

# Prevalence Of Bronchiectasis in Patients Diagnosed with Chronic Obstructive Pulmonary Disease

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## A B S T R A C T

**Background:** Bronchiectasis is defined as an abnormal dilatation of the bronchi, usually as a result of chronic airway inflammation and/or infection. The prevalence of bronchiectasis in patients with COPD is high and has been recognized as a common comorbidity in COPD patients contributing to severity of symptoms and COPD progression. Early identification and timely intervention will prevent complications and decrease morbidity and rate of hospital admissions.

**Objective:** Objective of the present study was to determine the frequency of bronchiectasis in patients with diagnosed COPD.

**Methodology:** It was a descriptive, cross-sectional study conducted at department of Pulmonology, Khyber Teaching Hospital, Peshawar from 23 June 2019 to 23 Dec 2019. A total of 151 patients diagnosed with COPD (as described in operational definition) presenting to Pulmonology Unit Khyber Teaching Hospital Peshawar were included. Demographic characteristics and associated common risk factor for bronchiectasis like duration of COPD, patient's age, sex, literacy rate, severity of COPD, cigarette smoking, indoor air pollution and BMI were recorded. Each patient underwent CT thorax (HRCT) to assess for presence of bronchiectasis.

**Results:** In this study we included 151 patients with mean age of 55 years. 64.2% were female patients and 35.76% were male patients. Bronchiectasis was present in 41% (64 patients) of the study population. 30.5% were smokers while 69.5% were non smokers. 43% patients had comorbidities ( DM, HTN) while 41% had no comorbidities. 35% patients had normal BMI while 43% were overweight. Moreover, 86% of our patients were illiterate and 62.9% were housewives. Almost 50% of patients had COPD for more than 10 years.

**Conclusion:** Our study concludes that bronchiectasis was present in 41% of COPD patients. Presence of bronchiectasis is more affected by duration of COPD, age, gender, literacy rate and occupation of patients and less affected by severity of COPD, BMI, comorbidities or smoking habit of patient.

**Keywords:** COPD; Bronchiectasis; Peshawar

## Introduction

**B**ronchiectasis is defined as an irreversible and progressive dilation of the airways due to chronic airway injury. COPD and bronchiectasis are very prevalent in the general population and they may both coexist.<sup>1</sup>

Bronchiectasis has been classified as the comorbidity of COPD in Global Initiative for Chronic Obstructive Lung Disease (GOLD) since 2014 and its impact on natural course of COPD is well established.<sup>2</sup>

The prevalence of bronchiectasis in patients with COPD has been analyzed in different studies with variable results ranging from 4% to 72%.<sup>3</sup> Bronchiectasis was found in almost 50% of the Chronic obstructive pulmonary disease patients in a research study conducted in Pakistan.<sup>4</sup>

The prevalence of bronchiectasis in patients with COPD is high, especially in advanced stages. The identification of bronchiectasis in COPD has been recognized as a distinct clinical COPD phenotype with greater symptomatic severity, more frequent exacerbations, and poor prognosis. Exact causal association has not yet been established, but it is proposed that frequent infective exacerbation can be the cause of bronchiectasis without any other known etiology.<sup>5</sup> Bronchiectasis as a comorbidity of chronic obstructive pulmonary disease and its impact on natural course of disease has been studied widely. The presence of bronchiectasis has been associated with an increase in both local and systemic inflammation. Presence of bronchiectasis in COPD is associated with more severe bronchial obstruction, lower body mass index, older age, a greater production and purulence of sputum, more severe airflow obstruction, dyspnea, and exercise index. Moreover greater frequency and severity of exacerbations were identified in these patients.<sup>6</sup>

With growing utilization of HRCT (high-resolution computed tomography) in the evaluation of Chronic obstructive pulmonary disease, an increased frequency of bronchiectasis was established. Chronic obstructive pulmonary disease in patients, particularly individuals with moderate to severe disease.

