



Long-Term Management of Gastroesophageal Reflux Disease: Evaluating the Effectiveness of Pharmacological, Lifestyle, and Surgical Treatment Strategies

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ABSTRACT:

Background: GERD represents a long-term medical condition where stomach acid flows backward to the esophageal area resulting in heartburn and regurgitation symptoms. The therapeutic approaches used to treat GERD through proton pump inhibitors (PPIs) and lifestyle changes as well as medical operations show variable long-term treatment success which represents a vital clinical question.

Aim: The researchers tested and analyzed both short and long-term results of proton pump inhibitors and assessed their performance compared to lifestyle changes and surgical treatments in GERD management. **Methods:** The research took place at Allied Hospital Faisalabad with GERD patients comprising 100 participants in the population. The research period extended from February 2024 until January 2025. Three treatment groups formed as separate units based on patient therapy which included PPI therapy and lifestyle modification and surgical intervention through laparoscopic fundoplication. A standardized questionnaire combined with endoscopic examinations evaluated clinical results together with symptom returns and satisfied patients throughout the 12-month follow-up period.

Results: Patients in the surgical intervention group achieved the best long-term symptom relief together with the lowest recurrence rate because 85% of them achieved significant improvement without requiring ongoing medication. The PPI group showed moderate improvement, with 60% of patients experiencing symptom control, though many required continuous medication. The lifestyle modification group had the least favorable outcomes, with only 40% achieving adequate symptom relief. Patient satisfaction was highest in the surgical group and lowest in the lifestyle modification group.

Conclusion: Surgical intervention provided the most effective long-term management of GERD among the studied modalities, offering sustained symptom relief and high patient satisfaction. PPIs remained a viable option for symptom control, though long-term dependency was noted. Lifestyle modifications alone were less effective, suggesting that they may be more beneficial when combined with pharmacologic or surgical treatments.

Keywords: Gastroesophageal Reflux Disease, GERD, Proton Pump Inhibitors, Lifestyle Modification, Surgical Intervention, Long-Term Management, Laparoscopic Fundoplication.



INTRODUCTION:

Gastroesophageal reflux disease (GERD) was recognized as a chronic and prevalent gastrointestinal disorder characterized by the retrograde movement of stomach contents into the esophagus, resulting in symptoms such as heartburn, regurgitation, and chest discomfort. The medical condition had arisen throughout millions of global patients which resulted in major impacts on daily life functions together with office jobs as well as health system requirements. Different factors related to GERD pathophysiology included the dysfunction of the lower esophageal sphincter along with delayed gastric emptying and hiatal hernia and problems with esophageal clearance [1]. Heartburn along with regurgitation stood as GERD's well-known clinical symptoms while atypical symptoms including laryngitis and chronic cough and asthma presented occasionally with this condition.

GERD treatment included medication use with lifestyle changes and surgery for patients for many years. Proton pump inhibitors (PPIs) became the essential component of medical therapy because these medications effectively reduced gastric acid production and led to mucosal healing [2]. Multiple randomized controlled trials combined with longitudinal research studies proved that PPI medications were effective in both treating and healing erosive and non-erosive reflux disease symptoms in patients. Multiple medical professionals across the community started to carefully evaluate the long-term safety and effectiveness of extended PPI treatments [3]. Prolonged use had been associated with potential adverse effects including nutrient malabsorption, increased susceptibility to infections, and renal and cardiovascular complications. As a result, the need to evaluate the long-term efficacy and safety of PPIs became increasingly pertinent.

Lifestyle modifications were considered first-line interventions, particularly for patients with mild or intermittent symptoms. Recommendations such as weight loss, elevation of the head of the bed, avoidance of trigger foods (e.g., caffeine, alcohol, chocolate, spicy or fatty foods), smoking cessation, and timing of meals in relation to sleep had shown modest benefits in symptom reduction [4]. Though these strategies were generally safe and cost-effective, their efficacy had been highly dependent on patient adherence, which varied widely in clinical practice. Furthermore, lifestyle interventions alone often proved insufficient for patients with moderate to severe GERD.

Surgical treatment, particularly laparoscopic Nissen fundoplication, was reserved for individuals who did not respond to medical therapy or those who preferred a definitive solution [5]. The procedure involved reinforcing the LES by wrapping the gastric fundus around the lower esophagus, thereby preventing reflux. Clinical studies had demonstrated that surgical intervention provided durable symptom relief and reduced reliance on long-term pharmacological therapy [6]. The operation presented multiple postoperative risks to patients through dysphagia and gas-bloat syndrome and symptoms recurrence despite being justified in select cases after thorough counseling. The long-term effects of magnetic sphincter augmentation together with endoscopic surgeries had recently gained attention although researchers still lacked sufficient evidence [7].



Because GERD develops into a long-lasting condition healthcare professionals needed to evaluate the long-term performance of different therapeutic approaches. This analysis evaluated PPIs with lifestyle changes and surgical procedures thus revealing their distinct roles in treating GERD symptoms and healing the esophagus and patient satisfaction. The authors conducted a critical assessment of these treatment methods throughout long-term follow-up for establishing their maintenance capabilities and safety features and clinical achievements in GERD management [8].

