



Cost-Effectiveness Analysis of Vonoprazan Vs PPIs in the Treatment of Gastroesophageal Reflux Disease

Dr. Dhiren Chaudhari¹, Himani Mevada²

¹Associate Professor, Shri Sarvajanik Pharmacy College, Mehsana, Gujarat, India

²M.Pharm Scholar, Shri Sarvajanik Pharmacy College, Mehsana, Gujarat, India

Abstract

Introduction: Gastroesophageal reflux disease (GERD) is a common gastrointestinal disorder characterized by the reflux of gastric contents into the esophagus, leading to symptoms such as heartburn and regurgitation. Proton pump inhibitors (PPIs) are the standard therapy, while vonoprazan, a potassium-competitive acid blocker, is a newer alternative with improved acid suppression.

Objective: To evaluate and compare the cost-effectiveness of vonoprazan and PPIs in the treatment of GERD.

Methodology: A multicentric, prospective, observational, and comparative study was conducted over a period of 3 months. A total of 100 patients were enrolled and equally divided into two groups: vonoprazan (n=50) and PPIs (n=50). Data were collected through patient interviews, case records, and validated scales such as the Frequency Scale for the Symptoms of GERD (FSSG) and Morisky Medication Adherence Scale (MMAS-8). Cost-effectiveness was assessed using the average cost-effectiveness ratio (CER).

Results and Discussion: Male predominance was observed in both groups, and the majority of patients belonged to the middle age group. Both treatment groups showed significant improvement in GERD symptoms, as indicated by reduction in FSSG scores, with comparatively greater improvement observed in the vonoprazan group. The mean cost-effectiveness ratio (CER) was higher in the vonoprazan group (67.80 ± 27.76) compared to the PPIs group (62.09 ± 31.61), indicating relatively better cost-effectiveness of PPIs. These findings are consistent with previous studies.

Conclusion: Both vonoprazan and PPIs are effective in the management of GERD. Vonoprazan provides better symptom improvement, while PPIs remain a more cost-effective option. Therefore, PPIs can be considered a preferred economical treatment, especially in resource-limited settings.

Keywords: Gastroesophageal reflux disease (GERD), Vonoprazan, Proton pump inhibitors (PPIs), Cost effectiveness analysis, Cost-effectiveness ratio (CER), Medication adherence, FSSG score

1. Introduction

Gastroesophageal reflux disease (GERD) is characterized by abnormal retrograde movement of gastric contents into the esophagus and commonly presents with heartburn and regurgitation. Persistent reflux may lead to esophagitis and other complications. Proton pump inhibitors (PPIs) are widely used as standard acid-suppressive therapy.^{1,2} PPIs inhibit gastric H⁺/K⁺-ATPase, whereas vonoprazan is a potassium-competitive acid blocker (P-CAB) that produces potent acid suppression through potassium-competitive inhibition of the gastric proton pump.^{3,4}

Cost-effectiveness analysis compares the resources required for alternative interventions with their clinical outcomes and is useful when both treatment effectiveness and expenditure are important.⁵ In the present study, medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8), and symptom response was evaluated using the Frequency Scale for the Symptoms of GERD (FSSG).⁶⁻⁸

Wang et al. evaluated the cost-effectiveness of vonoprazan versus PPIs for reflux esophagitis using a 5-year Markov model and reported higher healing rates and lower modeled costs for vonoprazan in the Chinese healthcare setting.⁹ Jamshed et al., in a review of long-term GERD management, reported that PPIs were effective and that on-demand PPI treatment was more economical than continuous long-term therapy.¹⁰ These differing clinical and economic findings highlight the need for patient-level evidence in the Indian healthcare setting.

Therefore, the present study was undertaken to compare vonoprazan and PPIs by integrating direct medical, direct non-medical and indirect costs with medication adherence, FSSG-based symptom change and the resulting cost-effectiveness ratio among patients with GERD.

