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Comparative Prevalence of Gastroesophageal Reflux Disease in patients with Asthma and Chronic Obstructive Pulmonary Disease

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ABSTRACT

Background: Gastroesophageal reflux disease (GERD) is a common comorbidity in chronic respiratory conditions, particularly asthma and chronic obstructive pulmonary disease (COPD). While both diseases share pathophysiological links with GERD, the comparative prevalence and clinical impact remain unclear.

Objective: The aim of the present study was to evaluate the prevalence of gastroesophageal reflux disease (GERD) in patients with asthma and chronic obstructive pulmonary disease (COPD).

Methodology: This cross-sectional study evaluated 200 asthma patients, 200 COPD patients, and 400 controls at Bolan Medical College using a validated GERD questionnaire and spirometry-confirmed diagnoses. GERD was defined as weekly heartburn/regurgitation, with analysis of symptom patterns, medication use, and temporal relationships. Statistical comparisons employed chi-square tests and logistic regression ($p<0.05$ significant).

Results: In the present study prevalence of GERD was significantly higher in patients with asthma (28.5%) as compared to COPD (18.0%) and participants in controls group (20.3%). Patients with Asthma showed more frequent heartburn (17.5%) and regurgitation (11.0%), along with higher rates of extraesophageal symptoms like dysphagia (35.2%). GERD symptoms began after pulmonary diagnosis in 26.5% of asthmatics and 27.8% of COPD patients. No significant association was found between asthma severity and GERD prevalence ($p>0.05$), though moderate-severe cases showed a trend toward higher rates.

Conclusion: The present study confirms a distinct GERD-asthma association, with implications for screening and management in respiratory clinics. Future studies should explore mechanistic links and assess whether GERD treatment improves asthma control in this population.

Keywords: GERD; Asthma; COPD; Pulmonary Symptoms; Abnormal Reflux

Introduction

Gastroesophageal reflux disease (GERD) is one of the most common gastrointestinal disorders characterized with chronic symptoms and mucosal damage due to the abnormal reflux of gastric contents into the esophagus.[1] It is estimated that GERD affects approximately 20% of the population in developed countries, and it is widely accepted that the burden of GERD has been documented in developing countries as well.[2,3] GERD is associated with an array of symptoms, including heartburn, regurgitation, and extraesophageal symptoms such as asthma exacerbations, laryngitis, and chronic cough. Of these symptoms, the relationship between GERD and chronic respiratory diseases (CRDs), particularly asthma, and chronic obstructive pulmonary disease (COPD), has garnered considerable attention in research studies; however, the association is conflicting.

Asthma and chronic obstructive pulmonary disease (COPD) are two of the most prevalent chronic respiratory diseases around the world and are significant contributors to morbidity and healthcare expenditure. Asthma is defined by airway hyperresponsiveness and chronic inflammation and affects over 300 million individuals globally, while COPD, mainly due to smoking and environmental exposures, is a leading cause of mortality.[4,5] Gastroesophageal reflux disease (GERD) frequently occurs in these patients with possible mechanisms including microaspiration of gastric contents, vagally mediated bronchoconstriction and shared inflammatory pathways.[6,7] However, the prevalence of GERD in asthma and COPD has been reported in the range of 30% to 90% for asthma and have shown inconsistent trends in COPD.[8] These differences could result from differences in populations studied, criteria for diagnosing GERD and study methodology in tertiary referral centers compared to community primary care settings.

The existing literature indicates that GERD may worsen respiratory symptoms, decrease quality of life, and complicate the management of diseases in asthma and COPD subjects.[9] For example, uncontrolled GERD in patients with asthma was reported to increase bronchospasm, nocturnal symptoms and medication usage,[10] whereas respiratory medications (e.g. bronchodilators, corticosteroids) may hypothetically exacerbate GERD by decreasing the lower esophageal sphincter pressure or increasing gastric acid secretion. Nevertheless, there is some debate regarding the directionality of causation between GERD and chronic respiratory diseases, with certain studies reporting no significant association.[7-9]

The majority of available research on GERD prevalence in asthma and COPD has focused on Western populations, and there is less information available on developing countries which may vary widely in terms of lifestyle, eating habits, and access to health care. For instance, the high prevalence of Helicobacter pylori infection and different GERD phenotypes such as predominant non-erosive reflux disease in places like Turkey may influence disease distribution. It is not clear how factors like socioeconomic status, medication use, or diagnostic modalities, such as endoscopy or pH probe, may affect GERD prevalence in respiratory patients.

