



Pulmonary Medicine

“A STUDY OF CLINICAL FEATURES, RADIOLOGICAL PATTERN AND MICROBIOLOGICAL PROFILE OF BRONCHIECTASIS”

Dr. Raja Sekharam Gunta	M.D., Respiratory Medicine, Department Of Pulmonary Medicine, Assistant Professor, Government Medical College, Srikakulam, Andhra Pradesh, India-- 532001
Dr. M Mohana Pradeepika*	M.D., Respiratory Medicine, Department Of Pulmonary Medicine, Assistant Professor, Government Medical College, Srikakulam, Andhra Pradesh *Corresponding Author
Dr. P. Dhilleswar Rao	M.D., Pulmonary Medicine, Department Of Pulmonary Medicine, Assistant Professor, Government Medical College, Srikakulam, Andhra Pradesh, India-- 532001
Dr. Sarangam Karunya	M.D., Pulmonary Medicine, Department Of Pulmonary Medicine, Post Graduate, GEMS, Srikakulam

ABSTRACT

Introduction: Bronchiectasis is often a neglected chronic respiratory disease. patients presents with productive cough, frequent chest infections leading to health-related poor quality of life with increased morbidity and mortality **Aim:** The aim of the present study is to identify various clinical presentations, radiological patterns and to analyse the typical microbiological flora to design appropriate management and prevent complications in bronchiectasis patients **Materials and methods:** A single centre prospective Observational study done on 74 patients at Department of Respiratory medicine, GEMS & HOSPITAL, Srikakulam for 18Months from 2019 October to 2021 March. Clinical parameters were noted. Chest x-ray, HRCT done to assess radiological pattern. Sputum sample subjected to AFB staining, bacterial culture and sensitivity to analyse microbiological flora. **Results:** The maximum clustering was 27.02% in the age group of 61-70 years. Overall mean age was 54.96 ± 14.85 years. In our study the most common cause of bronchiectasis was Pulmonary Tuberculosis. 47.1% presented with cystic bronchiectasis. Pseudomonas showed increased prevalence i.e., 22.97% in sputum culture **Discussion:** In our study group of 74 patients most common age group involved are 61-70 years as proved in literature that elderly group is most commonly involved in bronchiectasis. In our study, majority of population presented with cystic bronchiectasis similar to Mehmet Ali Habesoglu et al, (2011). As tuberculosis is still prevalent in INDIA our study had TB as most common cause. Pseudomonas showed increased prevalence unlike other studies that shows geographical variation in microbiological flora **Conclusion:** elderly patients are most commonly involved. comorbidities like diabetes and hypertension are frequently associated with increased morbidity. Recently covid pneumonia is also playing a significant role in the etiology of bronchiectasis. Identification of microbiological picture helps in patient directed management and prevents recurrent infections.

KEYWORDS :**INTRODUCTION**

Bronchiectasis is derived from the Greek word, bronchion means windpipe and ektasis means stretching out.^[1,2] It is a neglected chronic respiratory disease. patients presents with productive cough, copious amount of sputum, frequent chest infections leading to health-related poor quality of life.^[3,4,5] Males are more commonly involved in Indian population and presents with recurrent exacerbations and frequent hospitalizations, chronic infections with antibiotic resistant pseudomonas.^[1,6] In India Tuberculosis is most common aetiology. By definition Bronchiectasis is an irreversible dilatation, destruction of one or more medium sized bronchi, with decreased clearance of mucus which leads to recurrent lower respiratory tract infections, worsening of lung functions, respiratory failure and pulmonary hypertension, resulting in a poor quality of life, with increased morbidity and mortality.^[7,8,9,10] Persistent bronchial inflammation and mucus hypersecretion predisposes to plugging of mucus and thickening of bronchial wall and destruction, resulting in decreased lung function.^[11,12] Improvement in the patient care and quality of life with patient tailored management by identifying the risk factors for exacerbations by sputum culture & sensitivity test is the need of the hour. This study aims to identify the common presentation of disease, aetiology, radiological pattern, microbiological profile causing disease, so as to improve management, outcome and patient's quality of life.

AIMS AND OBJECTIVES:

The aim of the present study is to identify various clinical presentations, radiological patterns and to analyse the typical microbiological flora to design appropriate management and prevent complications in bronchiectasis patients

OBJECTIVES:

The present study was undertaken to study the clinical picture (symptoms, duration of illness) and radiological pattern (chest x-ray and HRCT) and also to analyse microbiological profile (AFB, Culture & sensitivity) and assess complications of Bronchiectasis patients

MATERIALS AND METHODS

A single centre prospective Observational study done on 74 patients at Department of Respiratory medicine, GEMS & HOSPITAL, Srikakulam for 18Months from 2019 October to 2021 March.

