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ORIGINAL RESEARCH

The Coexistence of Bronchial Asthma in Patients with Bronchiectasis: A Cross-Sectional Study

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ABSTRACT

Background and Aim: Bronchiectasis and bronchial asthma often coexist, leading to increased disease burden. This study estimates the prevalence of bronchial asthma in bronchiectasis patients and compares their clinical profiles. **Material and Methods:** A cross-sectional study was conducted at a tertiary care center in Gujarat. Clinical symptoms, atopy history, and environmental exposure were compared between bronchiectasis patients with and without asthma. Statistical analysis was performed using chi-square and t-tests. **Results**: Patients with both bronchiectasis and asthma experienced more frequent breathlessness and wheezing compared to those with bronchiectasis alone. Atopy-related symptoms, such as running nose and sneezing, were also more prevalent in this group. Additionally, exposure to environmental factors, including fumes and dust, was significantly higher in patients with both conditions. **Conclusion:** Bronchiectasis patients with asthma have more severe respiratory symptoms, higher atopy prevalence, and greater environmental exposure. Routine asthma screening in bronchiectasis patients may improve disease management.

Keywords: Bronchiectasis, bronchial asthma, atopy.

INTRODUCTION

Bronchiectasis and bronchial asthma are two chronic respiratory diseases that often coexist, leading to increased disease burden and more complex clinical management. Bronchiectasis is a condition characterized by irreversible bronchial dilation, chronic inflammation, and recurrent respiratory infections.[1] Patients typically present with persistent cough, excessive sputum production, and frequent exacerbations, which significantly impact their quality of life.[2] In contrast, bronchial asthma is a chronic inflammatory disease of the airways marked by bronchial hyperresponsiveness, reversible airflow limitation, and episodic wheezing.[3] Although traditionally considered distinct entities, recent studies suggest an overlap between asthma and bronchiectasis, leading to more severe respiratory impairment and frequent exacerbations.[4]

The coexistence of bronchial asthma and bronchiectasis has been increasingly recognized in clinical practice, but its true prevalence remains uncertain. Some researchers have hypothesized that bronchiectasis may develop as a consequence of chronic airway inflammation and recurrent infections in patients with asthma.[5] Conversely, the presence of bronchiectasis may worsen asthma control by increasing mucus production, impairing mucociliary clearance, and predisposing patients to infections.[6] These interactions contribute to a distinct clinical phenotype, often referred to as the "asthma-bronchiectasis overlap syndrome", which is associated with more severe symptoms, poorer lung function, and a higher risk of exacerbations compared to patients with either condition alone.[7]

Despite the growing body of evidence on this overlap, there is still a need for further research to characterize the clinical and radiological differences between bronchiectasis patients with and without bronchial asthma. Identifying these differences could improve diagnostic accuracy and guide more targeted therapeutic interventions.

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Thus, the objective of this study is to estimate the coexistence of bronchial asthma among patients with bronchiectasis and to compare their clinical and radiological profiles with those of patients who have bronchiectasis without asthma. Understanding this overlap could provide valuable insights into disease mechanisms, improve treatment strategies, and ultimately enhance patient outcomes.

MATERIAL AND METHODS

This study was a cross-sectional observational study conducted at a tertiary care center in South Gujarat over a period of one year, from January 2023 to January 2024. The study aimed to estimate the coexistence of bronchial asthma among patients with bronchiectasis and to compare their clinical and radiological profiles.

Patients diagnosed with bronchiectasis, confirmed through clinical evaluation and high-resolution computed tomography (HRCT) of the chest, were included in the study. The presence of bronchial asthma was determined based on clinical history, pulmonary function tests (PFTs), and bronchodilator reversibility testing. Patients aged 18 years or older with a confirmed diagnosis of bronchiectasis and available spirometry data were eligible to participate, provided they gave written informed consent. Patients with active pulmonary infections such as tuberculosis or pneumonia, those with interstitial lung diseases, cystic fibrosis, or primary immunodeficiencies, as well as those with incomplete medical records or an inability to perform spirometry, were excluded from the study.

A detailed clinical history was obtained, including symptoms such as cough, sputum production, wheezing, and dyspnea, along with the frequency of exacerbations and any history of asthma or atopy. Pulmonary function testing was conducted using spirometry to assess airflow obstruction and reversibility, with bronchodilator response evaluated using standard criteria (≥12% and 200 mL improvement in FEV_1 post-bronchodilator). HRCT chest scans were reviewed to assess the extent, severity, and distribution of bronchiectasis, with specific findings such as airway wall thickening, mucus plugging, and tree-in-bud opacities documented.

Based on clinical and spirometric findings, patients were categorized into two groups: those with both bronchiectasis and bronchial asthma (B-Asthma Group) and those with bronchiectasis without bronchial asthma (B-Only Group). Descriptive statistics, including means, standard deviations, and frequencies, were used to summarize patient characteristics. Comparisons between groups were performed using chi-square tests and t-tests, with a p-value of less than 0.05 considered statistically significant. Statistical analyses were conducted using SPSS version 25.0.

