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Original Research Article

Prevalence of Bronchiectasis in Moderate and Severe Chronic Obstructive Pulmonary Disease

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Abstract

Introduction: Patients of COPD are prone to exacerbations, which account for significant morbidity and mortality and is a key determinant of health-related quality of life. Bronchiectasis and COPD commonly present as chronic cough, fixed airflow limitation. Bronchiectasis is present in many patients with COPD prevalence varies from 27% to 50% in various studies. Lower airway bacterial colonization is an independent stimulus to airway inflammation.

Objective: To study prevalence of bronchiectasis in COPD as well as correlation between degree of airflow obstruction, presence of potential pathogenic organism in sputum and exacerbations.

Material and Methods: This study was conducted at Dept of Respiratory Medicine, NRSMCH, Kolkata with patients diagnosed to have COPD in stable condition in the Dept. of Respiratory Medicine, NRSMCH, Kolkata during April 2014 – March 2015 (One Year). The pre-decided sample size of the study was 54 patients. This was an institution based observational case control study. Various parameters like basic demographic profile and baseline physical examinations were recorded for the patients enrolled. Apart from that sputum samples were collected for gram as well as AFB stain, chest x ray, pulse oximetry, post bronchodilator FEV1 & FVC were also recorded.

Results: In the present study, 54 COPD patients were selected. Among these patients, 24 had bronchiectasis. Out of 24 COPD-Bronchiectasis patients 19 male, mean age 61.5 yr. Presence of COPD-Bronchiectasis is associated with increased PPM colonization in lower respiratory tract, more severe airflow obstruction and increased number hospital admission. There was a statistically significant correlation between the severities of COPD and the scoring of associated bronchiectasis ($p<0.001$).

Conclusion: This study concluded that, there exists a significant correlation between bronchiectasis and COPD.

Keywords: chronic obstructive pulmonary disease, Bronchiectasis

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of mortality and morbidity throughout the world. According to GOLD criteria COPD is a common preventable disease, characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particle or gas. Exacerbations and co morbidities contribute to overall severity in individual patients. [1] Patients of COPD are prone to exacerbations, which account for significant morbidity and mortality and are a key determinant of health-related quality of life.

Bronchiectasis is irreversible and abnormal dilatation of one or more bronchi. Most common clinical manifestation is cough with profuse purulent expectoration and Hemoptysis. [2] Lower airway bacterial colonization is common clinical finding in COPD and is now recognized as independent stimulus to airway inflammation. These can modulate the character and frequency of COPD exacerbations. Patient with COPD and bronchiectasis have greater chronic bacterial colonization of bronchial mucosa by potentially pathogenic microorganisms (PPM), more bronchial inflammation, frequent & longer duration of exacerbations. In various studies, it is seen that COPD patient with bronchiectasis have more advanced airflow obstruction, increased potential pathogenic organism in sputum, increased exacerbation per year. [3-8] Due to widespread and increasing availability of HRCT, It is easier to recognize and assess the prevalence, the type and location of bronchiectasis in patients with chronic cough and dyspnea like COPD.

Identification of COPD-Bronchiectasis phenotype is important as they determine the prognosis and frequency and severity of exacerbation, duration of treatment in COPD and provide opportunities to start early treatment.

With the use of various investigation tools like spirometry, HRCT thorax and sputum culture, we have tried to find out prevalence of bronchiectasis in COPD as well as correlation between degree of airflow obstruction, presence of potential pathogenic organism in sputum and exacerbations in our study.

Materials and Methods

This study was conducted at Dept of Respiratory Medicine, NRSMCH, Kolkata with patients diagnosed to have COPD in stable condition in the Dept. of Respiratory Medicine, NRSMCH, Kolkata during April 2014 – March 2015 (One Year). The pre-decided sample size of the study was 54 patients. This was an institution based observational case control study.

Patients of 40 – 80 years of age 7 willing to provide consent of participation, diagnosed to have COPD according to GOLD criteria – post-bronchodilator $FEV_1/FVC < 70\%$ and $FEV_1 < 80\%$ of the predicted, clinically stable without baseline O_2 desaturation and no history of acute exacerbation in the past 3 months were included in the study. Those patients not willing to provide consent, clinically unstable, with presence of pneumonia, bronchogenic carcinoma, asthma & interstitial lung disease, heart failure, myocardial infraction, congenital/valvular heart disease were excluded from the trial. Patients with CVA, weakness of lower limbs, peripheral vascular disease, known case of bronchiectasis and patients with BP > 180/110 mm Hg or Heart Rate > 140/min or Oxygen saturation (SpO2) < 80% were also excluded.

Various parameters like basic demographic profile and baseline physical examinations were recorded for the patients enrolled. Apart from that sputum samples were collected for gram as well as AFB stain, chest x ray, pulse oximetry, post

bronchodilator FEV1 & FVC were also recorded.

