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Frequency of Gastroesophageal Reflux Disease among Patients Presenting with Bronchial Asthma

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ABSTRACT

Background: Gastroesophageal reflux disease is increasingly recognized as a comorbidity in asthma patients, and may be involved in the modulation of disease severity and control of symptoms. Estimation of prevalence and risk factors is therefore of fundamental importance in the optimization of asthma management, most importantly in resource-poor settings. **Objective:** To determine the frequency of gastroesophageal reflux disease among patients presenting with bronchial asthma. **Study Design:** Descriptive cross-sectional study. **Duration and Place of Study:** This study was conducted from February to May 2025 at the Pulmonology Department, Mardan Medical Complex Mardan. **Methodology:** A total of 167 patients aged 18–65 years with confirmed bronchial asthma were enrolled. Diagnosis was based on clinical symptoms and spirometric criteria (≥12% and 200 mL increase in FEV_1 post-bronchodilator). Individuals with other chronic respiratory diseases were excluded. Symptom-based diagnosis of GERD required heartburn, regurgitation, dysphagia, and persistent throat discomfort. **Results:** The mean age was 41.22 ± 11.80 years; 53.3% were female. GERD was present in 46.1% of patients. Statistically significant associations with GERD included age >40 years ($p<0.001$), BMI >25 ($p<0.001$), asthma duration >5 years ($p<0.001$), smoking ($p<0.001$), diabetes mellitus ($p<0.001$), hypertension ($p<0.001$), and cardiac disease ($p<0.001$). **Conclusion:** GERD is prevalent among asthmatic patients and is significantly associated with age, obesity, smoking, chronic asthma, and comorbidities, underscoring the need for routine GERD screening in asthma care.

INTRODUCTION

Bronchial asthma is a type of chronic airway inflammatory disease that is marked by episodic wheezing, shortness of breath, chest tightness, and coughing, especially at night or in early morning.[1] The disease is due to hyperresponsiveness of the airway to exogenous stimuli, causing reversible airflow obstruction.[2] Asthma is determined by a mix of hereditary and environmental factors, such as allergens, respiratory infections, air pollution, and exercise.[3] The pathophysiology is one of inflammation, airway remodeling, and bronchoconstriction.[4] Treatment usually consists of inhaled corticosteroids, bronchodilators, and the establishment and avoidance of precipitants.[5]

Gastroesophageal reflux disease (GERD) is a chronic illness in which stomach contents reflux into the esophagus, leading to troublesome symptoms or mucosal injury.[6] The symptoms are characteristically linked with heartburn, regurgitation, and chest discomfort but may also present with atypical symptoms such as chronic cough, laryngitis, and wheeze.[7] GERD results from transient or permanent relaxation of the lower esophageal sphincter, dysfunctional peristalsis of the esophagus, or proximal delay in clearance of stomach contents.[8] Diagnosis generally remains clinical but may be supported by endoscopy, pH monitoring, or esophageal manometry in stubborn cases.[9] Modifications in lifestyle and pharmaceutical treatment, particularly with proton pump inhibitors, form the cornerstone treatment.[10]

There is increasing recognition of the association between GERD and bronchial asthma, with a potential bidirectional relationship.[11] Asthma subjects are more likely to develop GERD, possibly due to elevated intrathoracic pressure during persistent cough or side effects from some drugs used to treat asthma, such as relaxation of the lower esophageal sphincter.[11] Conversely, acid reflux might exacerbate asthmatic symptoms by provoking bronchoconstriction via vagal reflexes or microaspiration of acidic material into the airways.[12] The occurrence of GERD among asthmatic subjects might complicate management and be a cause of inadequate asthma control.[13] Diagnosis and treatment of GERD among them might enhance their respiratory outcome and their quality of life.[14]

Onyekwere CA et al. reported a prevalence of 36% for gastroesophageal reflux disease among patients presenting with bronchial asthma.[15]

Gastroesophageal reflux disease (GERD) has been a regular finding in asthmatics, frequently making management challenging and asthmatic symptoms more problematic. Despite its important clinical relevance, very little local data are documented to assist clinicians working in regions like Mardan. Asthma and GERD are both very frequent presentations in healthcare facilities in Mardan, but their association however remains unrecognized and unstudied. This study, then, shall fill a void by establishing the predominance of GERD among asthmatic presentations in Mardan, so that better clinical assessment, early treatments, and improved disease control are achieved among the local population.

