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# Efficacy of Diaphragmatic Breathing Exercises in Reducing Symptoms of Gastroesophageal Reflux Disease: A Quasi-Experimental Study.

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**ABSTRACT**

**Background:** The symptoms of gastroesophageal reflux disease (GERD), a chronic gastrointestinal condition that impairs patients' quality of life, include heartburn, regurgitation, and chest pain. Diaphragmatic breathing exercises (DBE) have the potential to decrease reflux episodes, increase gastric emptying, and improve lower esophageal sphincter (LES) function.

**Objective:** To assess how well adult patients' GERD symptoms are reduced by diaphragmatic breathing exercises.

**Methods:** A quasi-experimental method was used to enroll 60 adult patients with GERD who were between the ages of 25 and 60 and had been clinically and endoscopically diagnosed. Participants were divided into two groups: a control group (n = 30) that received only standard therapy and an intervention group (n = 30) that performed DBE twice daily for four weeks in addition to standard medical care. The GERD Questionnaire (GERDQ) was used to measure the severity of symptoms both before and after the intervention.

**Results:** The GERDQ scores of the intervention group decreased significantly (12.6 ± 2.1 to 6.8 ± 1.9, p <.001), while the control group's values changed only little (12.4 ± 2.0 to 11.2 ± 2.1, p =.08).

**Conclusion:** DBE considerably lessens the symptoms of GERD and is a safe, practical, and affordable supplementary therapy. Patient results can be enhanced by incorporating DBE into standard GERD treatment.

***Keywords:*** Gastroesophageal reflux disease. Diaphragmatic breathing. Lower esophageal sphincter. Non-pharmacological therapy.

## Introduction

The retrograde passage of stomach contents into the esophagus causes GERD, which manifests as regurgitation, heartburn, and discomfort in the chest. It has a major effect on everyday functioning and quality of life (Vakil et al., 2006; El-Serag et al., 2014). Diet, obesity, lifestyle, and stress all have an impact on the prevalence, which varies globally: Western nations claim 10–20%, whereas Asia reports 5–10% (El-Serag, 2014; Nilsson et al., 2004). Pharmacotherapy, particularly PPIs, is the mainstay of standard management; nevertheless, long-term use of these medications can result in infections, renal problems, and nutritional deficits (Katz et al., 2022; Scarpignato et al., 2016). DBE and other non-pharmacological therapies are becoming more popular as supplemental treatments. DBE enhances LES competence, strengthens diaphragmatic muscles, raises intra-abdominal pressure, and eases esophageal clearance (Siboni et al., 2022). Additionally, it might lessen stress-induced reflux and alter the autonomic nerve system (Wickramasinghe et al., 2023). The effectiveness of diaphragmatic breathing exercises in lowering GERD symptoms, increasing esophageal clearance, and improving lower esophageal sphincter function has been strongly supported by recent studies (Zdrhova et al., 2022). The purpose of this study is to assess DBE's efficacy in treating adult GERD patients and add to the body of knowledge bolstering non-pharmacological treatment approaches.

## Methodology:

**Study Design and Setting:** The effectiveness of diaphragmatic breathing exercises (DBE) in lowering symptoms of gastroesophageal reflux disease (GERD) was assessed in this study using a quasi-experimental method. The study was carried out at Gonoshasthaya Nagar Hospital in Dhaka, Bangladesh, over a six-month period, from January to June 2025. Patients with GERD who have been clinically and endoscopically proven might be

recruited thanks to the hospital's specialized gastroenterology services. In compliance with the Declaration of Helsinki, all subjects gave written informed permission before to enrollment, and the study was approved by the Gonoshasthaya Nagar Hospital's Institutional Review Board.

***Participants:***

The study included 60 adults with proven GERD, ranging in age from 25 to 60. The diagnosis was made in accordance with established standards based on upper gastrointestinal endoscopy and clinical presentation.

***Inclusion & Exclusion criteria:***

Participants included adults between the ages of 25 and 60 who had been experiencing symptoms of GERD for longer than three months, had a clinical and endoscopic diagnosis, were willing and able to perform diaphragmatic breathing exercises, and gave written informed consent to be included in the study. A history of abdominal or esophageal surgery, severe cardiac, pulmonary, or neurological illnesses that affected respiratory function, pregnancy or lactation, or mental or cognitive conditions that could impact adherence to the study protocol were also grounds for exclusion.

***Sample Size Calculation:***

Based on earlier research assessing DBE in GERD patients, the sample size was established. With a power of 80%, an effect size of 0.8, and $\alpha = 0.05$, each group needed at least 26 individuals. Each group had 30 members in order to account for possible dropouts.

**Group Allocation:** Participants were allocated into two groups:

- **Intervention group (n = 30):** Received diaphragmatic breathing exercises twice daily for 4 weeks in addition to standard medical therapy.
- **Control group (n = 30):** Received standard medical therapy alone.

Allocation was performed using a consecutive sampling technique, ensuring comparable baseline characteristics between groups.

***Diaphragmatic Breathing Protocol:***

The intervention group's participants lay supine with their knees slightly bent and engaged in diaphragmatic breathing exercises. To track movement, one hand was put on the chest and the other on the abdomen. In order to ensure that the abdomen rose while the chest stayed relatively stable, participants took slow, deep breaths through their noses. They then softly exhaled through pursed lips, letting the abdomen descend naturally. For a total of four weeks, the sessions were conducted twice a day for fifteen minutes each. The purpose of this procedure was to increase esophageal clearance of refluxed stomach contents, strengthen diaphragmatic function, and improve lower esophageal sphincter tone.