Inclusion Criteria:

1. Patients admitted with HRCT diagnosis of Bronchiectasis (non-cystic fibrosis)
2. Age more than 14 years
3. Spo2 more than 90% on room air
4. History of pulmonary tuberculosis, childhood viral fever, pneumonia

Exclusion Criteria:

1. Patients with complications like Lung abscess and Amyloidosis
2. Patients with cystic fibrosis
3. Spo2 less than 90%

Patients attending Dept., of Respiratory medicine, GEMS hospital with complaints of productive cough with or without haemoptysis, shortness of breath, fever and radiological features suggestive of bronchiectasis, have been included along with old patients with bronchiectasis history in the past. The purpose of the study was explained to participating subjects, and consent was obtained. Information collected regarding presenting symptoms, past history, personal history. Chest x-ray, HRCT done to assess radiological pattern. Sputum sample subjected to AFB staining, bacterial culture and sensitivity to analyse microbiological flora.

Statistical Analysis

Statistical analysis was performed by using a software Statistical Package for Social Sciences (SPSS, version 16). Demographic variables, clinical picture, radiological pattern, microbiological profile and complications of bronchiectasis in categories were given in frequencies with their percentages. Age was given in mean and standard deviation. Difference between gender wise age distribution were compared using student's independent t-test. $P < 0.05$ was considered to be statistically significant.

RESULTS

The minimum age was 21 and maximum was 84. The maximum clustering was 27.02% in the age group of 61-70 years and 22.97% in 51 – 60 years.(Fig 1) Males mean age was 56.79±15.27 years and females mean age was 46.38±8.83 years (Table 1).

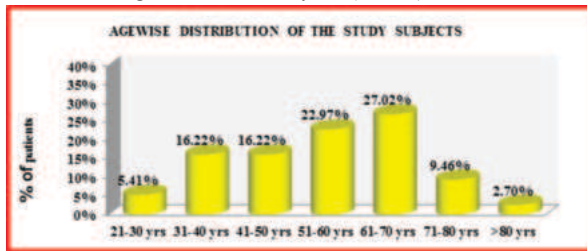


Figure 1

Table 1

SEX	N	Mean age in years	Std. Deviation	Student independent t-test
Male	61	56.79	15.27	t=2.36 p=0.03*(Significant)
Female	13	46.38	8.83	

Overall mean age was 54.96 ±14.85 years. Majority of patients i.e., 50.0% presented with cough with productive sputum, shortness of breath seen in 20.27% patients and 9.46% presented with dry cough. 52.70% of the study population were smokers and 47.30% were Non-smokers (Fig 2).

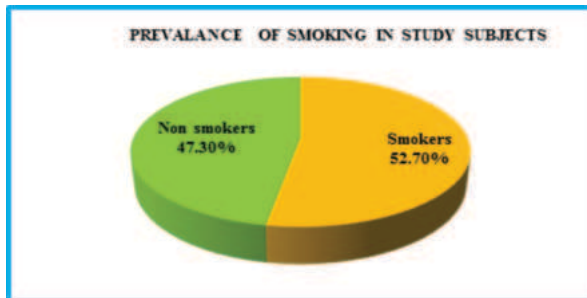


Figure 2

In our study the most common cause of bronchiectasis was Pulmonary Tuberculosis, i.e 64.86%. 9.46% of study group presented with history of pneumonia, 2.7% presented with Alpha-1 anti trypsin deficiency (table2).

Table 2

Etiology	No. of patients	%
Pulmonary TB	48	64.86%
No cause	12	16.22%
Pneumonia	7	9.46%
Viral exanthem	5	6.76%
Alpha 1 AT Deficiency	2	2.70%
Total	74	100.00

Majority of the study group population i.e., 66.22% had no comorbidities, 22.97% presented with DM, 9.45% presented with Hypertension, 2.70% population has a recent history of COVID-19 pneumonia, 1.35% presented with Allergy (table3)

Table 3

Co-morbidities	No. of patients	%
Allergy	1	1.35%
COVID	2	2.70%
DM	12	16.22%
DM,COVID	3	4.05%
DM,HTN	2	2.70%
DM,HTN,COVID	2	2.70%
HTN	3	4.05%
Nil	49	66.22%