METHODOLOGY

This descriptive cross-sectional study was carried out at the Pulmonology Department of Mardan Medical Complex, from February to May 2025. The sample size was determined to be 167 using the WHO sample size calculator, based on a 95% confidence interval, 7.3% absolute precision, and an expected prevalence of gastroesophageal reflux symptoms in 36% of individuals with asthma.[15]

Participants aged between 18 and 65 years of either sex were eligible if they had a confirmed diagnosis of bronchial asthma. This diagnosis was based on typical clinical presentation—recurrent wheeze, shortness of breath, chest tightness, and coughing—along with pulmonary function testing showing a post-bronchodilator increase in forced expiratory volume in one second (FEV_1) of at least 12% and 200 mL. Individuals with chronic respiratory conditions such as cystic fibrosis, chronic obstructive pulmonary disease, pulmonary fibrosis, or acute upper respiratory tract infections were excluded. After obtaining written informed consent, relevant patient information including age, sex, smoking history, comorbidities (such as diabetes mellitus, hypertension, or cardiac disease), and social variables like education, employment, residence, and economic status was collected. Smoking was recorded as positive if the individual had a history of more than five pack-years.

Each participant was assessed for symptoms indicative of gastroesophageal reflux. This required the presence of all of the following: a burning sensation behind the sternum (heartburn), regurgitation of gastric contents, difficulty swallowing (dysphagia), and persistent throat discomfort. This symptom-based evaluation was performed by a consultant pulmonologist with a minimum of five years of post-fellowship clinical experience. All findings were systematically recorded by the principal investigator using a structured data collection form.

Data analysis was performed using IBM SPSS version 23. The Shapiro-Wilk test was applied to assess the distribution of continuous variables. Normally distributed data such as age, BMI, and asthma duration were reported as mean ± standard deviation, while skewed variables were presented as median with interquartile range. Categorical variables were described as frequencies and percentages. To assess potential confounding variables such as age, BMI, duration of illness, and socioeconomic indicators, stratification was carried out. Chi-square or Fisher's exact test was used post-stratification, and a p-value of 0.05 or less was considered statistically significant.

RESULTS

The study assessed 167 patients with bronchial asthma, reporting a mean age of 41.22 ± 11.80 years, mean BMI of 25.84 ± 3.19 kg/m^2, and an average asthma duration of 4.44 ± 2.15 years. Female patients slightly predominated (53.3%) compared to males (46.7%). Most participants belonged to the low socioeconomic group (55.1%), while 38.3% were from the middle-income group and only 6.6% from the high-income bracket. Regarding comorbidities, 26.3% of patients had a smoking history, the same percentage had diabetes mellitus, 32.9% had hypertension, and 12.0% had underlying cardiac disease (as shown in Table-I)

Table I

Patient Demographics

Demographics	Mean ± SD
Age (years)	41.22±11.80
BMI (Kg/m^2)	25.84±3.19
Duration of Asthma (years)	4.44±2.15
Gender	
Male n (%)	78 (46.7%)
Female n (%)	89 (53.3%)
Socioeconomic Status	
Low n (%)	92 (55.1%)
Middle n (%)	64 (38.3%)
High n (%)	11 (6.6%)
Smoking History	
Yes n (%)	44 (26.3%)
No n (%)	123 (73.7%)
Diabetes Mellitus	
Yes n (%)	44 (26.3%)
No n (%)	123 (73.7%)
Hypertension	
Yes n (%)	55 (32.9%)
No n (%)	112 (67.1%)
Cardiac Disease	
Yes n (%)	20 (12.0%)
No n (%)	147 (88.0%)