2. Methodology

A multicentric, prospective, observational and comparative study was conducted for 3 months at Lions Hospital, Advanced Gastro Surgical Hospital and Gujarat Gastro Hub, Mehsana. Convenient sampling was used. Adults aged ≥ 18 years with diagnosed GERD receiving either vonoprazan or PPI therapy were included. Both genders and patients with associated comorbidities were eligible. Patients unwilling to participate, pregnant or lactating women, and patients receiving combination drug therapy were excluded. Ethical approval was obtained from the Sarvajanik Clinical Research Ethics Committee, and written informed consent was obtained.

Data were collected through patient interviews and case records using a structured case record form. Demographic characteristics and treatment-related costs were recorded. Medication adherence was assessed using MMAS-8, and GERD symptoms were assessed using the FSSG.⁶⁻⁸ Data were entered in Microsoft Excel. Direct medical costs included consultation and medication costs; direct non-medical costs included travel and

food expenses; and indirect costs included loss of wages of the patient and caregiver. The average cost-effectiveness ratio (CER) was calculated as the cost of one tablet multiplied by the number of days between baseline and follow-up, divided by the change in GERD symptom score between baseline and follow-up, according to the thesis methodology.

Frequencies and percentages were used for categorical variables, while means and standard deviations were used for continuous variables. Findings were summarized in tables.

3. Results

3.1 Study sample and data collection summary

Data collection was carried out from December 2025 to February 2026. A total of 100 patients from the three study sites met the study criteria and were enrolled; 50 received vonoprazan (Group A) and 50 received PPIs (Group B). Baseline information was collected at the initial visit and first follow-up information at the subsequent visit.

Treatment group	No. of patients	Percentage
Vonoprazan (Group A)	50	50%
PPIs (Group B)	50	50%
Total	100	100%

The table shows an equal allocation of the 100 enrolled patients between the two treatment groups. Fifty patients (50%) received vonoprazan (Group A) and 50 patients (50%) received PPIs (Group B), providing equally sized groups for comparison of clinical and economic outcomes.

3.2 Gender-wise distribution

Gender	Vonoprazan N (%)	PPIs N (%)
Male	30 (60.00%)	34 (68.00%)
Female	20 (40.00%)	16 (32.00%)
Total	50 (100%)	50 (100%)

Male patients predominated in both treatment groups. In the vonoprazan group, 30 patients (60%) were male and 20 (40%) were female, whereas in the PPI group, 34 patients (68%) were male and 16 (32%) were female. Thus, the proportion of males was slightly higher in the PPI group.

3.3 Age-group-wise distribution

Age group	Vonoprazan N (%)	PPIs N (%)
18–29 years	7 (14.00%)	8 (16.00%)
30–39 years	8 (16.00%)	14 (28.00%)
40–49 years	15 (30.00%)	6 (12.00%)
50–59 years	9 (18.00%)	13 (26.00%)
60–69 years	6 (12.00%)	4 (8.00%)
70–79 years	4 (8.00%)	3 (6.00%)
80 years or above	1 (2.00%)	2 (4.00%)
Total	50 (100%)	50 (100%)

The age distribution differed between the two treatment groups. In the vonoprazan group, the largest proportion of patients belonged to the 40–49-year age group (30%), followed by 50–59 years (18%). In the PPI group, the largest proportion was in the 30–39-year age group (28%), followed by 50–59 years (26%). Patients aged 80 years or above represented the smallest proportion in both groups (2% and 4%, respectively).

3.4 GERD patients having comorbidities

Comorbidity	No. of patients	Percentage
No comorbidity	58	58.00%
Hypertension	19	19.00%
Diabetes mellitus	14	14.00%
Hyperthyroidism	3	3.00%
Hyperuricemia	1	1.00%
Chronic kidney disease	1	1.00%
Vertigo	1	1.00%
Inguinal hernia	1	1.00%
Dyslipidemia	1	1.00%
Migraine	1	1.00%

More than half of the study population, 58 patients (58%), had no reported comorbidity. Hypertension was the most frequently reported comorbidity (19%), followed by diabetes mellitus (14%) and hyperthyroidism (3%). Hyperuricemia, chronic kidney disease, vertigo, inguinal hernia, dyslipidemia and migraine were each reported in 1% of patients.

