were recorded as baseline. First review values of FBG and PPBG recorded at the end of the second month, after the first, final review values recorded at the end of the fourth month. The efficacy of two drugs with metformin was assessed by a reduction in terms of FBG, PPBG at the first review from baseline and at the second review from the first review. The average cost-effectiveness ratio is calculated using the average cost of therapy for 4 months and the average reduction in effectiveness for 4 months. In this study, cost data included direct costs of purchasing the drugs.

Result and Discussion

A total of 112 patients, 56 each in group A and B, enrolled in the study. Other comorbidities observed were hypertension and hyperlipidemia.

In group A, patients are categorized into 5 ranges based on the values of their FBG level. In each category individual patient's reduction in FBG from review 1 and baseline, from review 2 and review 1 calculated, and the average of each group was taken. Then the total average value was calculated, and the same procedure was applied to group B, for PPBG in groups A and B. In group A average reduction in FBG level from baseline to review 1 was 5.14mg/dL, and from review 1 to review 2, it was 7.32mg/dL. The total average reduction in FBG level is found to be 6.23mg/dL. In group B reduction in FBG level from baseline to review 1 is 4.55mg/dL, and from review 1 to review 2 is 5.67mg/dL, and the total average reduction in FBG is 5.08mg/dL.

Table 1. Drugs used in treatment of varicose veins [22 – 31]

FBS in mg/dL	Group A (metformin500 mg+ glimepiride 1 mg) no of patients			Group B (metformin500mg+ teneligliptin 20 mg) number of Patients		
	Baseline	Review 1	Review 2	Baseline	Review 1	Review 2
120-139	6	8	13	3	4	7
140-159	12	15	16	20	23	28
160-179	16	16	14	19	16	12
180-199	16	13	11	9	11	7
>200	6	4	2	5	2	2

Table 2. Drugs used in treatment of varicose veins [22 – 31]

PPBG in mg/dL	Group A (metformin500mg+ glimepiride 1 mg)			Group B (metformin 500 mg+ teneligliptin 20 mg)		
	Baseline	Review 1	Review 2	baseline	Review 1	Review 2
<or= 180		2	4		2	8
181-209	22	27	33	26	28	28
210-239	17	11	16	18	14	12
240-269	9	8	6	9	9	6
>270	8	8	7	3	3	2

Cost-effectiveness analysis was conducted using costs and effectiveness for both drug combinations. In this study, cost data included direct costs of purchasing the drugs.

Unit cost of drugs obtained from the outpatient pharmacy department. Diabetic medications are supplied by the government through the outpatient pharmacy. The cost of treatment in the two groups was calculated as follows.

The cost for each patient for 4 months is calculated by the unit price of each drug/combination per day multiplied by 30 days. Then calculated for four months. Cost of treatment for a patient for 4 months = unit price of metformin 500 mg, glimepiride 1 mg, or unit price of metformin 500 mg, teneligliptin 20 mg x frequency of medication x duration of treatment days. The average cost for the treatment group is equal to the sum of the costs of total patients/number of patients in each treatment group. Let the cost of drugs for each patient for 4 months be C1, C2, and Cn for N number of patients. Then the average cost for a group is C1 + C2……+Cn/N.

Effectiveness was calculated as the reduction of FBG and PPBG from baseline, review 1, and review 2.

Let the difference between baseline and review 1 be D1, the difference between review 2 and review 1 be D2, then the average difference between review 1 and baseline for all patients in a group is D11+D12+……D1n/N, similarly for the difference between review 2 and review 1 is D21+D22+……D2n, and the average is D21+D22+……D2n /N.

Average reduction in glucose level in each group =sum of average reduction/number of patients in each group.

Total Average reduction in glucose level in each patient in terms of FBG and PPBG is (difference between baseline and review 1+ difference between review 1 and review 2)/ 2

Average cost effectiveness ratio ACER = average cost of therapy/average effectiveness.

Incremental Cost Effectiveness Ration = (total cost Group A – total cost group B)/ (effectiveness of group A – effectiveness of group B

Calculation of cost for 4 months

Unit price of metformin 500 mg is 0.40 RS and glimepiride 1mg is 0.17RS and teneligliptin 20 mg is 0.70 RS.

