

## Evaluating the Coexistence of Bronchial Asthma in Bronchiectasis Patients: A Cross-Sectional Study

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### Abstract

**Background:** Bronchiectasis is a chronic airway disease frequently associated with comorbid conditions that influence clinical outcomes. Bronchial asthma represents an important overlapping airway disorder.

**Aim:** To determine the coexistence of bronchial asthma in patients with bronchiectasis and to compare the clinico-radiological profile between patients with bronchiectasis alone and those with concomitant bronchial asthma.

**Materials and Methods:** A cross-sectional observational study was conducted on 80 patients with radiologically confirmed bronchiectasis. Clinical features, radiological findings, and exposure history were compared between patients with bronchiectasis alone and those with coexisting bronchial asthma.

**Results:** Bronchial asthma was present in a substantial proportion of patients with bronchiectasis and was associated with increased breathlessness, wheezing, atopic manifestations, and specific environmental exposures.

**Conclusion:** Coexisting bronchial asthma significantly modifies the clinical profile of bronchiectasis, highlighting the need for routine evaluation and tailored management strategies.

**Keywords:** Bronchiectasis; Bronchial asthma; Airway overlap; Clinico-radiological profile.

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### Introduction

Bronchiectasis is a chronic respiratory disease characterized by irreversible bronchial dilatation, persistent airway inflammation, recurrent infections, and progressive decline in lung function. Once considered an orphan disease, bronchiectasis is now increasingly recognized as a significant contributor to respiratory morbidity worldwide, particularly due to improved diagnostic imaging and better survival of patients with chronic airway diseases [1].

The clinical course of bronchiectasis is often influenced by the presence of coexisting airway disorders, which can modify disease severity, symptom burden, and treatment response.

Bronchial asthma is a chronic inflammatory airway disease characterized by variable airflow obstruction, bronchial hyperresponsiveness, and predominantly type 2 inflammation. Traditionally, asthma and bronchiectasis have been regarded as distinct disease entities; however, emerging evidence suggests a significant overlap between the

two conditions, giving rise to a complex clinical phenotype [2]. This coexistence challenges conventional diagnostic and therapeutic approaches, as patients may exhibit features of both reversible airway obstruction and irreversible structural lung damage.

Large multicenter registry studies have highlighted the frequent coexistence of asthma in patients with bronchiectasis. Data from the European Bronchiectasis Registry (EMBARC) indicate that nearly one-third of patients with bronchiectasis have coexisting asthma, underscoring the clinical relevance of this overlap [3]. Patients with concomitant bronchiectasis and asthma tend to be younger, have a higher prevalence of allergic comorbidities, and experience more frequent respiratory symptoms compared with patients having bronchiectasis alone [3].

The coexistence of asthma and bronchiectasis has also been linked to distinct inflammatory patterns. Studies have demonstrated that patients with both

conditions often show features of eosinophilic airway inflammation, allergic sensitization, and upper airway involvement, suggesting shared immunopathological mechanisms [4]. These findings support the hypothesis that asthma may contribute to the development or progression of bronchiectasis through chronic airway inflammation and recurrent exacerbations.

Conversely, radiological studies have demonstrated that bronchiectasis is not uncommon in patients with asthma, particularly those with long-standing or poorly controlled disease. Computed tomography-based studies have shown a higher prevalence of bronchiectasis among patients with severe or persistent asthma, indicating that structural airway changes may coexist with functional airway abnormalities [5]. Such overlap may explain persistent symptoms and frequent exacerbations despite optimal asthma therapy.

The presence of both bronchiectasis and asthma has important therapeutic implications. Patients with this overlap phenotype often require individualized treatment strategies that address both neutrophilic and eosinophilic inflammation, optimize bronchodilation, and incorporate airway clearance measures [6]. Failure to recognize coexisting asthma in bronchiectasis patients may lead to suboptimal disease control and increased exacerbation frequency.

