

Original Research Article

Clinical, etiological, microbiological and radiological features of bronchiectasis patients-an institution based analytical cross-sectional study

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ABSTRACT

Background: Bronchiectasis is an irreversible dilatation of more than one bronchus, with decreased clearance of secretions and expiratory flow. Secondary bacterial infection is so common, which worsens the disease. Sequelae of the disease lead to poor quality of life, with increased morbidity and mortality. This issue has limited literature.

Methods: Patients diagnosed to have bronchiectasis by HRCT chest in a tertiary care hospital, Alluri Sitarama academy of medical sciences, Eluru, A. P were included. Detailed clinical history was taken. After basic investigations, sputum samples were sent to CBNAAT and routine bacterial culture sensitivity. These patients were subjected to spirometry. Parameters measured in spirometry were forced vital capacity (FVC), forced expiratory volume in 1st second (FEV1), ratio of FEV1 to FVC (FEV1/FVC).

Results: Forty patients were enrolled in this study. Majority of them were females i.e., 24 (60%). Most common symptom/sign was crackles (95%) followed by productive cough (92.5%), dyspnea (55%) and haemoptysis (28%). Increased growth of *Pseudomonas aeruginosa* (37.5%) was found followed by *Klebsiella pneumoniae* (30%), *Streptococcus pneumoniae* (15%), *Staphylococcus aureus* (2.5%) and *H. influenzae* (2.5%).

Conclusions: Bronchiectasis, which is an end result of various diseases, commonly presents with productive cough, dyspnoea and haemoptysis, either as a single entity or as comorbidity with COPD or asthma. Knowledge of prevalent etiologies and types of bronchiectasis helps clinician for effective diagnosis and treatment of these patients.

Keywords: Bronchiectasis, Etiological, Haemoptysis, Radiology, Spirometry

INTRODUCTION

Bronchiectasis is an irreversible dilatation of one or more bronchi, with decrease in mucociliary clearance due to recurrent infections and airflow limitation (expiratory).¹ It is the reason for recurrent respiratory tract infections, decrease in lung function and complications like pulmonary hypertension, respiratory failure which leads to poor quality of life and increased morbidity and mortality.²⁻⁴ Nowadays there is apparent increase in incidence rates of bronchiectasis, due to diagnostic modalities like high resolution computerized tomography.⁵

Prevalence of bronchiectasis is reported higher among developing countries than developed countries, in case scenario with less access to healthcare. However, it may be probably underestimated in reports which focused on healthcare claims and cases reported by physicians. In non-smokers, lower respiratory tract is comparatively sterile compared to patients having bronchiectasis or chronic obstructive pulmonary disease (COPD), which were reported to have pathogenic microorganisms.⁶⁻⁹

Many studies report that the pathogenic microbes were found in distal airways and correlated with patients having bronchiectasis. Process of infections, tissue

damage, obstruction and secondary inflammatory processes act in a “vicious cycle” which is main contributory factor of disease chronicity.¹⁰ So, to overcome this vicious cycle and to explore effective treatment measures, many researches are required in this field.

Many researches conducted were based upon sputum microscopy, culture as main diagnostic methods for the identification of bronchial pathogens during exacerbations within patients of bronchiectasis.¹¹ Sputum microscopy, sputum cultures are easy, cost effective, non-invasive procedures, but there is risk of contamination by commensals of oropharyngeal wall. Flexible bronchoscopy and other newer diagnostic procedures decrease contamination, and thus lead to better diagnostic accuracy of the samples compared to older procedures.^{12,13}

Bronchiectasis was referred to as an “orphan disease” which was due to poor clinical diagnosis, few research activities and less commercial interest.¹⁴ As a consequence, and due to decreased research in non-cystic fibrosis bronchiectasis, there is less reference literature found in this subject compared to other causes of obstructive lung diseases and pneumonia.¹⁵ There is need of specific bacteriological evaluation to decrease the frequency of complications and better treatment outcomes. Issue of antimicrobial resistance is of big concern, which is due to irrational use of prophylactic or therapeutic antibiotics even before the culture reports.¹⁶

In this study, we reviewed our current understanding on clinical, etiological, microbiological and radiological aspects in patients of bronchiectasis, in a tertiary care hospital, Alluri Sitarama academy of medical sciences, Eluru.