Majority of study population presented with cystic bronchiectasis i.e., 47.1% followed by Cylindrical 25.68%, Traction 13.50%, varicoid 6.76% and Mixed type 6.76%. (fig 3)

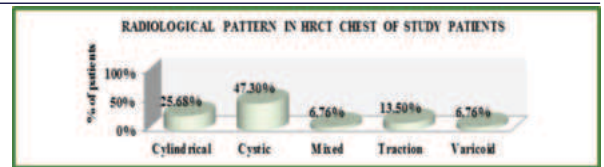


Figure3

Sputum for Acid Fast Bacilli(AFB) was detected in 8 patients out of 74 patients i.e.,10.81% and rest of the population i.e., 89.19% detected Negative for AFB. In our study Pseudomonas showed increased prevalence i.e.,22.97% and 1.35% detected with MDRTB. fungal growth was also observed as our study included covid-19 patients with Diabetes mellitus. Aspergillus 9.46%, Candida 6.76% was isolated. (Table 4)

Table 4

MICROBIOLOGICAL FLORA	No. of patients	%
Acinetobacter	4	5.41%
Aspergillus	7	9.46%
candida	5	6.76%
E.coli	3	4.05%
H.influenza	4	5.41%
klebsiella	13	17.57%
MDRTB	1	1.35%
MTB	1	1.35%
no growth	13	17.57%
pseudomonas	17	22.97%
staphylococcus	3	4.05%
streptococcus	3	4.05%
Total	74	100%

Majority of study group had no complications. hemoptysis and PAH was most commonly seen in 5.4% of study group each (Fig 4)

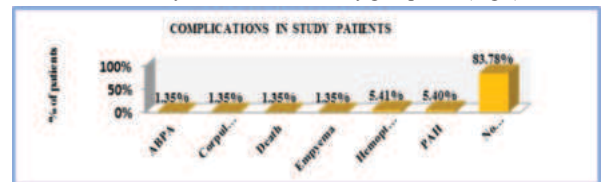


Figure 4

Bronchiectasis in subjects with >50 years age were more smokers. Tuberculosis i.e sputum positive afb was most commonly observed in <50 years age group with p value <0.001.

DISCUSSION

In our study group of 74 patients most common age group involved are 61-70 years (27.02%) followed by 51-60 years (22.9%) as proved in literature that elderly group is most commonly involved in bronchiectasis similar to studies like Mehmet Ali Habesoglu et al. M. Brooke Nicotra et al, (1995) and Paul T.King et al,(2006).^[13,14,15] In our study with a total study population of 74 patients, Males were 82.5% and Females were 17.5% are involved whereas studies like M Brooke Nicorta et al, (1995) Mehmet ali habesoglu et al, (2011). Paul T king et al, (2006) 10 Cuvelier Antoinet et al, (2000) showed almost equal male and female subjects.^[13,14,15,16] As our study was conducted in a village, where females were less commonly diagnosed so males were more commonly diagnosed though females were most commonly involved in literatures. According to our study conducted on 74 patients, most of the patients presented with productive cough (50%), dry cough (9.46%), followed by dyspnea (20.2%), and haemoptysis (8.1%), similar to Mehmet Ali Habesoglu et al, (2011) M Brooke Nicorta et al,(2006) Paul T king et al, (2000) studies.^[13,14,15] According to Our study conducted in 74 patients, smokers were 52.7%, Non-smokers 47.2% similar to M Brooke Nicorta et al,(1995) Mehmet Ali Habesoglu et al, (2011) stated that 43 out of 104 patients had a history of smoking (41.3%).^[13,14] Smoking history was 60.4% for males and 12.1% for females (P < 0.001). Paul T king et al,(2006) and R.Nedunchezhian et al,(2019) studies had more smokers.^[15,17] According to study conducted by R. Nedunchezhian et al,(2019) Among 90 patients, Idiopathic bronchiectasis were 42%, Post infectious bronchiectasis were 19%, Post pulmonary TB 9% ,Congenital 7.8%.^[17] Mehmet Ali Habesoglu et al, (2011) stated that