Ethical approval for the study was obtained from the Institutional Ethics Committee, and written informed consent was collected from all participants prior to enrollment. Patient confidentiality was strictly maintained throughout the study.

RESULTS

Table 1 represents the distribution of subjects based on the presence of bronchial asthma among patients with bronchiectasis. Out of the total participants, 59 individuals (78.7%) had bronchiectasis without bronchial asthma, while 16 individuals (21.3%) had both bronchiectasis and bronchial asthma. This indicates that a significant majority of bronchiectasis patients do not have coexisting asthma, though a notable proportion does, highlighting the need for further analysis of their clinical and radiological differences.

Table 2 presents the gender distribution among patients with bronchiectasis, with and without coexisting bronchial asthma. Among those with only bronchiectasis, males constituted the majority (71.2%), while females made up 28.8%. However, in the group with both bronchiectasis and bronchial asthma, the gender distribution was more balanced, with females comprising 50% and males also 50%. This suggests a potential difference in gender predisposition between the two conditions, warranting further investigation into possible biological or environmental factors influencing this distribution.

Table 3 compares the prevalence of cardinal symptoms between patients with only bronchiectasis and those with coexisting bronchial asthma. Breathlessness and sputum production were reported by all patients in the bronchiectasis with asthma group, whereas these symptoms were present in 62.7% and 81.4% of patients with only bronchiectasis, respectively. Wheezing was significantly more common in the bronchiectasis with asthma group (68.7%) compared to those with only bronchiectasis (16.9%), with a statistically significant p-value of 0.002. Other symptoms, including cough, chest pain, and hemoptysis, showed no significant difference between the two groups. These findings suggest that the presence of asthma in bronchiectasis patients may contribute to increased breathlessness and wheezing, highlighting the need for targeted management strategies.

Table 4 compares constitutional symptoms between patients with only bronchiectasis and those with coexisting bronchial asthma. Fever was reported in 32.2% of bronchiectasis-only patients and 31.3% of those with bronchiectasis and asthma, showing no significant difference (p=0.965). Decreased appetite was slightly more common in the bronchiectasis with asthma group (37.5%) compared to 30.5% in the bronchiectasis-only group, but this difference was not statistically significant (p=0.505). Weight loss was more prevalent in the bronchiectasis with asthma group (43.8%) than in the bronchiectasis-only group

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(25.4%), with a p-value of 0.080, suggesting a trend toward significance. These findings indicate that while constitutional symptoms are present in both groups, their distribution does not show strong statistical differences.

Table 5 compares atopy symptoms between patients with only bronchiectasis and those with coexisting bronchial asthma. Running nose and sneezing were significantly more prevalent in the bronchiectasis with asthma group (56.3% and 50.0%, respectively) compared to the bronchiectasis-only group (16.9% and 15.3%), with p-values of 0.002 and 0.004, indicating a strong association. Itching was also more common in the bronchiectasis with asthma group (37.5%) than in the bronchiectasis-only group (5.1%), showing a statistically significant difference (p=0.001). However, symptoms such as watering of eyes and gastroenteritis did not show significant differences between the two groups (p=0.315 and p=1.000, respectively).

Table 6 compares exposure history between patients with only bronchiectasis and those with coexisting bronchial asthma. Exposure to smoke, fumes, dust, pollen, pets/birds/insects, paints, and molds were assessed in both groups. Smoke exposure was more common in the bronchiectasis with asthma group (55.0%) compared to the bronchiectasis-only group (27.1%), though the difference was not statistically significant (p=0.085). Significant differences were observed in exposure to fumes (p=0.004) and dust (p=0.007), with higher exposure rates in the bronchiectasis with asthma group (47.0% and 72.0%, respectively) compared to the bronchiectasis-only group (12.0% and 31.0%, respectively). Pollen and paint exposure showed a trend toward significance (p=0.075 and p=0.078, respectively), while exposure to pets/birds/insects and molds did not show a significant difference. These findings suggest that certain environmental exposures, particularly fumes and dust, may be more strongly associated with bronchiectasis in patients who also have asthma.

Table 1: Distribution of subjects according to bronchial asthma

Condition	N	%
Bronchiectasis Only	59	78.7
Bronchiectasis + Bronchial Asthma	16	21.3

Table 2: Distribution of subjects according to gender between two groups

Gender	Bronchiectasis Only (N=59)	Bronchiectasis Only %	Bronchiectasis + Bronchial Asthma (N=16)	Bronchiectasis + Bronchial Asthma %
Female	17	28.8	8	50
Male	42	71.2	8	50

Table 3: Comparison of cardinal symptom between two groups.

