

Comparison of the clinical profile in patients with bronchiectasis and coexisting with bronchial asthma. A cross sectional study.

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Abstract:

Background: To determine the co-existence of bronchial asthma in patients of bronchiectasis, and to compare the clinical profile between patients having only bronchiectasis and both bronchiectasis and bronchial asthma.

Materials and Methods: 67 patients who presented as Bronchiectasis (Clinical) were subjected to baseline investigations and spirometry/PEFR after informed consent. Statistical analysis was performed using SPSS 22 version software. The clinical profile was compared between the group having only bronchiectasis and those with bronchiectasis and asthma.

Results: Out of the 67 study patients, 55(82.08%) had only bronchiectasis and 12(17.91%) had bronchiectasis with bronchial asthma. In the bronchiectasis only group, majority of the patients were male 40(72.72%) and in the in bronchiectasis with bronchial asthma group majority of the patients were female 7(58.33%) which was statistically significant (P value 0.05). The mean age for onset of symptoms was found to be lower in the bronchiectasis with bronchial asthma group. Patients in the bronchiectasis with bronchial asthma group had a lower mean FEV1 value.

Conclusions: 17.91% of bronchiectasis patients had coexisting bronchial asthma. Hence, a proper diagnosis can reduce the burden of patients suffering from more frequent exacerbations, with better optimized treatment options.

Introduction

Bronchiectasis a chronic lung condition, defined as the abnormal, irreversible dilatation of the bronchi and bronchioles, where the elastic and muscular tissue is destroyed by acute or chronic

inflammation and infection.^{1,2} This anatomical definition has been evolved from the original description of ectatic bronchi found in pathological specimens in the year 1819. 1 Bronchi, mostly medium sized, are abnormally dilated and bronchial wall shows inflammatory changes. Such changes result from disordered anatomy of bronchial tree, bacterial colonization and chronic host inflammatory response.¹⁻³ It is characterised by chronic sputum production, recurrent chest infections, and airflow obstruction. Patients suffer from frequent exacerbations and often have significant limitation of activity.¹⁻⁶ It was found that bronchiectasis is a relatively common disease among US, European and Australian cohorts, with the mean disease prevalence being approximately 701 per 100,000 population, with the average age group affected being 60-70 years, hence an increasing trend with higher age groups was also noted.⁷ In India the following features were noted:

1. Younger age group
2. *P. aeruginosa* was the most common organism isolated in sputum culture
3. Cystic changes was the most common Bronchiectatic pattern was noted in on CT films.
4. Patients were also found to have severe form of the disease, and suffer from more severe exacerbations.
5. Patients were poorly evaluated and did not follow a proper treatment regimen. Therefore there is an increasing need to improve the of care for patients with [WU3] bronchiectasis in India.⁸ Several etiologies for the occurrence of bronchiectasis have been identified and studied, among which asthma and ABPA have been included. 50 percent of the bronchiectasis cases are idiopathic and for which the aetiology has to be ascertained. Bronchial asthma is a heterogeneous chronic inflammatory disorder of the airways in which many cells and cellular elements play a role, characterized by recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, these episodes vary in time and intensity and have variable expiratory airflow limitation that is often reversible either spontaneously or with treatment.⁹ Multiple number of guidelines exist on the treatment of asthma, However significant differences exist across countries.⁹ A large proportion of patients with asthma have been found to have poor control and inadequate treatment, this is evident among Indian asthmatics who are found to have a higher frequency of exacerbations, poor quality of life and limitation of activity and this results in socioeconomic burden due to poor work force performance and absenteeism from school and work.⁹⁻¹¹ In a resource limited settings like in our country; patient's lack of awareness about the disease, use of alternative forms of therapy without any proven efficacy, physicians not following step-wise standard guidelines in the management of patients, and lack of affordability of inhalers/medications, affects patients survival with the disease and more prone to suffer from exacerbations. One of the important components for the treatment of asthma includes identification and avoiding of precipitating factors along with addition of medications in a step-wise manner. If left untreated patients could develop complications such as airway remodeling, bronchiectasis, allergic bronchopulmonary aspergillosis (ABPA), etc.⁹⁻¹⁴ Studies have

been performed to ascertain the relationship between the 2 conditions, and they have found certain features among patients having coexistent bronchiectasis and bronchial asthma, they include:

1. Lower FEV1 values
2. More severe radiological involvement, with lower lobe involvement, presence of cylindrical bronchiectasis.
3. More severe and frequent exacerbations, with poor symptom control.
4. Poor prognosis
5. Higher airway hyper-responsiveness.
6. Symptoms of Upper airway involvement.
7. Heterogeneous presentation in terms of clinical features and outcome.
9. Higher FeNo values.¹⁵

Aims and Objectives of the study The purpose of the study conducted was to estimate the coexistence of bronchial asthma among patients with bronchiectasis, to compare clinical profile of patients of bronchiectasis with or without bronchial asthma.

Materials and Methods: It is a cross sectional study done among patients diagnosed with bronchiectasis (diagnosed clinically) presenting to department of respiratory medicine. Patients were examined and investigated to see if they have coexisting bronchial asthma or not.

