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Patterns of Bronchiectasis in Patients with Chronic Obstructive Pulmonary Disease; Experience from a Tertiary Care Hospital in Mardan

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A B S T R A C T

Background: Bronchiectasis is commonly linked to Chronic Obstructive Pulmonary Disease (COPD) and can go undetected due to limited access to diagnostic tools like HRCT scans. This chronic lung condition involves the irreversible dilation of airways, leading to mucus buildup and recurrent infections. Early diagnosis and management are crucial for improving patient outcomes.

Objectives: Objective of the present study was to identify the prevalence and pattern of bronchiectasis in individuals with COPD and the contributing variables.

Methodology: A cross-sectional survey was conducted in the department of medicine MMC Mardan from January 2020 to January 2021, including 60 (COPD) patients with diagnoses. A high-resolution CT scan was used to diagnose bronchiectasis. A systematic proforma was used to document all relevant characteristics connected to the severity of (COPD) or bronchiectasis.

Results: In (COPD) patients, 16 (55%) had bronchiectasis. Of all (COPD) patients, 42% had a cylindrical type, with higher bilateral and lower lobe involvement. The Modified Medical Research Council (MMRC) Dyspnoea Scale score, the diagnosis, and the number of pack years of smoking were shown to be strongly linked to the development of bronchiectasis in individuals with (COPD).

Conclusion: In summary, this study identified bronchiectasis as a relatively common coexisting condition in COPD patients, affecting 51% of the studied population, with a specific cylindrical pattern and bilateral lower lobe involvement on chest imaging. Intriguingly, there were no significant differences in terms of mean smoking pack years and years from the onset of symptoms between patients with and without bronchiectasis, suggesting that these factors may not be strongly associated with its development in the context of COPD.

Keywords: Pulmonary TB History; Bronchiectasis Patterns; COPD; Severity Factors

Introduction

Chronic obstructive pulmonary disease (COPD) stands as a formidable challenge to global health, exerting a substantial burden on individuals, healthcare systems, and economies worldwide. Recent statistics underscore its pervasive impact, positioning COPD as the fourth leading cause of chronic morbidity and mortality globally. However, projections indicate a concerning trajectory, with COPD predicted to ascend to the fifth position in the hierarchy of global illness burden by the year 2020.[1,2]

The rise in COPD prevalence parallels an alarming surge in airway infections, underscoring the complex interplay between respiratory health and environmental factors. Notably, while COPD is commonly associated with tobacco use, its incidence extends beyond smokers, affecting former smokers and even individuals who have never smoked. This broad reach emphasizes the multifaceted nature of COPD etiology, necessitating comprehensive strategies for prevention and management.[3,4]

The economic ramifications of COPD are staggering, with healthcare costs poised to skyrocket in the coming years. Projections indicate that by 2030, the global expenditure attributable to airway problems will exceed a staggering $45 trillion. However, amid this daunting financial forecast, a glimmer of hope emerges in the form of cost-effective interventions. For instance, implementing programs aimed at reducing tobacco-related diseases could be achieved at a remarkably low cost of just $0.41 per person per year. Such initiatives hold promise not only for mitigating the financial burden of COPD but also for curbing its incidence and improving public health outcomes on a global scale.[5,6]

Within the realm of chronic obstructive pulmonary disease (COPD), individuals presenting with co-existing bronchiectasis constitute a distinct subgroup with unique clinical characteristics and management complexities. These patients often endure heightened disease severity, frequent exacerbations, and inferior outcomes compared to their counterparts without bronchiectasis. The cooccurrence of these two conditions exacerbates respiratory symptoms, leading to a compounded burden on both patients and healthcare systems.[7]

High-resolution computed tomography (HRCT) emerges as a pivotal diagnostic tool in assessing the extent and severity of both COPD and bronchiectasis. By providing detailed anatomical information, HRCT enables clinicians to tailor treatment strategies according to individual patient needs, thus optimizing therapeutic outcomes. Through the delineation of bronchiectasis patterns and associated factors within COPD cohorts, clinicians gain valuable insights into disease progression and response to therapy, facilitating personalized care delivery.[8]