The occurrence of bronchiectasis in Chronic obstructive pulmonary disease patients was found in numerous research articles, with variable ranges from 4% to 72%.<sup>7</sup>

In a study conducted by Arram et al, it was concluded that 69 COPD patients, 47.8% of the COPD patients were having bronchiectasis. Further they observed that prevalence of bronchiectasis was greater in COPD patients with more severe functional impairment (FEV1 < 50%), having greater bacterial colonization and more exacerbations.<sup>8</sup> Similarly Kumar N et al reported bronchiectasis in 69% of the study population while in patients had some evidence of bronchiectasis<sup>9</sup> while in ECLIPSE study, it only 4% of COPD patients have

radiographic evidence of bronchiectasis.<sup>10</sup> Several studies have shown that COPD patients with radiographic bronchiectasis are more likely to be chronic sputum producers, have worse health status, have more airway or systemic inflammation and to have more purulent sputum. Potentially pathogenic microorganisms (PPM) were isolated more frequently from sputum of COPD patients with radiographic bronchiectasis during stability.<sup>9</sup> Bronchiectasis is a heterogeneous disease and frequently overlaps with other chronic airway diseases. Management of these overlap conditions is particularly challenging in terms of diagnosis and therapy, and requires future research.<sup>11</sup> The presence of bronchiectasis in patients with COPD was associated with exacerbation frequency, isolation of a potentially pathogenic microorganism, severe airway obstruction and mortality. Bronchiectasis revealed by chest computed tomography in COPD patients and its comorbid effect on prognosis have not been addressed by large-sized studies. Understanding the presence of bronchiectasis in COPD is important for future intervention and preventing disease progression.<sup>12</sup>

## Objective

To determine the frequency of bronchiectasis in patients with diagnosed COPD.

## Methodology

It was a Descriptive, cross-sectional study conducted at department of Pulmonology, Khyber Teaching Hospital, Peshawar from 23 June 2019 to 23 Dec 2019. Sample size was 151 with 95% confidence interval, 8% margin of error and prevalence of 50%. Consecutive, Non Probability sampling technique was applied. All the patients including both genders and age range 40-70 years with spirometry proven COPD were included. Patients with asthma, ABPA, COPD with pneumothorax, post pulmonary tuberculosis, post lobectomy, lung cancer, congenital bronchiectasis and hemodynamically unstable patients were excluded. After taking consent and appropriate management of these patients; age, gender and spirometric findings were noted.

All the patients were subjected HRCT in radiology department for the diagnosis of Bronchiectasis. Bronchiectasis was considered positive on the presence of any one or more of these features a. Bronchus visualised within 1cm of pleural surface b. Lack of tapering. c. Increased broncho-arterial ratio i.e greater than 1.5 indicates bronchiectasis. All the radiology examination was conducted under the supervision of expert consultant having at least 5 years of experience. Data was analyzed by SPSS version 22. Mean and standard deviation were calculated for quantitative variable like age, height, weight, BMI, duration of

Table 1. Age groups distribution

Age	Frequency	Percentage
40-45 Years	22	14.6%
45-50 Years	39	25.8%
50-55 Years	62	41.1%
55-60 Years	20	13.2%
60 -70 Years	8	5.3%
Total	151	100%

smoking, duration of COPD. Frequency and percentages were calculated for categorical variables like gender, severity of COPD, hypertension, diabetes mellitus, smoking status and bronchiectasis. Bronchiectasis was stratified with age, gender, BMI, duration of COPD, severity of COPD, smoking, occupation, education level to see effect modification. Post stratification chi square test was applied in which P value  $\leq 0.05$  was considered as significant value.

## Results

In this study we analysed 151 patients of COPD fulfilling the criteria. Mean age was 55 years with standard deviation  $\pm 9.49$ . Among 151 patients, 35.8% (54

patients) were male and 64.2% (97 patients) were female. Bronchiectasis was present in 41.06% (62) patients as shown in Fig.1). Study population was further classified into age groups. Most of the patients were concentrated in age group 50-55yrs as shown in table 1. Regarding smoking we analyzed that only 30.5% (46 patients) were smokers while 69.5% (105 patients) were non-smokers as shown in Table 2. Severity of COPD was analyzed which showed 43% (65 patients) had severe exacerbation, 29% (44 patients) had moderate exacerbation, 18.5% (28 patients) had very severe exacerbations and only 9.3%(14 patients) had mild exacerbation of COPD as shown in table 3. 64 Co morbidities analysis showed 35%(53 patients) had hypertension only, 9.3%(14 patients) had diabetes only, 28.5%(43 patients) had both