Results

The present study included 54 patients of Chronic Obstructive Pulmonary Disease (COPD) in stable condition (according to GOLD criteria) attending the OPD of Dept of Respiratory Medicine. The included patients in the study were between 42 to 77 years (Mean 60.8 years). Among them 42 are males (77.7%) & twelve females (22.3%). Among males, maximum 22 patients (47.62%) lie in the 60-69 age groups, also in female's maximum nine patients (66.67%) lie in the 50-59 age groups.

Table 1: Age & Sex Distribution among Patient

Age groups	Male		Female	
	n=42		n=12	
Year	No	%	No	%
40-49	0	0	0	0
50-59	18	42.86	8	66.67
60-69	20	47.62	3	25
>69	4	9.52	1	8.33

Among 54 Patients 42 were male, 12 were female. 75% male presented with moderate & 25% presented with severe COPD. In the female group, 86% and 14% patients had moderate and severe COPD respectively. Mean age in moderate group was 58.22, severe group was 67.07. Mean post BD FEV1 in moderate group 62.3, severe group 43.71. Bronchiectasis was observed in 14 (35%) of moderate and 10 (75%) of severe COPD group.

Among 54 patients 24 had bronchiectasis. Out of 24 COPD-Bronchiectasis patients 19 male, mean age 61.5 yr. They had increased sputum production, mostly mucopurulent, mean post BD FEV1-50.2, Tweleve culture positive for PPM (50%). These groups had more dyspnea, more numbers of exacerbations (2.12) & hospital admission in previous year.

Among 30 patients of COPD without bronchiectasis 23 male, mean age 60.04 yr. This group had less amount of sputum production, mostly mucoid, mean post BD FEV1-63.3; culture positive for PPM in 6 patients (20%). These group had less dyspnea, less number of exacerbations (1.16) & hospital admission in previous year.

Table 2: Demographics & data of the patients

Parameters	Moderate COPD	Severe COPD
No	40	14
Mean Age	58.9 ±5.18	67.07±5.26
Male	30(75%)	12(25%)
Female	10(86%)	2(14%)
Mean post BD FEV1	61.5±8.9	43.71±4.87
Bronchiectasis	14(35%)	10(71%)

Table 3: Baseline &clinical characteristics in between two groups

	COPD with Bronchiectasis	COPD without Bronchiectasis	*p* value
No	24	30	
Sex-female	5	7	NA
Male	19	23	NA
Age	61.5±6.05	60.04±6.47	NA

Pack –year	21.4±2.9	25±4.5	NA
Dyspnea (mMRC)	2.45±0.5	1.9±0.3	<0.001
Daily sputum quantity	Large (>30ml)	10-20ml	<0.001
Daily sputum quality	Muco purulent	Mucoid	NA
Exacerbations	2.12±0.53	1.16±0.37	<0.001
Hospital admission	14(58.3%)	3(10%)	<0.001
Positive sputum culture	12(50%)	6(20%)	<0.04
Post BD FEV 1	50.2±5.36	63.3±10.5	<0.001

After collection of all data, we scored bronchiectasis according to FACED scale. In moderate COPD-Bronchiectasis (n=14) patients, 13 were of mild and 1had moderate grade of bronchiectasis. No patients had severe grade in this group. In severe COPD-Bronchiectasis (n=10) patients 7 had moderate and 3 had severe grade of bronchiectasis. None of the patients of mild grade of bronchiectasis found in this group. We found statistically significant correlation (p value < 0.00003) between severity of COPD and scoring of associated bronchiectasis.

Discussion

A number of previous studies have examined relationships between structural changes seen in HRCT scanning and functional or physiological parameters in COPD. It is not known, however, whether morphologic changes in the airways or lung parenchyma in COPD in stable state can related to the number or severity of exacerbations experienced by patients, or to the levels of airway inflammation. Recurrent COPD exacerbations are associated with a heightened airway inflammatory burden, and with the presence of lower airway bacterial colonization which in turn has been shown to be an independent stimulus to airway inflammation in COPD. In addition, it was also noted that lower airway bacterial colonization in the stable state is associated with increased sputum production and sputum purulence at exacerbation. [6]

In the present study, we included a well-defined group of patients with moderate to severe COPD, based on spirometry criteria. HRCT scans of the thorax were performed on patients in the stable state and the extent of bronchiectasis was quantified. Sputum was examined for potential pathogenic microorganisms.

We found the total prevalence of bronchiectasis in moderate to severe COPD was 44.4%. It was primarily of cylindrical type and mainly localized in the lower lobes. Our findings were close to the findings of studies done by Martinez Garcia et al. [9] and Emam Arram et al.[26]. Martinez Garcia et al. found bronchiectasis in 57.6% of patients with moderate to severe COPD and Emam Arram et al. found bronchiectasis in 47.8% of COPD patients in their study.

In one study done in UK, bronchiectasis was found in 27% among 75 patients of COPD with all GOLD (Global Initiative for Chronic Obstructive Lung Disease) stages. In multinational Evaluation of COPD longitudinally to Identify Predictive Surrogate Endpoints (ECLIPSE) cohort, bronchiectasis was reported in 45% of 2,164 subjects.