However, in resource-constrained settings where healthcare resources are limited, the judicious use of HRCT becomes paramount. By carefully weighing the clinical indications and potential benefits of HRCT against resource constraints, clinicians can ensure equitable access to care for all patients while preserving valuable healthcare resources. Such strategic utilization of HRCT not only enhances diagnostic accuracy but also mitigates the risk of unnecessary testing and minimizes healthcare expenditure.[9,10]

Moreover, by informing local policies and guidelines regarding the appropriate utilization of HRCT, healthcare systems can optimize resource allocation and streamline diagnostic pathways. Through targeted approaches that prioritize high-risk patients and clinical scenarios, healthcare providers can maximize the utility of HRCT while minimizing its impact on limited resources. Ultimately, these efforts contribute to the delivery of efficient, cost-effective care and uphold the principle of equity in healthcare access for individuals with COPD and bronchiectasis.

In this narrative, we delve into the intricate landscape of COPD, exploring its epidemiology, economic impact, and clinical nuances. Through a comprehensive understanding of the challenges and opportunities inherent in COPD management, we aim to explain a roadmap for improving patient outcomes and advancing global respiratory health.

Objectives

Objective of the present study was to identify the prevalence and pattern of bronchiectasis in individuals with COPD and the contributing variables.

Methodology

We conducted cross-sectional research in the department of medicine MMC Mardan from January 2020 to January 2021. In all, sixty patients were present. People were diagnosed with (COPD) if their post-bronchodilator FEV1 was more than 80% with a reversibility of less than 15% or fewer than 200 millilitres and if their forced expiratory volume in one second (FEV1)/forced vital capacity (FVC) was less than 0.7. A stable diagnosis was made if (COPD) did not worsen after six weeks. In the 2011 GOLD report, the term "(COPD) exacerbations" was defined. Bronchiectasis was diagnosed when the consultant radiologist provided the chest CT scan results. Among the types of bronchiectasis implicated were the radiological type (cystic/cylindrical), location (right/left side & lobe affected), and severity (localized - confined to one lobule or diffused - more than one lobe), which were identified using the HRCT data.

Along with other basic demographics of these people, records were made of their Age, gender, body mass index

Table 1. Demographic Characteristics of Study Participants

Characteristic	Total (n=60)	Bronchiectasis (n=16)	Without bronchiectasis (n=44)
Age (years), Mean ± SD	57.6 ± 5.09	56.4 ± 4.61	58.2 ± 5.31
Gender (Male/Female)	70%/30%	68.8%/31.3%	70.5%/29.5%
Pulmonary TB History	15%	12.5%	16.7%
Current Smokers	66%	68.8%	65.9%
Never Smoked	44%	31.3%	47.7%

(BMI), history of previous or current smoking, pack-year of smoking, history of Huqqa smoking, history of TB, history of exposure to biomass fuel, and number of exacerbations of COPD in the year before are all taken into consideration. The MMRC dyspnea scale was used to evaluate the functional state. Eleven criteria were investigated in this study: the number of exacerbations of COPD, smoking history, years from the beginning of symptoms, years of smoking pack years, MMRC Score, and current and former smokers (who had stopped for a year). A desktop computer running SPSS version 28.0 was used for all computations.

Results

The research included sixty patients with a mean age of 57.6 ± 05.09 years, ranging from 40 to 7 5 years. Of the patients, 18 (30%) were female and 42 (70%) were male. Fifteen patients (14%) had previously received treatment for pulmonary TB. The most prevalent forms of smoke exposure among the individuals in our sample were cigarettes and Hukka, found in 50% of the sample. The remaining patients (66%) were current smokers, whereas 44 had never smoked. It was discovered that 16 individuals (53%) had bronchiectasis. On a CT scan, 27 (42%) had cylindrical bronchiectasis, while 6 (8%) had cystic bronchiectasis. In our selected group, most bronchiectasis patients had more than one lobe affected (mean: 23; 42%) (Table 1-4). The lower lobe was seen to be more affected by bronchiectasis. Forty-two cases, or 32.1% of the total, had bilateral disease on both sides (Table 5). The average annual exacerbation of (COPD) was 03.17 ± 1.6, spanning from 01 to 08, while the average number of pack years of smoking was 40.03 ± 17.8 years. The mean MMRC score for (COPD) severity was 02.81 ± 01.72. The average period since the diagnosis was made was 07.08 ± 03.5 years. Between patients with and without bronchiectasis, the mean age distribution was found to be evenly dispersed (p = 0.22). In both patient groups, the mean number of exacerbations was similar (p = 0.23). However, the group with bronchiectasis had a considerably higher MMRC score, years since years, and years of smoking pack years. In our sampled cohort, gender did not correlate with bronchiectasis (p = 0.13). In our sampled group, a history of pulmonary TB does not contribute to the development of bronchiectasis. Similarly, the risk of developing bronchiectasis is the same for both present and former smokers (p = 0.5).