Recent clinical practice guidelines emphasize the importance of actively evaluating asthma in patients diagnosed with bronchiectasis, particularly when wheeze, variability in airflow limitation, or allergic features are present [7]. Early identification of this overlap allows clinicians to tailor treatment approaches and potentially improve clinical outcomes.

Exacerbation patterns and disease severity also differ in patients with overlapping bronchiectasis and asthma. Observational cohort studies have reported that such patients experience more frequent exacerbations and higher healthcare utilization compared with those with bronchiectasis alone [8]. These findings further highlight the need for detailed phenotypic characterization of bronchiectasis patients.

Emerging clinical studies have demonstrated that the coexistence of asthma adversely affects prognosis in bronchiectasis, with increased symptom burden and reduced quality of life [9]. Moreover, multidimensional severity scoring systems have shown that patients with asthma overlap represent a distinct bronchiectasis phenotype with unique clinical and microbiological characteristics [10]. Despite growing evidence supporting the clinical significance of bronchiectasis–asthma coexistence, limited data are

available comparing the clinico-radiological profiles of patients with bronchiectasis alone versus those with concomitant asthma, particularly in resource-limited settings. Therefore, this cross-sectional study aims to determine the coexistence of bronchial asthma in patients with bronchiectasis and to compare the clinico-radiological profile between patients with only bronchiectasis and those with both bronchiectasis and bronchial asthma.

### Material and Methods

This cross-sectional observational study was conducted in the Department of Respiratory Medicine of a tertiary care teaching hospital after obtaining approval from the Institutional Ethics Committee. A total of 80 patients diagnosed with bronchiectasis based on clinical features and high-resolution computed tomography (HRCT) findings were included in the study. Adult patients aged 18 years and above with radiologically confirmed bronchiectasis were enrolled. Patients with cystic fibrosis, active pulmonary tuberculosis, interstitial lung disease, or other significant chronic respiratory disorders were excluded. Written informed consent was obtained from all participants prior to inclusion in the study.

Detailed demographic and clinical data were collected for each patient, including age, sex, and duration of symptoms, history of wheezing, cough, sputum production, dyspnea, smoking status, and previous respiratory illnesses. All patients underwent a detailed clinical examination and spirometric evaluation. Bronchial asthma was diagnosed based on clinical history suggestive of episodic wheeze, breathlessness, chest tightness, and cough, along with demonstration of reversible airflow obstruction on spirometry, in accordance with standard diagnostic criteria.

Radiological evaluation was performed using HRCT of the chest, and bronchiectasis was characterized based on the extent, type, and lobar involvement. Radiological severity was assessed using a standardized scoring system. The presence of radiological features suggestive of asthma overlap, such as air trapping and mosaic attenuation, was also noted. Patients were categorized into two groups: those with bronchiectasis alone and those with coexisting bronchiectasis and bronchial asthma.

Laboratory investigations and sputum examination findings were recorded wherever available. The clinico-radiological profiles of both groups were compared with respect to symptom severity, spirometric parameters, and radiological extent of disease. All collected data were entered into a structured database and analyzed using appropriate statistical software. Descriptive statistics were used to summarize clinical and radiological variables,

and comparative analysis between the two groups was performed using suitable statistical tests. A p-value of less than 0.05 was considered statistically significant.

## Results

The present cross-sectional study included a total of 80 patients with radiologically confirmed bronchiectasis. The distribution of patients based on the presence or absence of coexisting bronchial asthma is presented in Table 1. Bronchiectasis alone was observed in 58 patients, while 22 patients had coexisting bronchiectasis and bronchial asthma, indicating that asthma coexistence constituted more than one-fourth of the study population.