Name of drug	Unit price in RS (P)	Cost for 4 months in RS Px30x4
metformin 500 mg	0.40	48
glimepiride 1mg	0.17	20.4
teneligliptin 20 mg	0.70	84

Calculation of cost effectiveness

GROUP	Average Cost for 4months in RS	Average Reduction in FBG mg/dL	Average Reduction in PPBG mg/dL	Average Cost effectiveness ratio in FBG	Average Cost effectiveness ratio in PPBG
A	68.4	6.23	6.9	10.98	9.91
B	132	5.08	6.48	25.98	20.37

Calculation of ICER

group	Cost A in RS	Cost B in RS	Cost A-CostB in RS	Effectiveness A	Effectiveness B	EffectivenessA-EffectivenessB	ICER
FBG	68.4	132	-63.6	6.23	5.08	1.15	-55.30
PPBG	68.4	132	-63.6	6.9	6.48	0.42	-151.42

Conclusion

Group A is having a reduction of 6.23mg/dL FBG level, and group B is showing 5.08 mg/dL. The average cost needed for group A for 4 months of treatment is RS 68.4, and for group B is RS 132. The average cost-effectiveness ratio for group A in FBG level is 10.98, and for group B is 25.98.

In the PPBG group, A has having average reduction of 6.9 mg/dL, and group B has a reduction of 6.48 mg/dL. Average cost effectiveness ratio for group A in PPBG level is 9.91and for group B is 20.37. In cost effectiveness analysis cost is taken in monetary units and effectiveness in nonmonetary units, such as reduction in FBG and PPBG

Group A is showing the least cost-effectiveness ratio, 10.98 in terms of reduction in FBG level and 9.91 in PPBG level. Hence, group A is more cost-effective. A combination of metformin 500 mg and glimepiride 1 mg shows better effectiveness than the teneligliptin 20 mg and metformin 500 mg combination, in FBG and PPBG reduction, and at least cost too. Teneligliptin 20 mg and metformin 500 mg combination has shown satisfactory reduction in FBG and PPBG levels, but it is more expensive.

As per the calculation of ICER: The cost is high in the group B and low in group A, and effectiveness in terms of reduction in FBG and PPBG is high in Group A, which means the group A is better. Here group A is dominating.

Limitation of the Study

For long-term, sulphonyl urea remains the second-line add-on therapy with metformin when glycemic control becomes inadequate, but it has side effects like weight gain and hypoglycemia. Dipeptidyl peptidase (DPP-4) inhibitors provide similar efficacy but are free from the above adverse effects and also free from cardiovascular risks. Even though the first combination is cost-effective for patients with a risk of hypoglycemia and cardiovascular problems, the second one is a better choice. Effectiveness of the combinations are different, adverse effects and complications are also different, so considering only the acquisition cost of medications without considering the other medical costs may influence the cost effectiveness ratio.

Reference

[1] Gavina C, Carvalho DS, Dias DM, Bernardo F, Martinho H, Couceiro J, Santos-Araújo C, Dinis-Oliveira RJ, Taveira-Gomes T. Premature Mortality in Type 2 Diabetes Mellitus Associated with Heart Failure and Chronic Kidney Disease: 20 Years of Real-World Data. *Journal of Clinical Medicine*. 2022; 11(8):2131. https://doi.org/10.3390/jcm11082131

[2] Haghighatpanah M, Nejad ASM, Haghighatpanah M, Thunga G, Mallayasamy S. Factors that Correlate with Poor Glycemic Control in Type 2 Diabetes Mellitus Patients with Complications. Osong Public Health Res Perspect. 2018 Aug;9(4):167-174. doi: 10.24171/j.phrp.2018.9.4.05. PMID: 30159222; PMCID: PMC6110332.

[3] Simeon I Taylor et al Pharmacological Treatent of Hyperglycemia in Type 2 diabetes The Journal of Clinical investigations 2021 Jan19;131(2): e142243.doi:10.1172/JCI142243.

[4] Bernard Zinman, Initial Combination Therapy for Type 2 Diabetes Mellitus: Is It Ready for Prime Time? The American Journal of Medicine,Volume 124, Issue 1, Supplement, 2011,Pages S19-S34,ISSN 0002-9343,https://doi.org/10.1016/j.amjmed.2010.11.003.