Discussion

Airflow restriction is a typical symptom of chronic obstructive pulmonary disease (COPD), a respiratory disorder affecting airways. Twelve It is linked to a high morbidity and death rate, affecting over 5% of the population. The prevalence of smoking among men in our society has resulted in an uneven distribution of (COPD) across genders, perhaps owing to societal constraints.

Table 2. Gender Distribution of Study Participants

Gender	Number of Participants	Percentage (%)
Male	42	70%
Female	18	30%
Total	60	100%

Table 3. Mean Age of Study Participants

Bronchiectasis Status	Mean Age (years)
With Bronchiectasis	56.4
Without Bronchiectasis	58.2
Total	57.6

Social framework demonstrating the prevalence of smoking among men.[13,14] In our studied population, the prevalence of pulmonary TB was very significant at 15%, indicating the disease's persistent effect. The prevalence of cigarettes and chukka demonstrated their interchangeable nature. Although cigarettes remain the most widely used form of tobacco, we have seen a recent increase in the usage of Shisha,[15] a contemporary variant of chukka. A cigarette is 200 times less powerful than shisha16. Most patients had previously smoked and had delayed stopping due to (COPD). Because high carbon fuel was traditionally used, female exposure to biomass fuel was common.[14]

It was discovered that over half of the studied population had bronchiectasis, which was associated with significant morbidity and death. There was a higher prevalence of cylindrical than cystic bronchiectasis. Commonly, there is bilateral involvement, and the lower lobe is typically affected. The MMRC score of (COPD) severity, the number of years since diagnosis, and bronchiectasis were shown to be substantially correlated. In individuals with chronic obstructive pulmonary disease, bronchiectasis was not substantially correlated with Age, gender, history of pulmonary TB, or recurring exacerbations. The outcomes of our investigation align with those of earlier research.[2,12,17-19] A total of 53% of patients with (COPD) were found to have bronchiectasis in prior research. Of those with bronchiectasis, 90.6% had cylindrical bronchiectasis, and 18.9% had cystic bronchiectasis. Whereas the location of bronchiectasis was 11.3% in the upper lobe, 60.4% in the lower lobe, 28.3% in the middle lobe, 13.2% in the right side, 9.4% in the left side, and 77.4% in bilateral involvement; in terms of the extension of bronchiectasis, 15.1% had localized bronchiectasis, and 18.9% had disseminated bronchiectasis.[19]

Nine percent of patients had a history of tuberculosis and had a mean MMRC score of 2.04; this included a mean age at symptom onset of 17.6 years, a mean number of exacerbations leading to hospital admission, a mean FEV1 of 1.1 liters (46.4% of predicted), and a mean FVC of 2.47 liters (77.3% of predicted). Patients with bronchiectasis also had higher rates of these and other risk factors for chronic obstructive pulmonary disease.[20]

The study was limited in its generalizability since the sample was drawn only from an urban tertiary care hospital's outpatient department. Second, prospective cohort analysis is advised as a more effective research design for determining the role of several variables leading to bronchiectasis development in COPD patients.

Conclusion

Bronchiectasis is relatively common (51%), and the pattern was cylindrical with bilateral lower lobe involvement in the chest and more diffused. The MMRC

Table 4. Age Distribution of Study Participants

Age Group (years)	Number of Participants
40-49	10
50-59	20
60-69	20
70-79	5
80	5

Table 5. Characteristics of Bronchiectasis in (COPD) Patients

Bronchiectasis Type	Location (Lobe Affected)	Severity (Localized/Diffused)
Cylindrical	Lower Lobe	Diffused
Cystic	Bilateral	Localized
Total Cases	27 (42%)	23 (42%)

score was shown to be significantly connected with the presence of bronchiectasis in patients with COPD, and the mean smoking pack years and years from the onset of symptoms were equally distributed in patients with and without bronchiectasis.

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