3.5 Direct medical cost

Total direct medical cost	Vonoprazan N (%)	PPIs N (%)
₹0–₹500	0 (0.00%)	2 (4.00%)
₹501–₹1000	0 (0.00%)	7 (14.00%)
₹1001–₹1500	29 (58.00%)	40 (80.00%)
₹1501–₹2000	21 (42.00%)	1 (2.00%)

Most patients in both treatment groups had a total direct medical cost between ₹1001 and ₹1500: 29 patients (58%) in the vonoprazan group and 40 (80%) in the PPI group. A higher proportion of vonoprazan-treated patients had costs of ₹1501–₹2000 (42%) compared with the PPI group (2%). In the PPI group, 18% of patients had direct medical costs of ₹1000 or less, whereas no vonoprazan-treated patient was reported in these lower-cost categories. The thesis discussion reported total direct medical costs of 1388.11 for vonoprazan and 1179.92 for PPIs.

3.6 Direct non-medical cost

Total direct non-medical cost	Vonoprazan N (%)	PPIs N (%)
₹0–₹200	30 (60.00%)	34 (68.00%)
₹201–₹400	15 (30.00%)	8 (16.00%)
₹401–₹600	4 (8.00%)	5 (10.00%)
₹601–₹800	4 (8.00%)	2 (4.00%)
₹801–₹1000	3 (6.00%)	1 (2.00%)
₹1001–₹3000	1 (2.00%)	0 (0.00%)

Direct non-medical costs were concentrated in the lower cost categories in both groups. Costs of ₹0–₹200 were reported for 60% of patients receiving vonoprazan and 68% receiving PPIs. The ₹201–₹400 category included 30% of the vonoprazan group and 16% of the PPI group. Higher cost categories were less frequent, and no PPI-treated patient was reported in the ₹1001–₹3000 category. The thesis reports a total direct non-medical cost of 228.6 but does not clearly assign this value to either treatment group; therefore, no group-specific mean is inferred.

3.7 Indirect cost

Total indirect cost	Vonoprazan N (%)	PPIs N (%)
₹0–₹1000	25 (50.00%)	37 (74.00%)
₹1001–₹2000	12 (24.00%)	5 (10.00%)
₹2001–₹3000	7 (14.00%)	7 (14.00%)
₹3001–₹4000	5 (10.00%)	1 (2.00%)
₹4001–₹5000	1 (2.00%)	0 (0.00%)

Indirect costs were also concentrated in the lowest cost category. Half of the vonoprazan group (50%) and nearly three-fourths of the PPI group (74%) had total indirect costs of ₹0–₹1000. Higher indirect costs were more frequent in the vonoprazan group: 10% had costs of ₹3001–₹4000 and 2% had costs of ₹4001–₹5000, compared with 2% and 0%, respectively, in the PPI group. The thesis reports a total indirect cost of 1024 without clearly allocating this value by treatment group.

3.8 Classification of GERD patients by medication adherence category

Medication adherence category	Vonoprazan N (%)	PPIs N (%)
High adherence (9–11)	31 (62.00%)	34 (68.00%)
Medium adherence (6–8)	15 (30.00%)	14 (28.00%)
Low adherence (<6)	4 (8.00%)	2 (4.00%)

Medication adherence was generally good in both groups. High adherence was observed in 31 patients (62%) receiving vonoprazan and 34 patients (68%) receiving PPIs. Medium adherence was reported in 30% and 28%, respectively, while low adherence was limited to 8% of the vonoprazan group and 4% of the PPI group. Thus, most patients in both groups were classified as having high or medium adherence.

3.9 FSSG responses (12-item) at baseline and follow-up

The thesis reports FSSG responses using five frequency categories: Never, Occasionally, Sometimes, Often and Always. The four source tables are consolidated below.