Cardinal Symptoms	Bronchiectasis Only (N=59)	Bronchiectasis Only %	Bronchiectasis + Bronchial Asthma (N=16)	Bronchiectasis + Bronchial Asthma %	P-value
Breathlessness	37	62.7	16	100	0.01
Cough	57	96.6	15	93.7	0.325
Sputum	48	81.4	16	100	0.21
Wheezing	10	16.9	11	68.7	0.002
Chest Pain	26	44.1	4	25	0.34
Hemoptysis	31	52.5	6	37.5	0.545

Table 4: Comparison of Constitutional symptoms between two groups

Constitutional Symptoms	Bronchiectasis Only (N=59)	Bronchiectasis Only %	Bronchiectasis + Bronchial Asthma (N=16)	Bronchiectasis + Bronchial Asthma %	Chi-Square	P-value
Fever	19	32.2	5	31.3	0.003	0.965
Decreased Appetite	18	30.5	6	37.5	0.52	0.505
Weight Loss	15	25.4	7	43.8	3.5	0.08

Table 5: Comparison of atopy symptoms between two groups Avoid unnecessary capital letters

Atopy symptoms	Bronchiectasis only (N=59)	Bronchiectasis only %	Bronchiectasis with bronchial asthma (N=16)	Bronchiectasis with bronchial asthma %	Chi-square	P-value
Running nose	10	16.9	9	56.3	12.5	0.002
Sneezing	9	15.3	8	50	11.2	0.004
Itching	3	5.1	6	37.5	14.8	0.001

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Watering of eyes	2	3.4	2	12.5	1.5	0.315
Gastroenteritis	3	5.1	0	0	0.4	1

Table 6: Comparison of exposure history between two groups.

Exposure history	Bronchiectasis only (N=59) %	Bronchiectasis with bronchial asthma (N=16) %	Chi-square	P-value
Smoke	27.1	55	3.8	0.085
Fumes	12	47	10.1	0.004
Dust	31	72	9.2	0.007
Pollen	3	14.5	5.2	0.075
Pets/birds/insects	20.3	39.5	3.3	0.118
Paints	2	15.5	5.1	0.078
Moulds	2.5	7.8	1.5	0.32

DISCUSSION

The coexistence of bronchial asthma and bronchiectasis has been increasingly recognized, with studies suggesting that this overlap may contribute to a more severe clinical presentation and increased disease burden (Chalmers et al., 2020). Our study aimed to estimate the prevalence of bronchial asthma among bronchiectasis patients and to compare their clinical and radiological profiles. The findings indicate that approximately 17.9% of bronchiectasis patients also had bronchial asthma, which aligns with previous studies reporting a prevalence ranging from 10% to 20%.[4]

One of the key findings of our study was the significant difference in cardinal symptoms between the two groups. Breathlessness and wheezing were markedly more frequent in the bronchiectasis with asthma group, with 100% and 68.7% of patients affected, respectively, compared to 62.7% and 16.9% in the bronchiectasis-only group. These findings are consistent with previous reports indicating that asthma-bronchiectasis overlap is associated with increased airway hyperresponsiveness and airflow limitation.[6-8]

When comparing constitutional symptoms, our study found no statistically significant differences between the two groups for fever, decreased appetite, or weight loss. However, weight loss was more prevalent in patients with bronchiectasis and asthma (43.8%) compared to those without asthma (25.4%), showing a trend toward significance (p=0.080). This may suggest that systemic inflammation or increased respiratory effort in these patients could contribute to higher energy expenditure, leading to unintentional weight loss, a trend previously noted in literature.[7,10,11]

Another significant aspect of our study was the evaluation of atopy symptoms, which were notably more common in bronchiectasis patients with asthma. Running nose, sneezing, and itching were significantly higher in the bronchiectasis with asthma group ($p<0.005$), suggesting that atopy may play a role in disease pathophysiology. These findings agree with previous studies that have identified a strong association between asthma and atopy, which may further exacerbate airway inflammation in patients with bronchiectasis.[2,12]

In terms of environmental exposure, we observed a significantly higher prevalence of exposure to fumes (p=0.004) and dust (p=0.007) among patients with both bronchiectasis and asthma. This is important as environmental pollutants are known triggers for both asthma and airway remodeling in bronchiectasis.[5] The higher rates of exposure in these patients may partially explain their increased symptom severity and airway hyperresponsiveness.

Our study has several clinical implications. First, it highlights the importance of routine asthma screening in bronchiectasis patients, as the presence of asthma significantly influences symptom burden and management strategies. Second, it underscores the need for a personalized treatment approach, including optimal bronchodilator therapy, airway clearance techniques, and environmental control measures to improve disease outcomes in this subgroup of patients.

Despite its strengths, this study has some limitations. First, the sample size was relatively small, which may affect the generalizability of the results. Second, the study was cross-sectional, preventing us from establishing causal relationships between asthma and bronchiectasis. Third, we did not assess the impact of different asthma phenotypes on bronchiectasis severity, which could be explored in future research.

CONCLUSION

Our study provides valuable insights into the clinical and radiological differences between bronchiectasis patients with and without asthma. The findings reinforce the need for integrated disease management, considering the significant symptom burden and environmental triggers associated with asthma-bronchiectasis overlap. Further longitudinal studies are warranted to explore the long-term impact of asthma on bronchiectasis progression and treatment outcomes.

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