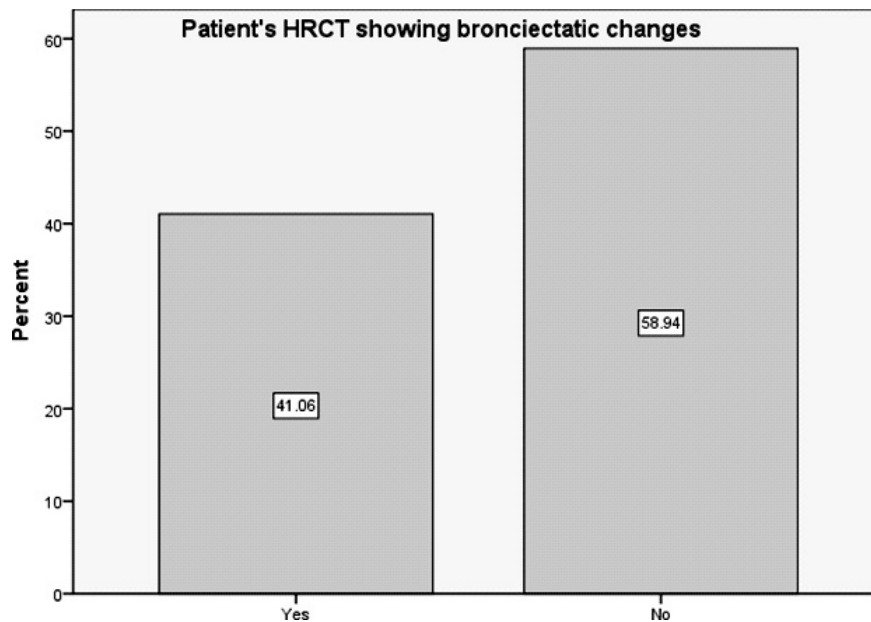


Figure 1. Prevalance of Bronchiectatic changes on HRCT (n=151)

Table 2. Smoking status of study population

	Frequency	Percentage
Smokers	46	30.5
Non Smokers	105	69.5
Total	151	100.0

hypertension and diabetes while 27.2%(41 patients) had no comorbidities Stratification of patients duration of COPD with respect to presence or absence of bronchiectasis was done. Similarly stratification of patients age and gender with respect to patients HRCT showing bronchiectatic changes was done.

## Discussion

Chronic obstructive pulmonary disease (COPD) is a main reason of morbidity and increased death rate and represents a considerable financial and community trouble all over the world. although the study was done on a small sample, but sample size was reasonably sufficient and can stand for the overall prototype of frequency of bronchiectasis in COPD patients in Khyber Pukthoonkhawa.

In our study ,the mean age was 55 years with SD. 9.49. 41% of our patients were in age group 50-55 years with only 5.3% above age 60 years. Bronchiectasis was found in 41.06% patients which is also comparable to the other study done in Pakistan<sup>13</sup>. Almost the same results were found by a study conducted by da Silva SM & colleagues<sup>14</sup> In our study it was concluded that the frequency of bronchiectasis was almost double in female patients i.e 64.2% as compared to male patients where bronchiectasis was found in only 35.76 %. BMI analysis showed that most of the patients included in our study were either

overweight (43%) or had normal BMI(35%).Those who were underweight were very less in number(2%). Moreover it was shown that the percentage of patients included in this study who were smokers was less (30.5%) as compared to non-smokers (69.5%). Duration of COPD was greatly affecting presence of bronchiectasis. As the duration of COPD increases, the presence of bronchiectasis also increases. Thus in patients having COPD for more than 10 years, bronchiectasis was found in 54.8%( 62) patients as compared to only 3.2%(2) patients who had COPD for less than 1 year. The increase is seen more after at least 5 years of COPD. The probability of bronchiectasis is less if duration of COPD is less than 5 years. Exacerbation of disease is also affected by presence of bronchiectasis. Patients having COPD as well as bronchiectasis usually present with moderate (24%)or severe (21%) exacerbation. Few of them may present with mild exacerbation or very severe exacerbation of COPD.