Group A – Baseline

No.	Question	Never	Occasionally	Sometimes	Often	Always
1	Do you get heartburn?	5 (10%)	2 (4%)	19 (38%)	14 (28%)	10 (20%)
2	Does your stomach get bloated?	12 (24%)	2 (4%)	22 (44%)	6 (12%)	8 (16%)

3	Does your stomach ever feel heavy after meals?	12 (24%)	7 (14%)	22 (44%)	4 (8%)	5 (10%)
4	Do you sometimes subconsciously rub your chest with your hand?	24 (48%)	9 (18%)	12 (24%)	5 (10%)	0 (0%)
5	Do you ever feel sick after meals?	42 (84%)	0 (0%)	6 (12%)	1 (2%)	1 (2%)
6	Do you get heartburn after meals?	24 (48%)	2 (4%)	17 (34%)	5 (10%)	2 (4%)
7	Do you have an unusual (e.g. burning) sensation in your throat?	24 (48%)	8 (16%)	8 (16%)	8 (16%)	2 (4%)
8	Do you feel full while eating meals?	24 (48%)	5 (10%)	14 (28%)	6 (12%)	1 (2%)
9	Do some things get stuck when you swallow?	43 (86%)	1 (2%)	1 (2%)	4 (8%)	1 (2%)
10	Do you get bitter liquid (acid) coming up into your throat?	34 (68%)	6 (12%)	16 (32%)	6 (12%)	6 (12%)
11	Do you burp a lot?	5 (10%)	3 (6%)	16 (32%)	16 (32%)	10 (20%)
12	Do you get heartburn if you bend over?	40 (80%)	3 (6%)	4 (8%)	3 (6%)	0 (0%)

At baseline in the vonoprazan group, several GERD symptoms were reported with moderate-to-high frequency. Heartburn was reported as sometimes, often or always by 86% of patients, while frequent burping was also prominent, with 84% reporting it at least sometimes. In contrast, symptoms such as difficulty with swallowing and heartburn on bending were absent in most patients, with 86% and 80%, respectively, reporting 'never'. These baseline responses indicate that symptom burden varied considerably across individual FSSG items.

Group A – Follow-up

No.	Question	Never	Occasionally	Sometimes	Often	Always
1	Do you get heartburn?	14 (28%)	20 (40%)	13 (26%)	3 (6%)	0 (0%)
2	Does your stomach get bloated?	14 (28%)	20 (40%)	12 (24%)	4 (8%)	0 (0%)
3	Does your stomach ever feel heavy after meals?	20 (40%)	21 (42%)	9 (18%)	0 (0%)	1 (2%)
4	Do you sometimes subconsciously rub your chest with your hand?	41 (82%)	9 (18%)	0 (0%)	0 (0%)	0 (0%)
5	Do you ever feel sick after meals?	45 (90%)	5 (10%)	0 (0%)	0 (0%)	0 (0%)
6	Do you get heartburn after meals?	31 (62%)	14 (28%)	5 (10%)	0 (0%)	0 (0%)
7	Do you have an unusual (e.g. burning) sensation in your throat?	33 (66%)	13 (26%)	4 (8%)	0 (0%)	0 (0%)
8	Do you feel full while eating meals?	27 (54%)	12 (24%)	6 (12%)	5 (10%)	0 (0%)
9	Do some things get stuck when you swallow?	46 (92%)	2 (4%)	1 (2%)	1 (2%)	0 (0%)
10	Do you get bitter liquid (acid) coming up into your throat?	21 (42%)	23 (46%)	6 (12%)	0 (0%)	0 (0%)
11	Do you burp a lot?	44 (88%)	15 (30%)	23 (46%)	6 (12%)	0 (0%)

12	Do you get heartburn if you bend over?	45 (90%)	3 (6%)	2 (4%)	0 (0%)	0 (0%)
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At follow-up in the vonoprazan group, the response distribution generally shifted toward 'never' and 'occasionally' for most FSSG items. For example, 68% of patients reported heartburn as never or occasionally at follow-up, while 90% reported never feeling sick after meals and 92% reported never experiencing swallowing difficulty. Heartburn after meals and unusual throat sensations were also reported as never by 62% and 66% of patients, respectively. This pattern is consistent with improvement in GERD symptoms after treatment. The source table for item 11 ('Do you burp a lot?') is internally inconsistent because the reported frequencies exceed the group total; the values are retained exactly as reported in the thesis.