Aim and objectives

Aim and objectives were to analyse the clinical, etiological, microbiological and radiological features of bronchiectasis patients attending a tertiary care centre.

METHODS

Study design

An institution based analytical cross-sectional study was used.

Study area

Study was conducted at Alluri Sitarama academy of medical sciences, Eluru, A.P.

Study period

Study conducted for one year from October 2021 to September 2022

Study population

Bronchiectasis patients attending to department of respiratory medicine, Alluri Sitarama academy of medical sciences were selected for study.

Sample size

Total 40 patients were selected for study.

Study subjects

Inclusion criteria

Patients ≥ 18 years of age having bronchiectasis on high resolution computed tomography-chest were included in the study.

Exclusion criteria

Patients with history of interstitial lung diseases, radiation therapy, HIV, patients who are not willing to be enrolled into the study were excluded.

Methodology

Forty individuals who had chronic cough with mucopurulent expectoration and crackles on auscultation were recruited. HRCT chest was taken to confirm the diagnosis of bronchiectasis. Detailed clinical history and physical examination were performed. After basic investigations, sputum samples were sent to CBNAAT and for routine bacterial culture sensitivity. All the patients were subjected to spirometry, fulfilling the acceptability and reproducibility criteria as per American thoracic society recommendations. The parameters measured in spirometry included forced vital capacity (FVC), forced expiratory volume in 1st second (FEV1), ratio of FEV1 to FVC (FEV1/FVC).

Data analysis

The analysis of statistical data was performed using Microsoft excel software. Descriptive statistics were performed for baseline and demographic characteristics were expressed in terms of frequencies and percentages and represented in the forms of tables and graphs.

Ethical issues

The study was conducted after approval from the institutional ethical committee (Alluri Sitarama academy of medical sciences, Eluru). Informed written consent was obtained from the patients in local language before their inclusion in the study.

RESULTS

As per the inclusion criteria, a total of 40 patients were enrolled in the study.

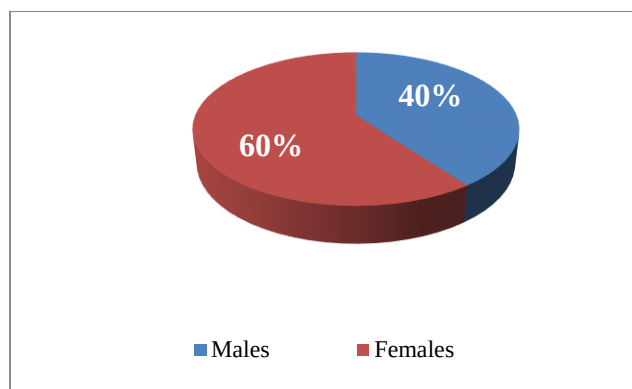


Figure 1: The gender distribution.

Figure 1 showing gender distribution among the 40 patients in which 24 (60%) and 16 (40%) patients were females and males respectively.

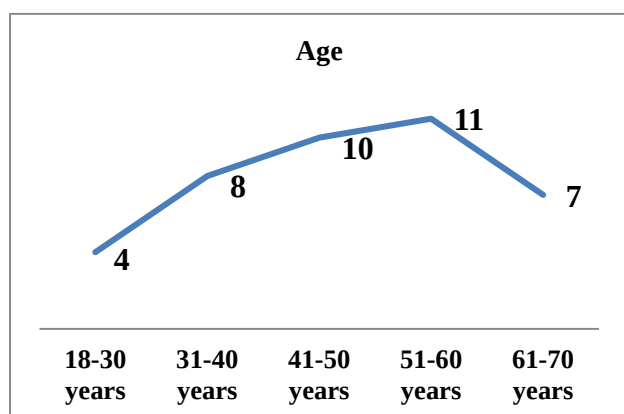


Figure 2: Age wise distribution.

Figure 2 showing age wise distribution of the patients, majority of them i.e., 11 (27.5%) were between the age group of 51-60 years and least were found to be in between 18-30 years i.e., 4 (10%).