among 304 patients an underlying etiology was identified in 52.6% of the patients i.e post-infectious (49.7%) childhood infections (22.7%), tuberculosis (15.5%) and severe pneumonia (11.5%), immotile cilia syndrome (1.6%), immunoglobulin deficiency 0.3%, allergic bronchopulmonary aspergillosis 0.3% and congenital bronchoesophageal fistula 0.3%.^[13] According to our study conducted on 74 patients, most of the patients had history pulmonary tuberculosis 64.8%, idiopathic 16.22% Alpha-1 anti-tyrpsin deficiency 2.7%, pneumonia 4%. As tuberculosis is still prevalent in INDIA our study had TB as most common cause. *Maevae P. Smith*(2017) stated that Anxiety (39.8% to 55%) and depression (21.1% to 34%) are common among patients with bronchiectasis, other comorbidities were Cardiovascular risk, asthma, COPD, GERD, Post nasal drip^[18] According to our study majority of the study group population i.e., 66.2% had no comorbidities, 25.6% presented with DM, 9.4% presented with Hypertension, 9.4% population has a recent history of COVID-19 pneumonia, 1.3% presented with Allergy. *Paul T King et al.*(2006) Stated that lung involvement is bilateral seen in 80% of population followed by right sided involvement (RLL 69%, RUL 13%).^[15] *Karamat Asifa et al.* (2021) stated that both Lower lobes were most commonly involved.^[19] In our study majority of the population i.e., 45.9% presented with Right sided bronchiectasis, 36.4% had bilateral involvement, 17.5% had left sided involvement.

In our study, majority of population presented with cystic bronchiectasis i.e., 47.30% followed by cylindrical bronchiectasis 25.68%, traction 13.50%, varicoid 6.76%, Mixed type 6.76%. similar to the following studies. *Mehmet Ali Habesoglu et al.* (2011), Stated that cystic bronchiectasis seen in 143 cases (47%) and non-cystic type in 161 cases (53%). More than one type of bronchiectasis was noticed in 74 subjects (24.3%) out of 302 patients.^[13] *R. Nedunchezian et al.* (2019) study showed Cylindrical bronchiectasis in 53% of cases, followed by cystic bronchiectasis 36%.^[17]

R. Nedunchezian et al. (2019) stated that Among 90 study population the pathogenic organisms isolated from sputum and BAL culture were H. influenza (17%), Pseudomonas species (16%), Streptococcus pneumoniae (10%), Moraxella, Klebsiella, and Staph aureus were 3-4% respectively.^[17] *Maevae P. Smith*(2017) stated that the most common infectious pathogens are *Haemophilus influenzae* (47%–55%) and *P. aeruginosa* (12%–26%), *Streptococcus pneumoniae*, *Moraxella catarrhalis*, *Staphylococcus aureus* and other gram-negative pathogens^[18] *Angrill et al.*(2002) stated that among 77 patients the most frequent potential pathogenic micro-organisms (PPMs) isolated were *Haemophilus influenzae* (55%) and *Pseudomonas* (26%).^[20] *Paul T King et al.*(2006) Stated that ,Sputum samples were obtained in 94 subjects. The most frequently isolated bacterium was *Haemophilus influenzae* which was found in 36% subjects, other common bacteria were *Moraxella catarrhalis* 10%, *Pseudomonas aeruginosa* 7% and *Staphylococcus aureus* 5%, 36 patients had no pathogenic bacteria isolated^[15] However In our study among 74 patients, *Pseudomonas* showed increased prevalence, i.e., 22.9%, *klebsiella* 17.56%. Sterile was culture in 17.56%. fungal growth was also observed, as our study involved patients with past history of covid-19 and Diabetes mellitus. *Aspergillus* 9.4%, *Candida* 6.7% was isolated. It is observed that bronchiectasis patients are vulnerable for COVID-19 pneumonia, hence it is advised to take COVID-19 vaccination to prevent morbidity and mortality. *Mehmet Ali Habesoglu et al.* (2011), Stated that cystic type bronchiectasis increases the bacterial colonization of *Pseudomonas* which leads to significant reduction of lung function and more frequent development of pulmonary artery hypertension.^[13] In our study Majority of study population had no complications i.e., 83.7% of study group has no complications, followed by 5.4% of population presented with Haemoptysis and PAH each, 1.3% population presented with ABPA, Cor-pulmonale, Empyema each and 1.3% death due to complication of bronchiectasis.

CONCLUSION

According to present study elderly patients are most commonly involved and more so in males. Most commonly presented as post tubercular sequelae. Early detection and treatment of tuberculosis prevents parenchymal damage and post tubercular bronchiectasis. According to our study comorbidities like diabetes and hypertension are frequently associated with increased morbidity, covid pneumonia also play a significant role as bronchiectasis presents as post covid sequelae and poor quality of life. Identification of microbiological picture helps in patient directed management and prevents recurrent infections. HRCT CHEST pattern shows cystic bronchiectasis predominantly. Sputum culture & sensitivity shows increased

prevalence of *Pseudomonas*. As this was a single center study, large multicenter study is needed in order to draw some more generalised conclusions.