Group B – Baseline

No.	Question	Never	Occasionally	Sometimes	Often	Always
1	Do you get heartburn?	8 (16%)	4 (8%)	22 (44%)	9 (18%)	7 (14%)
2	Does your stomach get bloated?	17 (34%)	3 (6%)	15 (30%)	6 (12%)	9 (18%)
3	Does your stomach ever feel heavy after meals?	7 (14%)	3 (6%)	19 (38%)	6 (12%)	15 (30%)
4	Do you sometimes subconsciously rub your chest with your hand?	22 (44%)	10 (20%)	13 (26%)	4 (8%)	1 (2%)
5	Do you ever feel sick after meals?	37 (74%)	1 (2%)	3 (6%)	3 (6%)	6 (12%)
6	Do you get heartburn after meals?	18 (36%)	6 (12%)	16 (32%)	6 (12%)	4 (8%)
7	Do you have an unusual (e.g. burning) sensation in your throat?	31 (62%)	4 (8%)	8 (16%)	4 (8%)	3 (6%)
8	Do you feel full while eating meals?	0 (0%)	32 (64%)	7 (14%)	1 (2%)	10 (20%)
9	Do some things get stuck when you swallow?	42 (84%)	1 (2%)	2 (4%)	3 (6%)	2 (4%)
10	Do you get bitter liquid (acid) coming up into your throat?	18 (36%)	3 (6%)	16 (32%)	10 (20%)	3 (6%)
11	Do you burp a lot?	6 (12%)	1 (2%)	20 (40%)	11 (22%)	12 (24%)
12	Do you get heartburn if you bend over?	40 (80%)	1 (2%)	4 (8%)	3 (6%)	2 (4%)

At baseline in the PPI group, heartburn and post-meal heaviness were commonly reported. Heartburn was rated sometimes, often or always by 76% of patients, while post-meal heaviness was reported in these categories by 80%. Burping was also frequent, with 86% reporting it at least sometimes. Swallowing difficulty and heartburn on bending were less prominent, with 84% and 80% of patients, respectively, reporting 'never'.

Group B – Follow-up

No.	Question	Never	Occasionally	Sometimes	Often	Always
1	Do you get heartburn?	10 (20%)	22 (44%)	13 (26%)	5 (10%)	0 (0%)

2	Does your stomach get bloated?	20 (40%)	19 (38%)	7 (14%)	3 (6%)	1 (2%)
3	Does your stomach ever feel heavy after meals?	11 (22%)	20 (40%)	13 (26%)	5 (10%)	1 (2%)
4	Do you sometimes subconsciously rub your chest with your hand?	36 (72%)	12 (24%)	1 (2%)	1 (2%)	0 (0%)
5	Do you ever feel sick after meals?	40 (80%)	6 (12%)	4 (8%)	0 (0%)	0 (0%)
6	Do you get heartburn after meals?	24 (48%)	17 (34%)	6 (12%)	3 (6%)	0 (0%)
7	Do you have an unusual (e.g. burning) sensation in your throat?	37 (74%)	9 (18%)	2 (4%)	2 (4%)	0 (0%)
8	Do you feel full while eating meals?	32 (64%)	9 (18%)	5 (10%)	3 (6%)	1 (2%)
9	Do some things get stuck when you swallow?	47 (94%)	2 (4%)	1 (2%)	0 (0%)	0 (0%)
10	Do you get bitter liquid (acid) coming up into your throat?	23 (46%)	16 (32%)	9 (18%)	1 (2%)	1 (2%)
11	Do you burp a lot?	6 (12%)	20 (40%)	15 (30%)	8 (16%)	1 (2%)
12	Do you get heartburn if you bend over?	44 (88%)	2 (4%)	3 (6%)	1 (2%)	0 (0%)

At follow-up in the PPI group, most FSSG items showed a shift toward lower symptom-frequency categories. Heartburn was reported as never or occasionally by 64% of patients, bloating by 78%, heartburn after meals by 82%, and unusual throat sensations by 92%. Swallowing difficulty was reported as 'never' by 94% and heartburn on bending by 88%. However, burping remained relatively common, with 48% of patients reporting it sometimes, often or always. Overall, the follow-up distribution indicates symptom improvement compared with baseline.