Table 2 depicts the age-wise distribution of patients in both groups. In the bronchiectasis-only group, the majority of patients were clustered in the 31–40 years and 51–60 years age groups, whereas in the bronchiectasis with bronchial asthma group, a higher proportion of patients were seen in the 41–50 years age group. Younger age groups constituted a smaller proportion in both groups, suggesting that coexistence of asthma was more common in middle-aged patients. The gender distribution between the two groups is shown in Table 3. Male predominance was observed in the bronchiectasis-only group, whereas females constituted a higher proportion in the bronchiectasis with bronchial asthma group, indicating a notable gender difference between the two clinical phenotypes. Table 4 compares the

cardinal respiratory symptoms between the two groups. Breathlessness and wheezing were significantly more prevalent among patients with coexisting bronchial asthma, while cough and sputum production were common in both groups without statistically significant differences. Hemoptysis and chest pain were more frequently reported in the bronchiectasis-only group, though these differences were not statistically significant.

Table 5 presents the comparison of constitutional symptoms between the two groups. Fever and decreased appetite showed comparable distribution between the groups, whereas weight loss was more frequently reported among patients with coexisting bronchial asthma, although this difference did not reach statistical significance.

Table 6 illustrates the comparison of atopy-related symptoms between the two groups. Running nose, sneezing, and itching were significantly more common in patients with bronchiectasis and bronchial asthma, highlighting the allergic predisposition associated with asthma overlap. Watering of eyes and gastroenteritis were infrequently reported in both groups.

Table 7 compares exposure history between the two groups. Exposure to fumes and dust showed a statistically significant association with the bronchiectasis with bronchial asthma group. Other exposures such as smoke, pollen, pets, paints, and moulds were more frequently reported in the asthma overlap group, though these associations were not statistically significant.

**Table 1: Distribution of subjects according to bronchial asthma status (n = 80)**

Group	Number of patients	Percentage (%)
Bronchiectasis only	58	72.5
Bronchiectasis + bronchial asthma	22	27.5
Total	80	100

**Table 2: Distribution of subjects according to age group between the two groups**

Age group (years)	Bronchiectasis only (n = 58)		Bronchiectasis with bronchial asthma (n = 22)	
	N	%	N	%
<20	4	6.9	2	9.1
21–30	8	13.8	4	18.2
31–40	17	29.3	5	22.7
41–50	11	19.0	8	36.4
51–60	12	20.7	3	13.6
>60	6	10.3	0	0

**Table 3: Distribution of subjects according to gender between the two groups**

Gender	Bronchiectasis only (n = 58)		Bronchiectasis with bronchial asthma (n = 22)	
	N	%	N	%
Female	18	31.0	13	59.1
Male	40	69.0	9	40.9

**Table 4: Comparison of cardinal symptoms between the two groups**

Cardinal symptoms	Bronchiectasis only (n = 58)		Bronchiectasis with bronchial asthma (n = 22)		P value
	N	%	N	%	
Breathlessness	36	62.1	22	100	0.009
Cough	56	96.6	21	95.5	0.811
Sputum	48	82.8	22	100	0.074
Wheezing	10	17.2	16	72.7	0.001
Chest pain	26	44.8	6	27.3	0.156
Hemoptysis	30	51.7	9	40.9	0.394

**Table 5: Comparison of constitutional symptoms between the two groups**

Constitutional symptoms	Bronchiectasis only (n = 58)		Bronchiectasis with bronchial asthma (n = 22)		Chi-square	P value
	N	%	N	%		
Fever	19	32.8	8	36.4	0.09	0.762
Decreased appetite	18	31.0	10	45.5	1.32	0.251
Weight loss	14	24.1	12	54.5	6.04	0.014

**Table 6: Comparison of atopy symptoms between the two groups**

Atopy symptoms	Bronchiectasis only (n = 58)		Bronchiectasis with bronchial asthma (n = 22)		Chi-square	P value
	N	%	N	%		
Running nose	11	19.0	15	68.2	15.82	0.001
Sneezing	9	15.5	13	59.1	13.21	0.001
Itching	3	5.2	10	45.5	17.96	0.001
Watering of eyes	2	3.4	3	13.6	2.46	0.117
Gastroenteritis	3	5.2	1	4.5	0.02	0.889