The total number of subjects included are 67 according to inclusion and exclusion criteria.

Inclusion criteria 1. Patients with features consistent with bronchiectasis: (a) Chest symptoms –Cough with sputum production, breathlessness, with or without hemoptysis.

2. Patients who have given written informed consent for the study.

3. Patients above the age of 18 years. 3.2.

Exclusion criteria

1. Patients with Allergic Broncho-Pulmonary aspergillosis (ABPA)

2. Patients with Chronic Obstructive Pulmonary disease (COPD)

3. Asthma mimics: Examples including foreign body, laryngeal edema/vocal cord dysfunction

4. Patients having Active TB infection.

Methods of data collection: Patients who visited department of Respiratory Medicine were diagnosed with bronchiectasis (as per BTS guidelines 2019) and included in the study after taking informed written consent. Detailed clinical history was taken and clinical examination was done. Routine investigations were done. Patients were subjected to PFT or PEFr (If patients were unable to understand/perform PFT) after treating the

active infection/exacerbation. Diagnosis of bronchial asthma was made as per GINA 2021 guidelines. FEV1 change of >12% and 200ml post bronchodilator, or PEFr variability of >10% If bronchial asthma was diagnosed after performing spirometry/PEFR. The following tests to Rule out ABPA were performed: 1. Serum IgE 2. Serum Aspergillus specific IgE and IgG 3. Skin prick test (Serum precipitins testing is not available in our hospital and could not be included). Demographic data, clinical symptoms and signs in detail, all investigations were recorded in case record form. Occurrence of bronchial asthma in bronchiectasis patients was calculated and the symptomatology was compared between the 2 groups (i.e., patients with only bronchiectasis and patients with both bronchiectasis with Bronchial asthma).

Statistical analysis Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test or Fischer's exact test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation.

Statistical software MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyse data. 3.7.

Investigation or interventions conducted in study 1. Pulmonary function Test 2. Blood Investigations: Routine 3. Sputum for microbiology investigation: Grams stain, automated culture sensitivity, Sputum for AFB etc.

Results and Discussion: This study includes a total of 67 patients who were diagnosed to have bronchiectasis clinically.

Table 1: Distribution of subjects according to bronchial asthma

	N	%
bronchiectasis Only	55	82.08
bronchiectasis + bronchial asthma	12	17.91

In the study out of the 67 patients included, 55 (82.08 %) were found to have bronchiectasis only, and 12 (17.91 %) were found to have bronchiectasis with bronchial asthma. Table 1.

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

	Bronchiectasis only (55 Patients)	Bronchiectasis only (55 Patients)	Bronchiectasis with bronchial asthma (12 patients)	Bronchiectasis with bronchial asthma (12 patients)
	N	%	N	%
<20yrs	3	5.45	1	8.33

21-30	7	12.72	2	16.66
31-40	16	29.09	3	25
41-50	11	20	5	41.66
51-60	13	23.63	1	8.33
>60 yrs	5	9.09	0	0

Comparison of clinical profile between 2 groups: Age distribution The above table shows the age distribution of the patients in the study, In the bronchiectasis group, majority of the patients were found to belong to the age group 31-40 years, I.e. 16 patients (29.09%) In the Bronchiectasis with bronchial asthma group, majority of the patients were found to belong to the age group 41-50 years, I.e. 5 patients (41.66%). The P value 0.488 (Chi square value 4.440, df 5), there was no statistically significant difference found between two groups with respect to age group. The mean age for onset of symptoms in the bronchiectasis group was 35.89 years, and 24.83 % in the bronchiectasis with bronchial asthma group. Which was significantly lower in the bronchiectasis with bronchial asthma group. Table 2

In the bronchiectasis group the age of onset of symptoms were as follows:

1. 8 patients belonged to the age group < 20 years (14.54%)
2. 27 patients belonged to the age group 21-40 years (49%)
3. 17 patients belonged to the age group 41-60 years (30.90 %)
4. 3 patients belonged to the age group >60 years (5.45%)

In the bronchiectasis and asthma group the age of onset of symptoms were as follows:

1. 4 patients belonged to the age group < 20 years (33.33%)
2. 8 patients belonged to the age group 21-40 years (66.66%)
3. 0 patients belonged to the age group 41-60 years (0 %)
4. 0 patients belonged to the age group >60 years (0%) Maximum patients in both groups had onset of symptoms at 21-40 years of age.

Table 3: Distribution of subjects according to gender between two group

	Bronchiectasis only	Bronchiectasis only	Bronchiectasis with bronchial asthma	Bronchiectasis with bronchial asthma
	N	%	N	%
Female	15	27.27	7	58.33
male	40	72.72	5	41.66

Gender distribution In the Bronchiectasis only group, majority of the patients were males (40 patients, 72.72 %). Table 3 In the Bronchiectasis with bronchial asthma group, majority of the patients were Females (7 patients, 58.33%). The P value 0.049 (Chi square value 4.309, df 1), there was a statistically significant difference found between two groups with respect to sex.