Given the conflicting evidence and geographical gaps in the literature, this study aims to evaluate the comparative prevalence of GERD in patients with asthma and COPD in a tertiary care setting, using a validated questionnaire to ensure methodological consistency. With populations from a developing country, we aim to determine if the often-reported high prevalence of GERD in patients with respiratory conditions is prevalent among patients with other clinical and demographic characteristics. Additionally, we wanted to consider the timing of GERD symptom reporting and its relationship to respiratory symptoms and pulmonary medications as a modifying influence on reflux symptoms. Our findings may lend insight into the GERD-asthma-COPD triad that can be safely shared and used for diagnosis, treatment or general consideration of the comorbidity across multiple health systems.

Objective

The aim of the present study was to evaluate the prevalence of gastroesophageal reflux disease (GERD) in patients with asthma and chronic obstructive pulmonary disease (COPD).

Methodology

This cross-sectional study was conducted at the Department of Pulmonary Medicine and Gastroenterology, Bolan Medical College Quetta, from January 2022 to March 2023. The study included 200 consecutive asthma patients diagnosed according to GINA guidelines, 200 COPD patients diagnosed based on GOLD criteria, and 400 age- and sex-matched healthy controls recruited from the hospital's outpatient department.

Special diagnosis techniques were applied for diagnosis purposes. The diagnosis of asthma required documented reversible airway obstruction (≥ 12% improvement in FEV1 after bronchodilator administration or a positive methacholine challenge test). The confirmatory diagnosis of COPD required a FEV1/FVC of <0.70 after bronchodilator administration and a history of ≥ 10 pack-years of smoking or significant biomass exposure. Chronic respiratory symptoms or use of acid-suppressive medications or a diagnosis of GERD were exclusion criteria for the control group.

Initially data was collected and entered into Microsoft Excell sheet, specially designed for study purposes. The required data included the collection involved adminis-

tration of a culturally adapted, validated GERD questionnaire assessing symptom frequency (heartburn/ regurgitation ≥once weekly defined as frequent GERD), additional gastrointestinal symptoms, temporal relationship between respiratory and GERD symptoms, and medication use. All respiratory patients underwent spirometry to confirm diagnosis and assess disease severity. Demographic data, anthropometric measurements, medication history, and comorbidities were recorded. Once data collection process was completed, all data were transferred into SPSS version 25 for statistical analysis. Statistically analysis employing chi-square tests for the comparison of prevalence of GERD, t-tests for continuous variables, and logistic regression to identify GERD risk factors, with $p<0.05$ considered significant.

The study received ethical approval (Ref. No. 56-B/21) IRB department of Bolan Medical College, and all participants provided written informed consent with maintained confidentiality.

Results

A total of 800 participants were included in this study. Among these, 200 diagnosed asthma patients (145 females), 200 COPD patients (58 females), and 400 (180 females) healthy controls (Figure 1).

The overall prevalence of gastroesophageal reflux disease (GERD), defined as frequent heartburn and/or regurgitation (at least once per week), was significantly higher in the asthma group (28.5%) compared to COPD (18.0%) and controls (20.3%) (Figure 2). Occasional symptoms (less than weekly) were also more common in the asthma group (19.0%) than in the other groups.

Results showed that frequent heartburn was more (17.5%) among participants of Asthma group as compared to the patients in other groups. Similarly frequent regurgitation, overall GERD (weekly+) and occasional GERD symptoms were also higher in patients with asthma as compared with the participants in COPD and control groups (Table 1).

In the present study when we applied Chi-square tests, results showed statistically significant differences between asthma and both COPD ($p = 0.028$) and controls ($p = 0.037$), but no significant difference between COPD and controls ($p = 0.41$).