In this study stratification of bronchiectasis in COPD patients with respect to age and gender showed that number of female patients with bronchiectasis was 42 and males were 20 only. Hence female patients were more than double of male patients. Moreover, majority of patients who were diagnosed positive for bronchiectasis were in the age group 50-55 years. Prevalence of bronchiectasis was less both in the age groups below 40-45 years( 8 patients) and  $\geq 60$  years(7patients). Similarly

Table 3. Severity of COPD exacebations

Severity of COPD	Frequency	Percent
Mild	14	9.3
Moderate	44	29.1
Severe	65	43.0
Very severe	28	18.5
Total	151	100

Table 4. Relation of COPD duration with bronchiectasis

Patient's duration of COPD	HRCT showing bronchiectatic changes		Total
	Yes	No	
>1yrs	2 (3.2%)	8 (9.0%)	10 (6.6%)
1-2 yrs	8 (12.9%)	9 (10.1%)	17 (11.3%)
2-5yrs	6 (9.7%)	15 (16.9%)	21 (13.9%)
5-10yrs	12 (19.4%)	15 (16.9%)	27 (17.9%)
>10yrs	34 (54.8%)	42 (47.2%)	76 (50.3%)
	62 (100.0%)	62 (100.0%)	151 (100.0%)

stratification of bronchiectasis in COPD patients with respect to patients

literacy rates and occupation showed that bronchiectasis was highest in housewives(42) and almost all of them were illiterate. This was followed by retired person (11) who were either illiterate or had primary to secondary education. The frequency was lowest in office worker having education level up to secondary. Regarding the education status of our patients, we found that majority of our patients were illiterate.

The interesting thing we noted in this study was that smoking had no effect on the presence of bronchiectasis. In fact, the frequency of bronchiectasis was lower in

patients who were smokers, as compared to those who were non-smoker. This showed that there were some other factors which were responsible for progression of bronchiectasis in non-smokers.

Chi-square test shows there is association between different factors of study i.e Patient's age, gender, BMI, duration of COPD, severity of COPD, comorbidities, smoking status and literacy status.

Hence it can be concluded that bronchiectasis is present in a significant number of patients having COPD. HRCT is the best diagnostic tool for its diagnosis. Frequency of bronchiectasis is highest among the illiterate people. Its frequency decreases with increase in literacy rate.

Table 5. Correlation between patient occupation, literacy rate &amp; bronchiectasis

HRCT showing bronchiectatic changes	Patient Literacy status	Patient Occupation				Total
		Labor	Office worker	Retired	House wife	
Yes	Illiterate	5	0	7	40	52
	Primary to secondary	1	2	4	2	9
	Graduate & post-graduate	0	0	1	0	1
	Total	6	2	12	42	62
No	Illiterate	11	0	14	53	78
	Primary to secondary	2	2	6	0	10
	Graduate & post-graduate	1	0	0	0	1
	Total	14	2	20	53	89

Housewives are mostly affected probably due to poor control of COPD as they are constantly exposed to indoor pollution and because they are not aware of their health status due to lack of education. Duration of COPD also increases chances of bronchiectasis. If the duration of COPD is more than 5 years, we should consider to screen the patient for presence of bronchiectasis; particularly if the patient is illiterate, exposed to indoor pollution at home or in workplace or if there are comorbidities as well (diabetes mellitus and hypertension).

Early diagnosis and management of bronchiectasis in COPD will lead to improved symptoms control and reduced complications in long run. Bronchiectasis revealed by chest computed tomography in COPD patients and its comorbid effect on prognosis have not been addressed by large-sized studies. Understanding the presence of bronchiectasis in COPD is important for future intervention and preventing disease progression.

## Conclusion

Our study concludes that bronchiectasis was present in 41% of patients who were diagnosed cases of COPD. Presence of bronchiectasis is affected by duration of COPD, age, gender, literacy rate and occupation of patients and not much affected by severity of COPD, BMI, comorbidities or smoking habit of patient.

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