Table 4: Comparison of cardinal symptom between two groups.

Cardinal symptoms	Bronchiectasis only	Bronchiectasis only	Bronchiectasis with bronchial asthma	Bronchiectasis with bronchial asthma	P value
	N	%	N	%	
Breathlessness	35	63.63	12	100	0.013
Cough	54	98.18	11	91.66	0.328
Sputum	46	83.63	12	100	0.196
Wheezing	9	16.36	8	66.66	0.001
Chest pain	24	43.63	3	25	0.335
hemoptysis	29	52.72	5	41.66	0.539

Cardinal symptoms In the bronchiectasis only group, majority of the patients had cough as a cardinal symptom (total 54 patients, 98.18%). Other symptoms like sputum production (Total 46 patients 83.63%), chest pain (24 patients 43.63 %) and hemoptysis (29 patients, 52.72%) were more common in the bronchiectasis group. Table 4 In the bronchiectasis with bronchial asthma group, 12 patients (100%) had breathlessness as a cardinal symptom, and 12 patients (100%) had sputum production as a cardinal symptom. Symptom of Wheeze (8 patients, 66.66%) was more common in this group. P value was significant only on comparing symptom of breathlessness and wheezing between 2 groups, I.e. 0.013 and 0.001 respectively, which was more predominant in the bronchiectasis with bronchial asthma group.

Table 5: Comparison of Constitutional symptoms between two groups

constitutional symptoms	Bronchiectasis only	Bronchiectasis only	Bronchiectasis with bronchial asthma	Bronchiectasis with bronchial asthma	Chi square	P value
	N	%	N	%		
fever	18	32.72	4	33.33	0.002	0.968
Decreased appetite	17	30.90	5	41.66	0.517	0.510
Weight loss	13	23.63	6	50	3.370	0.084

Constitutional symptoms In the bronchiectasis only group, majority of the patients had fever (i.e. 18 patients, 37.72%). Table 5 In the bronchiectasis with bronchial asthma group majority of the patients had weight loss as a cardinal symptom (i.e. 6 patients, 50%). There is no statistical significant difference on comparing the constitutional symptoms between the 2 groups.

Table 6: Comparison of atopy symptoms between two groups

Atopy symptoms	Bronchiectasis only	Bronchiectasis only	Bronchiectasis with bronchial asthma	Bronchiectasis with bronchial asthma	Chi square	P value
	N	%	N	%		
Running nose	9	16.36	8	66.66	13.164	0.001
Sneezing	8	14.54	7	58.33	10.870	0.003
Itching	2	3.63	5	41.66	15.228	0.001
Watering of eyes	1	1.81	1	8.33	1.44	0.328
Gastroenteritis	2	3.63	0	0	0.450	1.00

Atopy symptoms In the bronchiectasis group, majority of the patients had running nose as a symptom of atopy (I.e. 9 patients 16.36 %). Table 6 In the bronchiectasis with bronchial asthma group, majority of the patients also had running nose as a symptom of atopy (i.e. 8 patients 66.66 %) There is a statistical difference between 2 groups, while comparing the symptoms of running nose, sneezing and itching. The P value being 0.001, 0.003, 0.001 respectively, which were more commonly found to occur amongst the patients belonging to bronchiectasis with bronchial asthma group.

Table 7: Comparison of exposure history between two groups.

Atopy symptoms	Bronchiectasis only	Bronchiectasis only	Bronchiectasis with bronchial asthma	Bronchiectasis with bronchial asthma	Chi square	P value
	N	%	N	%		
smoke	16	29.09	7	58.33	3.736	0.090
Fumes	6	10.90	6	50	9.981	0.005
Dust	16	29.09	9	75	8.876	0.006
Pollen	1	1.81	2	16.66	5.078	0.080
Pets/birds/insects	10	18.18	5	41.66	3.127	0.121

Paints	1	1.81	2	16.66	5.078	0.080
Moulds	1	1.81	1	8.33	1.44	0.328

Exposure history In the bronchiectasis group majority of the patients had exposure to smoke and dust (16 patients in each group, 29.09% in each group). Table 7 In the bronchiectasis with bronchial asthma group majority of the patients had exposure to dust (9 patients 75 %) While comparing the exposure history between 2 groups, only exposure to fumes and dust was found to be statistically significant, i.e. P value being: 0.005 and 0.006 respectively. Which was found to be more common among the patients belonging to the bronchiectasis with asthma group.

Conclusion: The study concludes that the prevalence of bronchial asthma in cases of bronchiectasis is significant found to be 17.91%. Early suspicion and diagnosis such cases reduces the morbidity and mortality of patients suffering from frequent and severe bronchiectasis exacerbations, associated complications and sequelae, and better treatment options can also be provided. *Study Limitations:* In the bronchiectasis and bronchial asthma group, ABPA could not be ruled out due to the following factors; Non availability of tests Serum IgE, Aspergillus specific IgE and IgG, Serum precipitins; Loss during follow up.

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