Results also showed that approximately 26.5% of asthma patients and 27.8% of COPD patients reported that GERD symptoms began after the onset of pulmonary disease. In contrast, 6.0% of asthma and 8.5% of COPD patients indicated experiencing heartburn before developing pulmonary disease.

Asthma patients with GERD reported higher frequencies of additional upper Gastrointestinal (GI) and Ear Nose

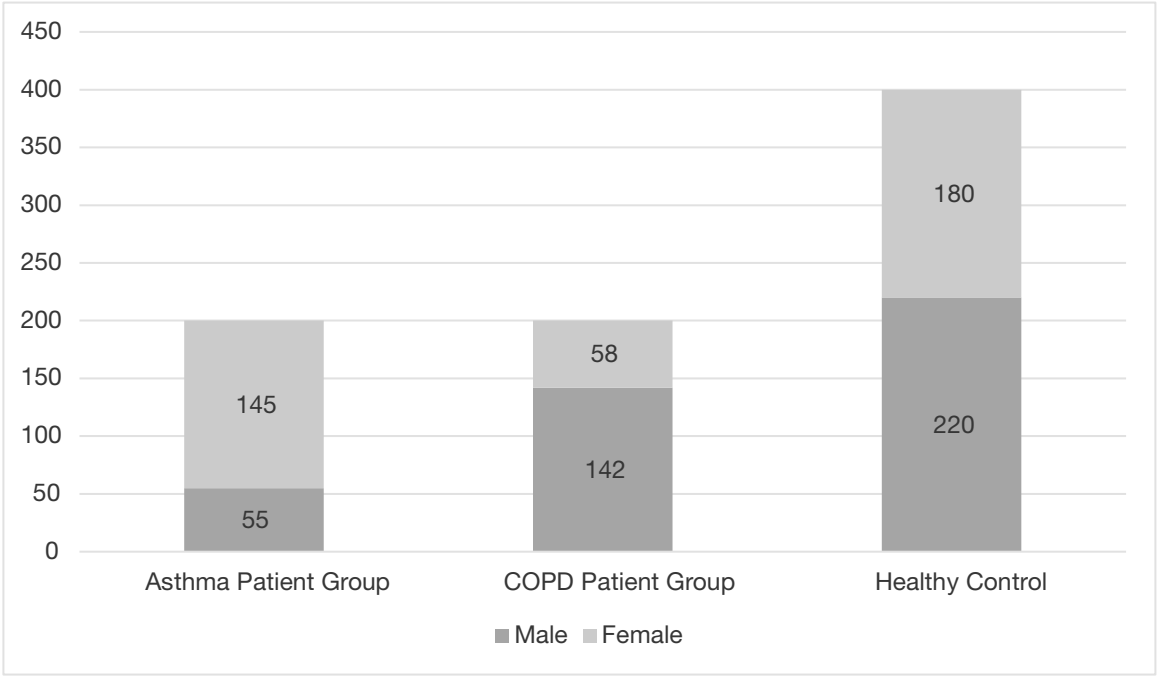

Figure 1. Gender base distribution of study cases

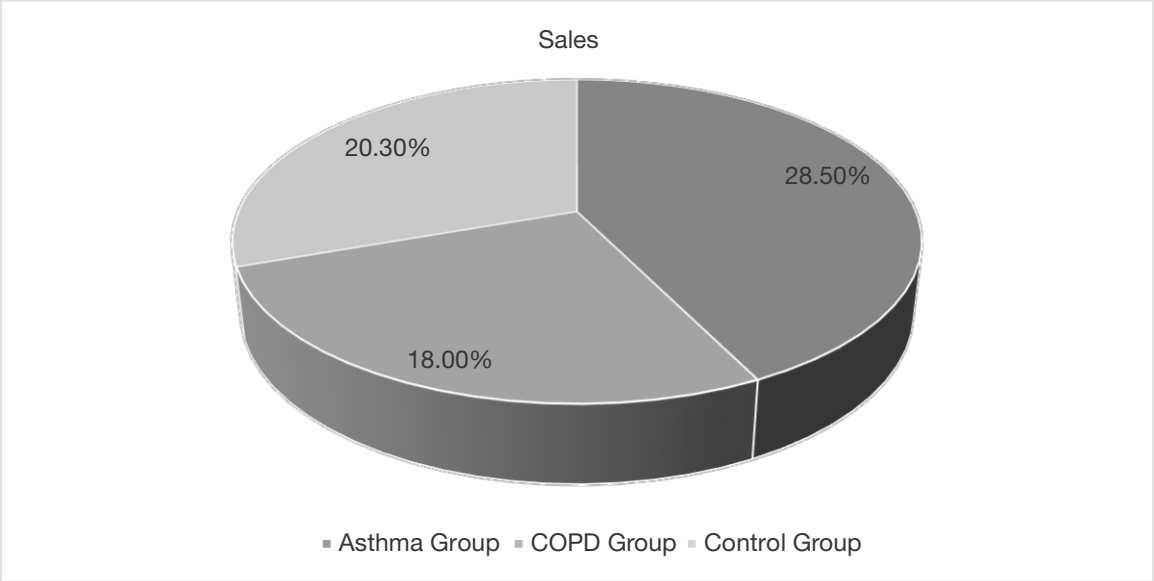

Figure 2. Prevalence of GERD among different study groups

Throat (ENT) symptoms compared to controls. Symptoms such as dysphagia was higher (35.2%) in asthmatic group as compared to other two groups. Other symptoms like dyspepsia, non-cardiac chest pain (NCCP), and nausea were notably elevated in asthmatic group as compared to COPD group. The prevalence of all these symptoms in both asthma and COPD group were also higher as compared to control group (Table 2). Asthma patients with frequent GERD symptoms reported significantly higher rates of all listed symptoms compared to asymptomatic counterparts ($p < 0.05$).

GERD prevalence increased with advancing age, peaking in the 45–64 age groups among both asthma and COPD patients. A notable drop was seen in those over 65, likely influenced by chronic medication use or decreased symptom perception (Table 3).

In asthma patients, GERD prevalence appeared to rise with increasing asthma severity. Mild asthmatics showed a GERD rate of 24.8%, while moderate and severe cases had GERD rates of 30.4% and 36.0%, respectively. However, these differences did not reach statistical significance ($p > 0.05$).