REFERENCES

- Pembroke T, Chalmers JD. Precision medicine in bronchiectasis. *Breathe*. 2021 Dec 1;17(4).
- Behzadi P, Baráth Z, Gajdacs M. It's not easy being green: A narrative review on the microbiology, virulence and therapeutic prospects of multidrug-resistant *Pseudomonas aeruginosa*. *Antibiotics*. 2021 Jan;10(1):42.
- Polverino E, Goeminne PC, McDonnell MJ, Aliberti S, Marshall SE, Loebinger MR, Murris M, Cantón R, Torres A, Dimakou K, De Soyza A. European Respiratory Society guidelines for the management of adult bronchiectasis. *European Respiratory Journal*. 2017 Sep 1;50(3).
- Navaratnam V, Forrester DL, Eg KP, Chang AB. Paediatric and adult bronchiectasis: Monitoring, cross infection, role of multidisciplinary teams and self management plans. *Respirology*. 2019 Feb;24(2):115-26.
- Chang AB, Grimwood K, Boyd J, Fortescue R, Powell Z, Kantar A. Management of children and adolescents with bronchiectasis: summary of the ERS clinical practice guideline. *Breathe*. 2021 Sep 1;17(3).
- Arafa MA. Sputum Bacteriology in Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease. *The Egyptian Journal of Hospital Medicine*. 2021 Jul 1;84(1):2510-5.
- Milliron B, Henry TS, Veeraghavan S, Little BP. Bronchiectasis: mechanisms and imaging clues of associated common and uncommon diseases. *Radiographics*. 2015 Jul;35(4):1011-30.
- Javidan-Nejad C, Bhalla S. Bronchiectasis. *Radiologic Clinics of North America*. 2009 Mar 1;47(2):289-306.
- Sethi GR, Batra V. Bronchiectasis: causes and management. *The Indian Journal of Pediatrics*. 2000 Feb;67(2):133-9.
- Goeminne P, Dupont L. Non-cystic fibrosis bronchiectasis: diagnosis and management in 21st century. *Postgraduate Medical Journal*. 2010 Aug 1;86(1018):493-501.
- Balázs A, Mall MA. Mucus obstruction and inflammation in early cystic fibrosis lung disease: Emerging role of the IL-1 signaling pathway. *Pediatric pulmonology*. 2019 Nov;54:S5-12.
- Jeffery PK. Differences and similarities between chronic obstructive pulmonary disease and asthma. *Clinical & Experimental Allergy*. 1999 Jun;29:14-26.
- Habesoglu MA, Ugurlu AO, Eyuboglu FO. Clinical, radiologic, and functional evaluation of 304 patients with bronchiectasis. *Annals of Thoracic Medicine*. 2011 Jul;6(3):131.
- Nicotra MB, Rivera M, Dale AM, Shepherd R, Carter R. Clinical, pathophysiologic, and microbiologic characterization of bronchiectasis in an aging cohort. *Chest*. 1995 Oct 1;108(4):955-61.
- King PT, Holdsworth SR, Freezer NJ, Villanueva E, Holmes PW. Characterisation of the onset and presenting clinical features of adult bronchiectasis. *Respiratory medicine*. 2006 Dec 1;100(12):2183-9.
- Cuvelier A, Muir JF, Benhamou D, Hellot MF, Bénichou J, Martin JP, Sesboué R. Distribution of α 1-antitrypsin alleles in patients with bronchiectasis. *Chest*. 2000 Feb 1;117(2):415-9.
- Nedunchezian R, Sundrarajaperumal A, Ranganathan D, Sundar V. Clinical evaluation of bacterial colonization of bronchiectasis.
- Smith MP. Diagnosis and management of bronchiectasis. *CMAJ*. 2017 Jun 19;189(24):E828-35.
- Karamat A, Batool H, Anwar S, Akram S, Masood A, Rafai WA. Frequency and Pattern of Bronchiectasis in Patients with Chronic Obstructive Pulmonary Disease Presenting in a Tertiary Care Hospital. In *Proceedings 2021 Jun 26 (Vol. 35, No. 3, pp. 54-57)*.
- Angrill J, Agusti C, de Celis R, Raño A, Gonzalez J, Solé T, Xaubet A, Rodriguez-Roisin R, Torres A. Bacterial colonisation in patients with bronchiectasis: microbiological pattern and risk factors. *Thorax*. 2002 Jan;57(1):15-9. doi: 10.1136/thorax.57.1.15. PMID: 11809984; PMCID: PMC1746176.