3.10 Cost-effectiveness ratio (CER)

Parameter (Mean $\pm$ SD)	Vonoprazan	PPIs
Baseline FSSG score	15.56 $\pm$ 4.92	16.42 $\pm$ 7.78
1st follow-up FSSG score	7.54 $\pm$ 3.95	8.56 $\pm$ 5.25
Difference	8.02 $\pm$ 2.64	7.86 $\pm$ 2.53
CER	67.80 $\pm$ 27.76	62.09 $\pm$ 31.61

Both groups demonstrated a reduction in mean FSSG score from baseline to first follow-up. The vonoprazan group decreased from 15.56 $\pm$ 4.92 to 7.54 $\pm$ 3.95, giving a mean reduction of 8.02 $\pm$ 2.64. The PPI group decreased from 16.42 $\pm$ 7.78 to 8.56 $\pm$ 5.25, with a mean reduction of 7.86 $\pm$ 2.53. The reduction was therefore slightly greater in the vonoprazan group. The mean CER was 67.80 $\pm$ 27.76 for vonoprazan and 62.09 $\pm$ 31.61 for PPIs; within the calculation method used in the thesis, the lower CER for PPIs indicates a lower cost per unit of symptom improvement.

4. Discussion

The present study enrolled 100 patients equally divided between vonoprazan and PPIs. Male predominance was observed in both groups (60% vs 68%). This pattern is comparable with Mahdi et al., in which males comprised 73.3% of the vonoprazan group and 70% of the omeprazole group.¹¹ In the present study, the largest age

category was 40–49 years in the vonoprazan group and 30–39 years in the PPI group; Mahdi et al. reported higher mean ages of 52.85 ± 11.65 and 51.64 ± 12.72 years, respectively.¹¹

More than half of the present study population (58%) had no comorbidity. Among the reported comorbidities, hypertension (19%) and diabetes mellitus (14%) were most frequent. The thesis discussion notes lower frequencies than those reported by Bunchorntavakul et al., where hypertension and diabetes were reported in 33% and 31%, respectively.¹² Differences may reflect variation in study populations and settings.

Both groups demonstrated reduction in FSSG scores. The mean score decreased from 15.56 ± 4.92 to 7.54 ± 3.95 in the vonoprazan group and from 16.42 ± 7.78 to 8.56 ± 5.25 in the PPI group, corresponding to mean reductions of 8.02 and 7.86, respectively. Mahdi et al. likewise reported reductions in FSSG scores in both vonoprazan and omeprazole groups.¹¹

Medication adherence was good in both groups: high adherence was observed in 62% of vonoprazan-treated patients and 68% of PPI-treated patients, while low adherence was observed in 8% and 4%, respectively. Thus, the observed symptom differences occurred in a population in which most participants demonstrated high or medium adherence.

The economic findings showed higher reported direct medical cost in the vonoprazan group (1388.11) than in the PPI group (1179.92). The distributions also showed that most patients in both groups incurred moderate direct medical costs, while direct non-medical and indirect costs were concentrated in the lower cost categories. The thesis compares these findings with Habu et al., who reported lower direct medical cost for vonoprazan than lansoprazole in their Japanese analysis,¹³ and with Szucs et al., who reported different cost levels in an esomeprazole study.¹⁴ Such differences may reflect healthcare setting, costing methods, treatment duration and patient characteristics.

The mean CER was 67.80 ± 27.76 for vonoprazan and 62.09 ± 31.61 for PPIs. Thus, within the calculation framework used in this thesis, the PPI group had the lower CER despite the slightly greater mean FSSG reduction observed with vonoprazan. This finding is directionally consistent with the thesis-cited Japanese analysis by Habu et al., which reported CER values of 39 for vonoprazan and 31 for PPIs.¹³

5. Conclusion

The present study concludes that both vonoprazan and proton pump inhibitors (PPIs) are effective in the management of gastroesophageal reflux disease (GERD), with both groups demonstrating good medication adherence. Vonoprazan showed comparatively better improvement in symptom relief, as evidenced by greater reduction in FSSG scores, and an additional 0.16 increase in therapeutic outcomes compared to PPIs. However, despite this marginal clinical advantage, PPIs were found to be more cost-effective, as indicated by a lower mean cost-effectiveness ratio (CER) compared to vonoprazan. Therefore, while vonoprazan may offer slightly superior therapeutic benefits, PPIs remain a more economical and practical choice for the management of GERD, particularly in resource-limited settings.

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