There was no significant difference in pulmonary medication use (e.g., bronchodilators, inhaled corticosteroids) between asthmatics with and without GERD symptoms. However, patients with frequent GERD were more likely to be on proton pump inhibitors or antacids (Table 4).

Discussion

The present study demonstrates a significantly higher prevalence of GERD in asthma patients (28.5%) compared to both COPD patients (18.0%) and healthy controls (20.3%), reinforcing the well-documented association between asthma and GERD as already discussed in a study by Bor et al., 2010.[11] Our findings align with prior studies reporting GERD prevalence rates of 30–89% in asthmatics, though our results fall at the lower end of this spectrum, possibly due to differences in population

Table 1. Prevalence of GERD and associated symptoms in different study groups

Symptom Type	Asthma (%)	COPD (%)	Controls (%)
Frequent heartburn	17.5	12.0	13.2
Frequent regurgitation	11.0	6.0	7.1
Overall GERD (weekly+)	28.5	18.0	20.3
Occasional GERD symptoms	19.0	14.5	16.8

Table 2. Prevalence of Additional Symptoms in Asthmatic Patients by GERD Symptom Frequency

Symptom	Frequent (%)	Occasional (%)	None (%)
Non-cardiac chest pain	52.0	46.5	20.3
Dysphagia	35.2	27.6	10.0
Odynophagia	50.8	32.5	19.7
Dyspepsia	53.0	46.2	24.0
Hiccup	18.2	12.3	3.5
Nausea	22.8	13.7	8.7
Emesis	13.3	5.1	2.1

characteristics or methodological approaches. Same results were also discussed by Boulton et al., 2022 and Shaheen et al., 2003 in their study.[12,13] Notably, the lack of significant difference in GERD prevalence between COPD patients and controls contrasts with some earlier reports (Mokhlesi et al., 2001),[8] suggesting that the GERD-COPD relationship may be less robust than that of GERD-asthma.