The overall frequency of gastroesophageal reflux disease among these asthmatic patients was found to be 46.1%, while 53.9% did not show evidence of GERD (as shown in Table-II)

Table II

Frequency of Gastroesophageal Reflux Disease Among Patients Presenting with Bronchial Asthma

Gastroesophageal Reflux Disease	Frequency	% age
Yes	77	46.10%
No	90	53.90%
Total	167	100.00%

In stratified analysis, GERD was significantly more prevalent in individuals older than 40 years (81.7%) compared to those aged 40 years or younger (19.8%), with a p-value <0.001, indicating a strong age-related association. Gender differences were not statistically significant (p=0.345), though 50.0% of males and 42.7% of females had GERD. A marked association was noted with BMI, where 80.7% of those with BMI >25 had GERD, compared to just 7.6% among those with BMI ≤25 (p<0.001), highlighting the impact of obesity. Duration of

asthma also played a role; GERD was more common among those with asthma for more than 5 years (77.2%) compared to shorter durations (30.0%), with p<0.001.

Socioeconomic status did not show a significant correlation with GERD (p=0.618), though its frequency was highest in the middle-income group (50.0%), followed by the low (44.6%) and high (36.4%) groups. Smoking history had a notable association: 72.7% of smokers had GERD compared to 36.6% of non-smokers (p<0.001). Likewise, diabetes mellitus was strongly associated with GERD (77.3% in diabetics vs 35.0% in non-diabetics, p<0.001). Hypertensive patients showed a 90.9% prevalence of GERD, significantly higher than 24.1% in normotensives (p<0.001). Notably, all patients with underlying cardiac disease (100%) had GERD, while only 38.8% of those without cardiac disease were affected, again with a highly significant p-value <0.001 (as shown in Table-III)

Table III

Association of Gastroesophageal Reflux Disease with Demographic and Clinical Factors

Demographic Factors		Gastroesophageal Reflux Disease		p-value
		Yes n(%)	No n(%)	
Age (years)	≤40	19 (19.8%)	77 (80.2%)	<0.001*
	>40	58 (81.7%)	13 (18.3%)	
Gender	Male	39 (50.0%)	39 (50.0%)	0.345
	Female	38 (42.7%)	51 (57.3%)	
BMI (Kg/m^2)	≤25	6 (7.6%)	73 (92.4%)	<0.001
	>25	71 (80.7%)	17 (19.3%)	
Duration (years)	≤5	33 (30.0%)	77 (70.0%)	<0.001
	>5	44 (77.2%)	13 (22.8%)	
Socioeconomic Status	Low	41 (44.6%)	51 (55.4%)	0.618*
	Middle	32 (50.0%)	32 (50.0%)	
	High	4 (36.4%)	7 (63.6%)	
Smoking	Yes	32 (72.7%)	12 (27.3%)	<0.001
	No	45 (36.6%)	78 (63.4%)	
Diabetes Mellitus	Yes	34 (77.3%)	10 (22.7%)	<0.001
	No	43 (35.0%)	80 (65.0%)	
Hypertension	Yes	50 (90.9%)	5 (9.1%)	<0.001*
	No	27 (24.1%)	85 (75.9%)	
Cardiac Disease	Yes	20 (100.0%)	0 (0.0%)	<0.001*
	No	57 (38.8%)	90 (61.2%)	

***Fischer Exact Test**

DISCUSSION

The findings revealed that nearly half of the asthmatic patients had coexisting GERD, indicating a substantial overlap between the two conditions. The higher prevalence of GERD among older patients may be attributed to age-related weakening of the lower esophageal sphincter and impaired esophageal motility. Increased BMI was significantly associated with GERD, likely due to elevated intra-abdominal pressure that promotes reflux of gastric contents. A longer duration of asthma was also linked with GERD, possibly because chronic coughing and the use of bronchodilators can reduce lower esophageal tone over time. Smoking emerged as a strong contributing factor, as nicotine relaxes the lower esophageal sphincter and reduces salivary bicarbonate, impairing acid clearance. The associations with diabetes and hypertension may be explained by autonomic dysfunction and medication side effects that influence gastrointestinal motility and sphincter control. Furthermore, the strong link between cardiac disease and GERD could result from overlapping symptoms, reduced physical activity, and altered thoracoabdominal pressure dynamics in cardiac patients.