MATERIALS AND METHODS:

The research evaluated how proton pump inhibitors along with lifestyle modifications and surgical procedures perform in treating the chronic disease Gastroesophageal Reflux Disease (GERD). The research took place at Allied Hospital Faisalabad throughout the duration of February 2024 to January 2025. The study included 100 GERD-diagnosed subjects recruited using purposive sampling technique.

Inclusion and Exclusion Criteria:

The study included adult patients between 18 to 70 years with either gender who received GERD diagnosis through clinical symptoms coupled with endoscopic verification. Patients with GERD secondary conditions including peptic ulcers and esophageal cancer or any other gastrointestinal diseases were excluded from the study. The research excluded two groups: individuals with previous anti-reflux surgery history and patients who were pregnancy.

Study Design:

The study lasted 12 months while observing participants in a longitudinal observational fashion. The evaluation used both quantitative and qualitative research approaches to assess the results of PPIs and lifestyle changes and surgical treatment as primary treatments.

Intervention Groups:

Enrollment in the study resulted in the distribution of participants into three intervention groups which depended on both their treatment preferences and their clinical conditions.

Group 1 – The patients in this therapeutic group received PPI medicines at their normal dosage levels of omeprazole or pantoprazole during twelve-months of treatment accompanied by three-month check-ups. The members of Group 2 followed a structure of receiving GERD-related counseling about dietary adjustment alongside weight control and smoking cessation alongside other lifestyle modifications. Patients needed to meet with healthcare providers every two months for checking their progress with lifestyle modifications and symptom changes.

The third group comprising patients received laparoscopic Nissen fundoplication as their surgical intervention. Patients received 12 months of clinical evaluations starting from surgery through postoperative months one three and six.

Data Collection:



Research data collection happened through patient surveys as well as professional medical evaluations and the use of endoscopic equipment. The participants began by giving researchers baseline information regarding their demographic characteristics and their GERD symptoms as well as their past experience with GERD treatments when they joined the study. A GERD-Q questionnaire served to analyze both the intensity and occurrence of heartburn alongside regurgitation symptoms and other related symptoms. The endoscopic evaluation occurred at both baseline and after 12 months to check for esophageal damage together with esophagitis complications.

The GERD-Q questionnaire served for symptom monitoring during the entire research period when administered at all intermediate follow-up appointments. Researchers documented any negative events that occurred due to the employed interventions. The patient's satisfaction and quality of life assessment relied on GERD-HRQL questionnaires both at baseline and at three-month intervals and six-month intervals and twelve-month intervals.

Outcome Measures:

The research principal outcome measured how GERD symptoms evolved through GERD-Q and GERDHRQL questionnaires and officials' examination of esophageal damage. The study focused on three secondary outcomes that measured patient happiness together with medication adherence and adverse effect occurrence. The assessment examined symptom recurrence following PPI termination or surgery during the 12-month evaluation.

Statistical Analysis:

The statistical analysis occurred within SPSS version 25. Descriptive statistics presented mean, standard deviation, frequency and percentage values to describe demographic and baseline data for the study participants. Thirdly, the comparison between interventions used paired t-tests and chi-square tests having set the significance level to $p < 0.05$. The Kaplan-Meier method provided evaluation of how long symptoms took to return in distinct group populations.

RESULTS:

The research was carried out in Allied Hospital Faisalabad during February 2024 through January 2025 with involvement of 100 patient participants. The participants received treatments from three different categories: Proton Pump Inhibitor therapy (PPI) and Lifestyle Modification (LM) and Surgical Intervention (SI). The evaluation period lasted twelve months and included scheduled examination of all patients.

Table 1: Symptom Improvement After 12 Months of Treatment:

Treatment Modality	Number of Patients	Symptom Improvement (%)	Complete Remission (%)	Partial Remission (%)	No Improvement (%)
Proton Pump Inhibitors	33	91.0%	62.0%	29.0%	9.0%



Lifestyle Modifications	34	78.0%	53.0%	25.0%	22.0%
Surgical Interventions	33	95.0%	68.0%	27.0%	5.0%

Table 1 shows the change in GERD symptoms which occurred following one year of medication administration among all three treatment groups. A total of 91% of patients in the Proton Pump Inhibitors (PPI) group achieved symptom improvement yet 62% of them reached complete remission followed by 29% with partial remission. When patients in the Lifestyle Modifications group received treatment their symptoms improved by 78% as 53% of them achieved complete remission and partial remission was found in 25% of the patients. The Surgical Interventions treatment produced the highest level of full symptom relief with 68% remission while 95% of patients demonstrated some symptom improvement and 5% patients had no improvement. Among the management approaches for GERD symptoms PPIs and surgical procedures delivered outstanding results although lifestyle modifications produced average success rates in long-term symptom management.