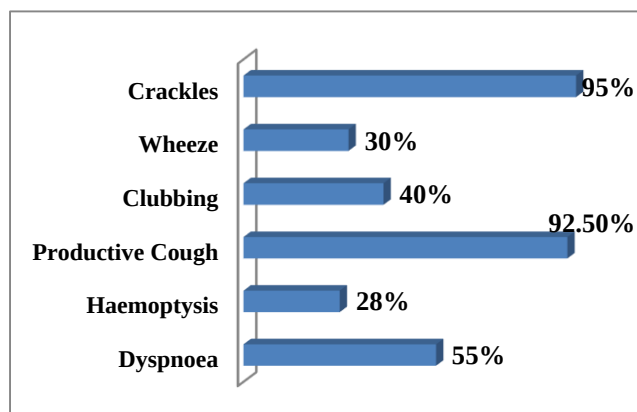


Figure 3: The clinical features.

Figure 3 showing the clinical features of which 95% were crackles followed by productive cough (92.5%) and 28% were having haemoptysis.

Co-morbidities

Among 40 patients, 19 (47.5%) were smokers and 15 (37.5%) were alcoholics. Ten out of forty had COPD (25%), three had bronchial asthma (7.5%), eighteen had diabetes (45%), sixteen were hypertensive (40%), five were having ischaemic heart disease (12.5%) and twelve were having GERD (30%).

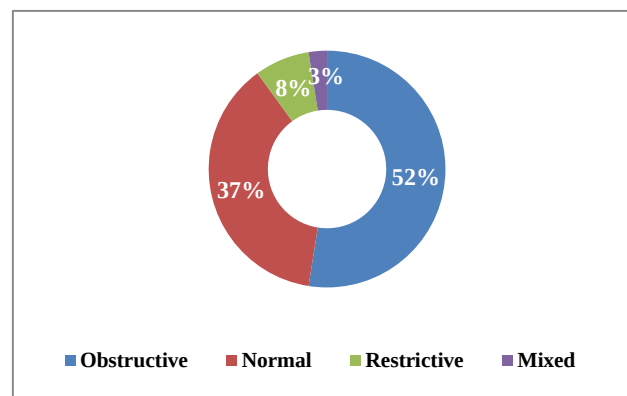


Figure 4: The spirometry pattern.

Figure 4 showing the spirometry pattern of which most common pattern observed was obstructive (52%), followed by normal pattern (37%), restrictive pattern (8%) and mixed pattern (3%).

Table 1: The etiological factors.

Etiological factor	N	Percentage (%)
Post tuberculosis	16	40
Post infective	10	25
Idiopathic	8	20
Congenital	2	5
Other causes	4	10

Table 1 showing the etiological factors, of which most common cause was old tuberculosis (40%), followed by post infective (25%), idiopathic (20%), other causes (10%) and congenital (5%).

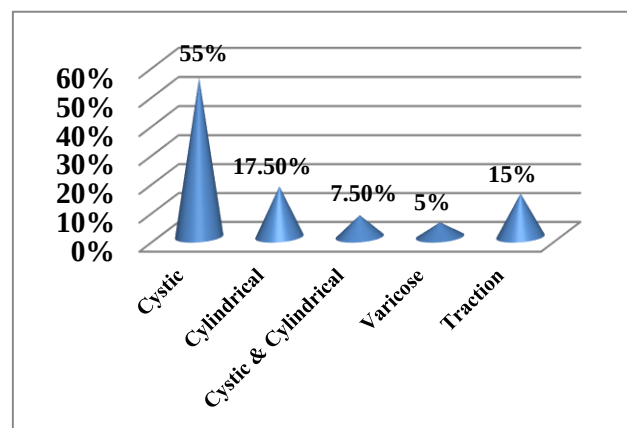


Figure 5: The radiological patterns.

Figure 5 showing the radiological patterns, of which most common pattern observed was cystic (55%), followed by cylindrical (17.5%), and combined cystic, cylindrical pattern (7.5%), traction bronchiectasis (15%) and varicose pattern (5%).

Figure 6 showing the microbiological profile, of which the most common organism isolated was *Pseudomonas aeruginosa* (37.5%), followed by *Klebsiella pneumoniae* (30%), *Streptococcus pneumoniae* (15%), *Staphylococcus aureus* (2.5%) and *H. influenzae* (2.5%). About 10% of cultures were found to be negative.