[5] (https://www.sciencedirect.com/science/article/pii/S0002934310009174)

[6] Hermann LS. Metformin: a review of its pharmacological properties and therapeutic use. Diabetes & Metabolism. 1979 Sep;5(3):233-245. PMID: 387488.

[7] Deacon CF, Lebovitz HE. Comparative review of dipeptidyl peptidase-4 inhibitors and sulphonylureas. Diabetes Obes Metab. 2016 Apr;18(4):333-47. doi: 10.1111/dom.12610. Epub 2016 Jan 8. PMID: 26597596.

[8] Sahay RK, Mittal V, Gopal GR, Kota S, Goyal G, Abhyankar M, Revenkar S. Glimepiride and Metformin Combinations in Diabetes Comorbidities and Complications: Real-World Evidence. Cureus. 2020 Sep 28;12(9):e10700. doi: 10.7759/cureus.10700. PMID: 33133865; PMCID: PMC7594657.

[9] Kanimozhi M, Bisht M, Ravikant, Bandyopadhyay A, Naithani M, Handu S. Pleiotropic effect of teneligliptin versus glimepiride add-on therapy on hs-CRP and cardiorenal parameters in Indian type 2 diabetes patients: An open-labeled randomized controlled trial. Perspect Clin Res. 2025 Jan-Mar;16(1):14-22. doi: 10.4103/picr.picr_265_23. Epub 2024 Jul 10. PMID: 39867519; PMCID: PMC11759232.

[10] Bommer C, Heesemann E, Sagalova V, Manne-Goehler J, Atun R, Bärnighausen T, Vollmer S. The global economic burden of diabetes in adults aged 20-79 years: a cost-of-illness study. Lancet Diabetes Endocrinol. 2017 Jun;5(6):423-430. doi: 10.1016/S2213-8587(17)30097-9. Epub 2017 Apr 26. PMID: 28456416.

[11] Pradeepa R, Mohan V. Epidemiology of type 2 diabetes in India. Indian J Ophthalmol. 2021 Nov;69(11):2932-2938. doi: 10.4103/ijo.IJO_1627_21. PMID: 34708726; PMCID: PMC8725109.

[12] Rasheed, Razia Abdul; Venkatraman, G.1; Vijayalakshmi, S.; Raja, T. A. R.; Senthil, G.; Renugadevi, P.. Effect of glimepiride versus teneligliptin in combination with metformin in type 2 diabetes mellitus patients. Indian Journal of Pharmacology 56(5):p 317-321, Sep–Oct 2024. | DOI: 10.4103/ijp.ijp_107_24

[13] Tandon T, Dubey AK, Srivastava S, Manocha S, Arora E, Hasan N. A pharmacoeconomic analysis to compare cost-effectiveness of metformin plus teneligliptin with metformin plus glimepiride in patients of type-2 diabetes mellitus. J Family Med Prim Care. 2019 Mar;8(3):955-959. doi: 10.4103/jfmpc.jfmpc_22_19. PMID: 31041232; PMCID: PMC6482796.

[14] Nishanth T, Maheshwari CU, Lakshmi RS, Sri D, Goud P, Tabassum K, Nadeem MT. A study to compare efficacy of metformin-glimepiride versus metformin-teneligliptin in type II diabetic patients. Int J Pharm Sci Res. 2018 Dec 1;9(12):5258-64.

[15] Anjoom M, Dutta S, Beg MA, Varma A, Bawa S, Kant R. Comparative evaluation of combination of metformin and glimepiride with that of metformin and sitagliptin in type 2 diabetes mellitus with respect to glycemic targets. Int J Med Sci Public Health. 2015 Apr 1;4(4):476-80.

[16] John NN, Arjun VJ, David D, Doddayya H. Pharmacoeconomic Evaluation of Antidiabetic Agents-Metformin Plus Teneligliptin Versus Metformin Plus Glimepiride-A Prospective Study.

[17] Gautam A, Singh SV, Gupta A, Sharma A, Gupta S, Pursnani N, Agrawal P. Comparison of efficacy between canagliflozin and teneligliptin as add-on therapy to metformin and glimepiride on plasma glucose levels along with blood pressure and lipid levels in patients with type 2 diabetes mellitus. Journal Of Diabetology. 2023 Jul 1;14(3):157-60.