We found the prevalence of bronchiectasis was 35% in moderate COPD, while that was 71% in severe COPD. Similar results were found by Patel et al [6,10], Emam Arram et al.[26] and Martinez-Garcia et al [9], and they found greater prevalence of bronchiectasis (>70%) in COPD patients with severe functional impairment (FEV1< 50%).

We got lower lobe and bilateral bronchiectasis in 66.7% of cases, and that was related to the presence of lower airway bacterial colonization. Our results were

similar to that of Patel et al[6,10], Emam Arram et al.[26] and Martinez-Garcia et al [9]. All these three researchers also observed that in various patients with moderate to severe COPD, that greater bronchial colonization by PPM was associated with presence of bronchiectasis. We noted that the most frequently isolated microorganism was H. influenza in all COPD patients, and the most frequently isolated microorganisms were P. aeruginosa and H. influenza in patients with moderate to severe COPD. We concluded that the potential pathogenic microorganism might be a marker for bronchiectasis. Our findings were similar to that found by Martinez-Garcia et al. and Eman O. Arram et al. in their studies. [9,11]

Most clinically significant finding in our study was the statistically significant co-relationship between the detection of radiologic bronchiectasis on HRCT and more sputum production (p value < 0.001), number of COPD exacerbations (p value < 0.001), daily dyspnea (p value < 0.001) and hospital admission per year (p value < 0.001). According to our study results, there is a wide range of possibilities for the patients with COPD-Bronchiectasis phenotype are associated with more bacterial colonization (PPM), increased sputum production, more decrease in Post-BD FEV1, more numbers of exacerbations and also hospital admission per year. [12]

Martinez-Garcia et al, Emam Arram et al concluded in their study that moderate to severe COPD patients with bronchiectasis had more severe airflow obstruction, more bacterial colonization of lower respiratory tract by PPM, more numbers of exacerbation and hospital admission per year. [9,11] Patel et al. observed that even though the number of exacerbations was not related to bronchiectasis in their study, patients with bronchiectasis did experience longer exacerbations.[6,10]

We concluded that there exists a significant correlation between bronchiectasis and COPD. Patients with pre-existing risk factors should be managed with keeping these outcomes in consideration. This information provided by the present study shall help the clinician to manage the COPD patients more efficiently.

References

1. Global initiative for chronic obstructive lung disease. Global strategy for the diagnosis, management and prevention of chronic obstructive pulmonary disease. NHLBI/WHO workshop report 2001.available at; http;//www.goldcopd.org
2. Davidson principle and practice of medicine (21st Ed).Edinburg: Churchil Livingstone/Elsevier.2010.p.6765.
   Stickled RA. Neutrophils and the pathogenesis of COPD .Chest. 2002; 121 (suppl 5): 151S - 155S
3. Wilkinson TMA, Patel IS, Wilks M, Donaldson GC, Wedzicha JA. Airway bacterial load and FEV 1 decline in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2003; 167 (8): 1090 - 1095.
4. Sethi S, Maloney J, Grove L, Wrona C, Berenson CS. Airway infl ammation and bronchial bacterial colonization in chronic obstructive pulmonary disease . Am J Respir Crit Care Med 2006; 173 (9): 991 - 998.
5. Zalacain R, Sobradillo V, Amilibia J, et al. Predisposing factors to bacterial colonization in chronic obstructive pulmonary disease. Eur Respir J. 1999; 13 (2): 343 - 348.
6. Patel IS Seemungal TA, Wilks M, Lloyd-Owen SJ, Donaldson GC, and Wedzicha JA. Relationship between bacterial colonization and the frequency, character and severity of COPD exacerbations. Thorax. 2002; 57 (9): 759 - 764.
7. Soler N, Ewig S, Torres A, Filella X, Gonzalez J, Zaubet A. Airway inflammation and bronchial microbial patterns in patients with stable chronic

obstructive pulmonary disease. Eur Respir J. 1999; 14 (5): 1015 - 1022
8. Banerjee D, Khair OA, Honeybourne D. Impact of sputum bacteria on airway inflammation and health status in clinical stable COPD. Eur Respir J. 2004; 23 (5): 685 – 691
9. Martinez-Garcia MA, Soler-Cataluna JJ, Sanz YD, et al. Factors associated with bronchiectasis in patients with COPD. Chest .2011; 140 (5): 1130-1137
10. Patel IS, Vlahos I, Wilkinson TMA, et al. Bronchiectasis, exacerbation indices, and inflammation in chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2004; 170 (4) 400 - 407.
11. Emam O Arram et al. Bronchiectasis in COPD patients. Egyptian journal of chest diseases and tuberculosis. October 2012: 61(4): 307-312.
12. Touyz, L. Z., & Touyz, S. J. Kissing, Saliva and Human Papilloma Virus: Principles, Practices, and Prophylaxis. Journal of Medical Research and Health Sciences, 2020:3(9), 1078–1086.