Table 2 showing statistically significant association of haemoptysis with cystic type of bronchiectasis ($p=0.0049$).

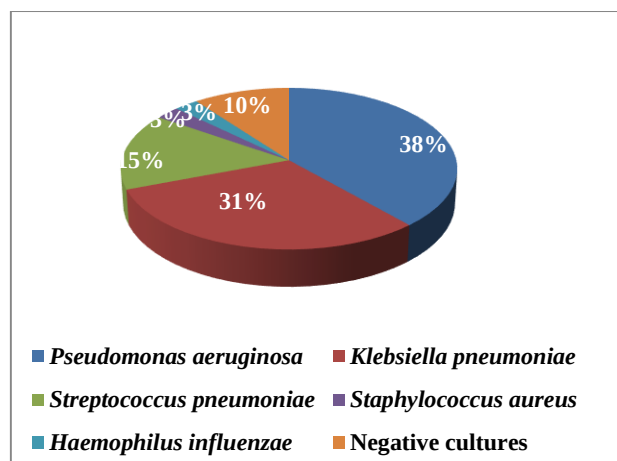


Figure 6: The microbiological profile.

Table 2: The association of haemoptysis with cystic bronchiectasis.

Variables	Cystic bronchiectasis		Total	P value
	Present	Absent		
Haemoptysis	Present	10	11	0.0049
	Absent	12	29	
Total	22	18	40	

DISCUSSION

Bronchiectasis is a chronic lung disease which is a final result of various respiratory and systemic disorders, it was previously considered as an orphan disease because of decreased hospital admissions, which was thought to be due to effective immunization, nutrition and improved sanitation.¹⁷ However, the definitive initial diagnosis of the disease is now done with advanced imaging technique, HRCT chest. Therefore, bronchiectasis is now not an orphan disease and needs to be studied extensively for effective treatment of patients.¹⁸

According to studies done by Raghavan, Jain et al and Vidaillac et al there was female predominance seen in bronchiectasis with poor clinical outcome, deteriorated lung function, many exacerbations leading to increased mortality.^{19,20} This may be due to genetic predisposition, sex hormones, co morbidities, and unawareness of symptoms, delayed medical care. This is similar to our study, where 60% of the patients were females.

Most common clinical presentation in our study was chronic cough with sputum production (92.5%) which closely matched with other studies like Dimakou et al and Altenburg et al.^{21,22}

In the study done by Dimakou et al, dyspnoea was the second most common symptom, which is similar in our study (55%). In the study done by Habesoglu et al haemoptysis was present in 32.8% patients which were similar to present study where haemoptysis was present in 28% of the patients.^{21,23}

Post TB bronchiectasis (40%) and post infection (25%) were the common causes in this study. Idiopathic bronchiectasis was reported in 20% cases. This is similar to Dhar et al where post TB (35.5%) and post infection (22.4%) were most common causes with idiopathic category being 21.4%.²⁴

Role of HRCT in bronchiectasis is to confirm the diagnosis, to localise and know the disease severity, for better treatment.²⁵ Cystic bronchiectasis was the most common (55%) radiological variety in our study, followed by cylindrical variety (17.5%). These results were similar to studies done by Habesoglu et al, Dhar et al, Alzeer et al.^{23,24,26} In the studies done by Habesoglu et al, Sreaton et al cystic varieties were associated with higher frequency of haemoptysis.^{23,27} This was similar to our study, in which haemoptysis had a significant association with cystic type of bronchiectasis ($p=0.0049$).

Pseudomonas aeruginosa was common organism isolated from sputum (37.5%) in study, which is similar to that of Dimakou et al where frequency of isolation 43%.²¹

Limitations

Due to limited resource settings in our institute, study was done on small sample size; and it is a single institute-based study; hence the results cannot be generalized to whole population.

CONCLUSION

To conclude, bronchiectasis, which is an end result of various diseases, commonly presents with productive

cough, dyspnoea and haemoptysis, either as a single entity or as comorbidity with COPD or asthma. Knowledge of prevalent etiologies and types of bronchiectasis helps clinician for effective diagnosis and treatment of these patients.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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