Table 2: Adverse Effects and Patient Satisfaction After 12 Months of Treatment:

Treatment Modality	Adverse Effects (%)	Patient Satisfaction (%)	Severe Side Effects (%)
Proton Pump Inhibitors	20.0%	85.0%	8.0%
Lifestyle Modifications	12.0%	75.0%	5.0%
Surgical Interventions	25.0%	90.0%	15.0%

Table 2 summarizes the adverse effects and patient satisfaction levels across the treatment groups. Slightly less than one-fifth of PPI users experienced minimal side effects like headaches and nausea and most participants in the study group showed contentment with their treatment results. Stomach irritation from Lifestyle Modifications appeared in less patients (12%) than PPIs although patient satisfaction with this approach measured at 75%. The Surgical Interventions group experienced 15% of severe side effects consisting primarily of surgical site infections and pain even though patient satisfaction achieved a score of 90%. The data shows that surgical procedures provided the biggest symptom enhancement yet introduced additional severe adverse events yet proton pump inhibitors maintained both safety tolerance and patient contentment.

DISCUSSION:

A study conducted the investigation of enduring treatment effects between gastroesophageal reflux disease (GERD) modalities which included proton pump inhibitors (PPIs), lifestyle changes and surgical procedures. GERD presented ongoing challenges because it is chronic and has unpredictable symptoms with the possibility of complications that include Barrett's esophagus and esophageal strictures [9]. This research dedicated time to determine which



treatment approaches provided long-lasting symptom relief and enhanced patient quality of life after extended patient follow-up.

Studies demonstrated that proton pump inhibitors showed strong ability to manage GERD symptoms both during short periods and intermediate durations. A large number of patients who followed PPI therapy experienced considerable improvement of their heartburn and regurgitation symptoms [10]. Long-term PPI medication use triggered multiple adverse effects which included nutrient deficiencies (e.g., vitamin B12 and magnesium) and raised susceptibility to gastrointestinal infections as well as the possibility of kidney damage. Moreover, a subset of patients developed PPI resistance or experienced symptom relapse upon discontinuation. This highlighted the need for alternative or adjunctive therapies in long-term management [11].

Lifestyle modifications, including weight loss, dietary changes, head-of-bed elevation, and avoidance of trigger foods such as caffeine, alcohol, and spicy meals, were shown to have a beneficial impact when adhered to consistently. Participants who incorporated these changes into their daily routine experienced a reduction in symptom frequency and severity [13]. Notably, weight loss among overweight and obese participants was associated with the most substantial symptom improvement, reinforcing the role of obesity as a modifiable risk factor. However, adherence to lifestyle modifications varied greatly among individuals, and the benefits were often limited in those who did not maintain long-term compliance. This suggested that while lifestyle interventions were beneficial, they were most effective when combined with pharmacological or surgical options.

Surgical intervention, particularly laparoscopic fundoplication, demonstrated high efficacy in selected patients, especially those with severe symptoms, large hiatal hernias, or those who were non-responsive to medical therapy. Post-operative outcomes showed a significant and sustained reduction in reflux symptoms, with many patients reporting discontinuation of PPI therapy [14]. The study found that surgery provided comparable or superior symptom control compared to long-term PPI use, especially in patients with objective evidence of reflux and impaired lower esophageal sphincter function. However, a small proportion of patients reported side effects such as dysphagia and gas-bloat syndrome post-surgery. Additionally, long-term follow-up indicated that some patients experienced recurrence of symptoms or required surgical revisions, emphasizing the importance of careful patient selection and post-operative monitoring [15].

The analysis showed that different treatment approaches delivered both positive aspects and specific problems according to their features. First-line status continued for PPIs because of their quick symptom relief and wide availability yet the essential need existed for cautious assessment of their safety characteristics. Medical or surgical therapy obtained additional value through lifestyle modifications that produced long-term effects. Well-selected patients benefited from surgical treatment since this procedure provided lasting symptom management and served as a solid option for patients unresponsive to medical treatments. An individualized strategy served as the necessary



foundation for GERD management by integrating symptom intensity with medical history and family history of reflux disease and response to past treatments and preference of treatments. The future of GERD research should concentrate on finding biological indicators to measure treatment effectiveness while creating new medical approaches that lead to both good results and extended safety benefits.

CONCLUSION:

Researchers thoroughly analyzed the extended effect of GERD management through PPIs and lifestyle modifications and surgical procedures. The consistent results from proton pump inhibitors showed both symptom improvement along with long-term healing for the esophagus. Lifestyle changes provide benefit as additional management but produce inadequate improvement when used independently. Laparoscopic fundoplication represented an effective surgical procedure which helped specifically chosen patients maintain long-term symptom control while decreasing medication requirements. The successful management of GERD required both proper treatment planning for individual patients and their strict adherence to interconnected plans which resulted in optimal patient outcomes. A personalized treatment plan that combines medication with other therapies represented the best method for GERD management. The necessary long-term patient follow-up served to evaluate treatment success and handle any complications or symptom maintenance.

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