Results of the present study showed that 26.5% of the patients with asthma and 27.8% of the patients with COPD developed GERD symptoms following their pulmonary disease diagnosis, affirms the hypothesis that respiratory disease can be a pathogenic factor for GERD. This result is in agreement with studies suggesting that airway obstruction elevates transdiaphragmatic pressure gradients, stimulating reflux.[14,15] In contrast, the minority of patients (6.0–8.5%) who experienced GERD as a precursor to pulmonary disease aligns with the results of a study conducted by Sontag, 2000.[16] The bidirectional relationship highlights the necessity of individualized management in comorbid patients.

Patients with Asthma correlated with GERD had an increased incidence of extraesophageal symptoms such as dysphagia (35.2%), non-cardiac chest pain (52.0%), and dyspepsia (53.0%), similar to the result of Bor et al. (2010).[14] These symptoms were significantly more common than in COPD or controls, raising the possibility that asthmatics could have more severe complications from reflux. The increased rates of odynophagia and nausea further highlight the broader gastrointestinal involvement in asthmatic GERD, which may be indicative of increased visceral sensitivity or abnormal motility.[17]

Age-stratified analysis showed the highest GERD prevalence was found among middle-aged asthmatic and COPD patients (45–64 years) with a decreasing trend among older individuals (65+ years). This trend is consistent with findings by De Marco et al. (2013),[18] who suggested that it may be due to age-related changes in symptom perception or greater use of PPIs. Lack of a notable relationship between asthma severity and prevalence of GERD is not in accordance with some studies (Havemann et al., 2007)[19] but is consistent with others (Ates et al., 2014),[20] suggesting that GERD can worsen symptoms in all asthma severities instead of occurring with disease stage.

Medication analysis demonstrated no meaningful associ-

Table 3. GERD Prevalence by Age Group

Age Group	Asthma GERD (%)	COPD GERD (%)	Control GERD (%)
18–34	19.4	11.1	15.3
35–44	25.0	17.6	18.0
45–54	30.1	20.0	21.5
55–64	32.4	21.1	23.0
65+	21.8	19.0	18.5

Table 4. Medication Use Across GERD Symptom Groups in Asthma Patients

Medication	No Symptoms (%)	Occasional (%)	Frequent (%)
Inhaled bronchodilators	45.0	42.0	59.2
Inhaled corticosteroids	62.3	54.5	67.5
Oral theophylline	20.5	22.0	26.5
Acid-suppressive therapy	16.5	21.0	33.8*
Antacids	14.7	18.5	30.1*

*$p < 0.05$ when comparing with no-symptom group.

ation between bronchodilators/inhaled corticosteroids and GERD symptoms, contradicting previous concerns that these medications worsen reflux. Increased usage in symptomatic patients (33.8% vs. 16.5% in asymptomatic) implies clinical appreciation of GERD comorbidity, as identified in previous work (Bor et al., 2010).[11] Failure to demonstrate difference in theophylline usage follows its previously implicated role in reflux, perhaps a reflection of modern prescribing habits or doses.

Conclusion

The present study concluded that a significant association was found between GERD and asthma. It was found that 28.5% of individuals with asthma reported a history of frequent reflux symptoms. This rate was significantly higher in the patients with asthma when compared with patients with COPD (18.0%) and healthy control participants (20.3%). Finidngs of the present study confirm the association between airway disease and gastroesophageal reflux while also clarifying important differences between asthma and COPD when considering GERD. The study noted the time frame when over a quarter of the patients in the respiratory group developed GERD symptoms post their pulmonary diagnosis. This indicates that airway disease may play a role in the pathogenesis of reflux with changes to thoracic pressure being mechanisms in question.

These findings have important clinical implications. The high burden of extraesophageal symptoms in asthmatic patients with GERD (e.g. 35.2% dysphagia and 52.0% non-cardiac chest pain) points to the importance of thorough evaluation of GERD symptoms when managing asthma. Although we did not observe statistically significant differences between asthma severity and GERD, we did see a trend towards higher prevalence of GERD in moderate-to-severe asthma. Thus, it is reasonable to speculate that reflux and GERD symptoms may be contributing to the disease burden of asthma regardless of severity.

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