***Outcome Measure:***

Gastroesophageal reflux disease (GERD) symptoms were assessed using the GERD Questionnaire (GERDQ; score range 0–18, with higher scores indicating greater symptom severity) at baseline and after 4 weeks.

## Data Analysis:

For statistical analysis, SPSS version 26 is utilized. Independent t-tests assessed differences across groups, while paired t-tests compared scores within groups before and after the intervention. At $p < .05$., significance is established.

## Data Analysis and Interpretation:

**Participant Characteristics:** Baseline demographic and clinical characteristics were comparable between the groups, indicating homogeneity at the start of the study**.**

**Table 1. Demographics & Baseline Characteristics**

| **Variable** | **Intervention (n=30)** | **Control (n=30)** | **p-value** |
|---|---|---|---|
| Age (years) | 43.2 ± 9.8 | 41.8 ± 10.5 | 0.62 |
| Gender (F/M) | 17/13 | 16/14 | 0.79 |
| BMI (kg/m²) | 26.4 ± 3.2 | 25.9 ± 3.1 | 0.58 |

| Variable | Intervention (n=30) | Control (n=30) | p-value |
|---|---|---|---|
| Baseline GERDQ | 12.6 ± 2.1 | 12.4 ± 2.0 | 0.72 |

**Symptom Improvement:** The baseline characteristics of participants in both the intervention and control groups were comparable, with no statistically significant differences in age, gender distribution, BMI, or baseline GERDQ scores (all $p > 0.05$). This indicates that randomization was successful and that the groups were homogeneous at the start of the study. Such comparability strengthens the validity of subsequent findings by minimizing potential confounding effects.

**Table 2. GERDQ Score Changes**

| Group | Pre | Post | Mean Change | p-value | Cohen's d |
|---|---|---|---|---|---|
| Intervention | 12.6 ± 2.1 | 6.8 ± 1.9 | -5.8 | <0.001 | 2.8 |
| Control | 12.4 ± 2.0 | 11.2 ± 2.1 | -1.2 | 0.08 | 0.57 |

**Interpretation of Intervention Outcomes:**

Following the 4-week intervention, the GERDQ score in the intervention group significantly decreased from 12.6 ± 2.1 to 6.8 ± 1.9 (mean change = –5.8, $p < 0.001$), with a very large effect size (Cohen's $d = 2.8$). In contrast, the control group showed a small, non-significant reduction from 12.4 ± 2.0 to 11.2 ± 2.1 (mean change = –1.2, $p = 0.08$), with only a moderate effect size (Cohen's $d = 0.57$). These findings demonstrate that the intervention was highly effective in reducing GERD symptoms compared to the control condition.

## Discussion

The results of this study showed that diaphragmatic breathing exercise (DBE) considerably decreased GERD symptoms; the intervention group's improvement over the control group was 46%. The potential of DBE as a non-pharmacological adjuvant in the treatment of GERD is demonstrated by this finding. The fundamental process could be explained by the strengthening of diaphragmatic muscles, which improves the tone of the lower esophageal sphincter (LES) and promotes esophageal clearance, both of which lessen reflux episodes (Azer & Goosenberg, 2025b). Additionally, DBE has been shown to affect the equilibrium of the autonomic nervous system by reducing sympathetic hyperactivity and altering vagal tone. Stress-related reflux episodes are a known trigger in the pathophysiology of GERD, and such modulation can help lessen them (Sandhu & Fass, 2018). The current results are consistent with previous studies that collectively suggest the significance of breathing-based therapies in improving esophageal function and reducing GERD symptoms (Zhao et al., 2024). Furthermore, studies have shown that a comprehensive and long-lasting approach to managing GERD can be achieved by combining non-pharmacological treatments like DBE with nutritional control, weight management, and head of bed elevation (Kang & Kang, 2015). The practical applicability of DBE as a realistic, affordable, and safe intervention is another crucial factor. DBE provides a workable substitute that may lessen the need for pharmaceutical treatment, especially proton pump inhibitors (PPIs), which, despite their effectiveness, are linked to long-term reliance and possible side effects. According to a number of studies, DBE may reduce the requirement for long-term pharmaceutical treatment, which is consistent with suggestions to reduce needless long-term PPI use (Rossi et al., 2024).

However, there are certain limitations to the current study. The findings' generalizability is limited by the small sample size and brief follow-up period. Furthermore, depending solely on self-reported results could lead to bias and reduce the precision of symptom assessment. Large-scale, randomized controlled trials with long-term follow-up and objective reflux measures, including manometry and 24-hour pH impedance monitoring, should be used in future research to overcome these limitations and validate the physiological advantages of DBE. When combined, the results point to DBE as a potentially effective GERD adjunctive treatment. Its clinical significance is highlighted by its capacity to improve autonomic balance, boost diaphragmatic and LES function, and maybe lessen pharmaceutical reliance. DBE might be used into thorough GERD management strategies with additional confirmation in reliable trials.

## Recommendation:

Diaphragmatic breathing exercise (DBE) should be incorporated into routine GERD treatment, structured patient education should be given to guarantee appropriate practice, long-term randomized controlled trials should be carried out to confirm results, and DBE should be combined with dietary and lifestyle changes for optimal benefit, according to the study's findings.

## Conclusion:

GERD symptoms are considerably reduced and patients' quality of life is improved by diaphragmatic breathing exercise (DBE). As a non-invasive, safe, and economical intervention, DBE has the potential to be a useful supplement to traditional treatment. Its regular clinical use may lessen pharmaceutical dependence over time and enhance treatment results overall.

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