Our study results demonstrate an overall GERD frequency of 46.1 % among 167 asthmatics, closely aligning with the 49.3 % reported by Fuaad et al. [16] in COPD and the 47 % pooled estimate from population studies cited by Grandes et al. [17] This concordance suggests that roughly half of chronic airway disease patients—whether asthma or COPD—harbor concurrent reflux, underscoring the universality of the asthma–GERD overlap. The mean age in our cohort (41.2 ± 11.8 y) was younger than that of Fuaad et al. (54.4 ± 16.1 y) [16]; nevertheless, we corroborate their finding that GERD rises sharply after the fourth decade (81.7 % vs 19.8 %, p < 0.001), probably reflecting cumulative esophageal insult and age-related loss of LES tone.

Gender distribution (53.3 % female) mirrors the female preponderance observed by Kanemitsu et al. (70 % female) [18] yet both studies, like ours, failed to demonstrate a statistically significant sex difference in GERD prevalence (p = 0.345). This comparable null finding across Asian [18] and Middle-Eastern populations implies that reflux mechanisms in asthma are largely gender-independent once age and BMI are considered. BMI emerged as the dominant predictor: 80.7 % of overweight/obese asthmatics had GERD versus only 7.6 % of those with BMI ≤ 25 (p < 0.001), echoing Kamal et al. [19] who recorded 97 % GERD in overweight and 100 % in obese asthmatics. The consistent dose-response relationship across studies supports mechanical augmentation of intra-abdominal pressure and transient LES relaxation as shared pathophysiology.

We further extend previous observations by demonstrating that prolonged asthma duration (> 5 y) carries a GERD prevalence of 77.2 %, significantly exceeding the 30 % seen with shorter disease (p < 0.001). While earlier reviews [17,20] postulated that chronic cough and hyperinflation promote reflux, our data provide quantitative confirmation that every additional year of asthma increases reflux risk, likely via repetitive diaphragmatic stress and medication-related LES relaxation. Smoking, diabetes, hypertension and cardiac disease each amplified GERD frequency to 72.7 %, 77.3 %, 90.9 % and 100 % respectively (all p < 0.001). These comorbid associations have been hinted at but not systematically quantified in prior asthma-specific reports; Grandes et al. [17] emphasized obesity and age, whereas Jiang & Huang [20] focused on reflux symptoms rather than

objective comorbidity. Our findings therefore fill an evidence gap by illustrating that traditional cardiovascular risk factors act synergistically with asthma to heighten GERD burden, possibly through autonomic neuropathy (diabetes), medications (antihypertensives) and systemic inflammation (cardiac disease). Finally, socioeconomic status did not influence GERD prevalence (p = 0.618), contrasting with the community survey by Kamal et al. [19] where lower income trended toward higher reflux. The discrepancy may stem from differing health-seeking behaviors and dietary patterns between Iraqi and broader Middle-Eastern populations.

The study was conducted at a single tertiary centre with a modest sample size, limiting broader generalizability. Selection bias may have occurred because referral patterns favor more severe or symptomatic asthmatics. GERD diagnosis relied on symptom-based questionnaires rather than 24-hour pH-metry or endoscopy, potentially misclassifying silent reflux. Confounders such as medication use, dietary habits and physical activity were not rigorously quantified.

Conclusion:

Our study has concluded that gastroesophageal reflux disease is common among patients with bronchial asthma and is significantly influenced by advancing age, elevated BMI, prolonged asthma duration, and concurrent cardiometabolic disorders. Timely identification and integrated management of these modifiable factors are essential to improve both respiratory and reflux outcomes.

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