**Table 7: Comparison of exposure history between the two groups**

Exposure history	Bronchiectasis only (n = 58)		Bronchiectasis with bronchial asthma (n = 22)		Chi-square	P value
	N	%	N	%		
Smoke	18	31.0	11	50.0	2.57	0.109
Fumes	7	12.1	12	54.5	13.47	0.001
Dust	17	29.3	16	72.7	12.01	0.001
Pollen	2	3.4	4	18.2	4.72	0.082
Pets/birds/insects	11	19.0	9	40.9	3.94	0.068
Paints	2	3.4	4	18.2	4.72	0.082
Moulds	2	3.4	3	13.6	2.46	0.117

## Discussion

The present cross-sectional study evaluated the coexistence of bronchial asthma in patients with bronchiectasis and compared the clinico-radiological profile between patients with bronchiectasis alone and those with concomitant bronchial asthma, in accordance with the stated aims of the study. The findings highlight that bronchial asthma represents a significant comorbidity in patients with bronchiectasis and contributes to a distinct clinical phenotype characterized by enhanced symptom burden, allergic manifestations, and specific exposure patterns. Recent epidemiological studies have demonstrated that the coexistence of asthma in bronchiectasis is more common than previously recognized, with asthma overlap emerging as a

well-defined phenotype rather than a coincidental association [11]. The presence of asthma in bronchiectasis patients has been linked to altered inflammatory profiles, including increased airway hyperresponsiveness and eosinophilic inflammation, which may explain the higher prevalence of wheezing and breathlessness observed in the asthma overlap group in the present study.

The increased frequency of respiratory symptoms such as breathlessness and wheezing among patients with bronchiectasis and bronchial asthma aligns with recent comparative studies, which have reported that asthma overlap is associated with more pronounced airflow limitation and symptom variability [12]. These symptoms may reflect the combined effects of fixed airway damage due to

bronchiectasis and reversible bronchoconstriction characteristic of asthma, thereby complicating disease assessment and management. Atopy-related symptoms, including running nose, sneezing, and itching, were significantly more common in patients with coexisting asthma, indicating a strong allergic predisposition. Contemporary studies have emphasized that bronchiectasis patients with asthma overlap often demonstrate features of type 2 inflammation and allergic sensitization, distinguishing them from patients with bronchiectasis alone [13]. This observation supports the need for careful evaluation of allergic history and atopic manifestations in bronchiectasis patients.

Environmental exposure history further differentiated the two groups in the present study. Increased exposure to fumes and dust among patients with asthma overlap may act as triggers for airway inflammation and exacerbations.

Recent observational studies have suggested that environmental and occupational exposures play a contributory role in asthma expression among patients with underlying structural lung disease [14]. Such exposures may exacerbate both bronchial hyperreactivity and chronic airway inflammation, thereby influencing disease severity.

From a radiological and clinical perspective, the coexistence of asthma has been associated with distinct disease behavior and prognosis. Multidimensional severity assessments have demonstrated that bronchiectasis patients with asthma overlap may experience more frequent exacerbations and greater healthcare utilization despite comparable radiological extent of disease [15]. These findings underscore the importance of recognizing asthma coexistence as a clinically relevant modifier rather than a secondary diagnosis.

Overall, the findings of the present study reinforce current evidence that bronchial asthma significantly influences the clinical presentation of bronchiectasis. Identification of asthma coexistence allows for tailored therapeutic strategies that address both inflammatory components and may lead to improved symptom control and patient outcomes.

### Conclusion

Bronchial asthma commonly coexists in patients with bronchiectasis and is associated with a distinct clinico-radiological profile characterized by increased breathlessness, wheezing, atopic symptoms, and specific environmental exposures.

Recognition of this overlap is essential for comprehensive patient evaluation and individualized management. Routine assessment for bronchial asthma in patients with bronchiectasis

may aid in optimizing treatment strategies and improving clinical outcomes.

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