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CAUSES OF ADULT BRONCHIECTASIS IN NON CYSTIC FIBROSIS IN PATIENTS PRESENTING IN A TERTIARY CARE HOSPITAL OF KPK

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ABSTRACT

Background: Non-cystic fibrosis bronchiectasis remains a significant public health concern, particularly in low and middle-income countries like Pakistan, where limited research has been conducted on its causes. The disease is characterized by chronic airway inflammation and recurrent infections, leading to a spectrum of clinical presentations and necessitating comprehensive etiological investigation.

Objective: To identify the predominant causes of non-cystic fibrosis bronchiectasis among adults in a tertiary care hospital in Khyber Pakhtunkhwa (KPK), Pakistan.

Methods: This prospective observational cohort study included 120 patients diagnosed with non-cystic fibrosis bronchiectasis based on clinical presentation and HRCT findings. Participants aged 20-80 years who provided written informed consent were included. The study excluded patients with ILD, traction bronchiectasis, cystic fibrosis, and those with a history of childhood onset bronchiectasis. Data were collected via structured questionnaires and analyzed using descriptive and inferential statistics.

Results: The study revealed that infectious causes were the most prevalent, with tuberculosis (TB) accounting for 55% (n=66) of the cases, followed by pneumonia at 10% (n=12). COPD was identified in 15% (n=18) of the patients, ABPA in 7% (n=8), idiopathic causes in 8% (n=10), non-tuberculous mycobacteria (NTB) in 3% (n=4), and Kartagener syndrome in 2% (n=2). The mean age of participants was 51.99 years (SD=15.74), with a predominance of males (65%, n=78).

Conclusion: The study highlights post-TB bronchiectasis as the leading cause of non-cystic fibrosis bronchiectasis in the adult population of KPK, underscoring the need for targeted interventions focusing on TB management and prevention.

Keywords: Bronchiectasis, COPD, Non-cystic fibrosis, Pakistan, Tuberculosis, HRCT, Prospective Cohort.

Introduction

Bronchiectasis, a chronic pulmonary condition characterized by the irreversible dilatation and destruction of the bronchial walls, has long been a significant public health concern worldwide. In the context of non-cystic fibrosis (non-CF) bronchiectasis, this condition emerges as an even more critical issue, particularly in low-income countries like Pakistan(1). Despite its substantial impact on public health, non-CF bronchiectasis remains a relatively neglected disease within the national healthcare discourse, contributing to considerable morbidity and mortality rates among the adult population. The persistent neglect of this disease underscores a dire need for enhanced awareness and understanding among healthcare professionals and policymakers alike(2, 3).

One of the most pressing concerns associated with non-CF bronchiectasis is its role as a leading cause of recurrent hospital admissions, necessitating the administration of costly intravenous antibiotics. This situation imposes a substantial financial burden on the healthcare system, particularly in regions with limited resources(4). The economic strain is exacerbated in low-income countries such as Pakistan, where the allocation of adequate healthcare resources remains a challenge. Patients with non-CF bronchiectasis frequently experience exacerbations of their symptoms, leading to hospitalization. Such episodes not only incur significant healthcare costs but also result in loss of productivity and absenteeism from work and educational institutions, further compounding the economic impact of the disease(5, 6).

Moreover, the geographical variation in the causes of bronchiectasis has been less explored, particularly in the context of Pakistan. This lack of research contributes to a presumption-based understanding of the disease's etiology, rather than one grounded in empirical evidence(7). The variability in environmental factors, infectious agents, and genetic predispositions across different regions underscores the importance of conducting localized studies to elucidate the specific causes of non-CF bronchiectasis in the Pakistani population(8, 9).

Identifying the precise etiological factors of non-CF bronchiectasis is critical for several reasons. Firstly, it would significantly enhance the knowledge base of local healthcare practitioners, empowering them to make more informed decisions regarding diagnosis, treatment, and management of the condition(10). Secondly, a clear understanding of the causes could inform the development of targeted preventive measures aimed at reducing the incidence of the disease. Furthermore, by slowing the progression of bronchiectasis, these interventions could alleviate the overall disease burden on the healthcare system. Finally, establishing a robust disease surveillance system is essential for monitoring trends, evaluating the effectiveness of interventions, and facilitating timely and appropriate healthcare responses(11, 12).

The objective of this article is to identify the causes of non-cystic fibrosis bronchiectasis among the adult population presenting in a tertiary care hospital in Khyber Pakhtunkhwa (KPK), Pakistan. By accomplishing this, the study aims to fill the significant gap in the existing literature on the geographical variations and etiological factors of non-CF bronchiectasis in the region(13). This endeavor is not merely academic; it has profound practical implications for improving patient outcomes, optimizing resource allocation, and ultimately enhancing the quality of life for those afflicted by this chronic condition. The rationale behind focusing on the adult population within a tertiary care setting is twofold. First, it reflects the reality that adults constitute a significant proportion of bronchiectasis patients requiring advanced medical care. Second, tertiary care hospitals, equipped with comprehensive medical facilities and specialized personnel, represent an ideal context for conducting such an investigation, ensuring the study's findings are both reliable and applicable to the broader healthcare environment in Pakistan(14, 15).

Current study sets out to address a critical gap in our understanding of non-CF bronchiectasis in Pakistan, a country where the disease's economic and health-related ramifications are particularly

pronounced. Through this research, we aim not only to shed light on the specific causes of non-CF bronchiectasis in the adult population of KPK but also to contribute to the global discourse on this neglected disease. By enhancing our understanding of the etiological factors and geographic variations associated with non-CF bronchiectasis, we can pave the way for more effective management strategies, improved patient care, and a more efficient allocation of healthcare resources in low-income countries(16).

Material and Methods

The study employed a prospective observational cohort design to explore the causes of non-cystic fibrosis bronchiectasis among adults presenting in a tertiary care hospital in Khyber Pakhtunkhwa (KPK), Pakistan. Conducted over a span of six months, this research adhered strictly to the ethical standards set by the relevant ethical committee of the tertiary care institution, from which approval was duly obtained prior to the commencement of the study(17).

Eligibility for participation was determined based on a set of inclusion criteria. Firstly, all patients diagnosed with bronchiectasis, grounded on a combination of clinical presentation and High-Resolution Computed Tomography (HRCT) findings, were considered for inclusion. The age bracket for potential participants was set between 20 to 80 years to capture a broad spectrum of the adult population. A critical precondition for inclusion was the procurement of written informed consent from each patient, ensuring compliance with ethical standards concerning patient rights and confidentiality. For the purpose of confirming suspicions of bronchiectasis, which were initially based on patient history, clinical examination, and X-ray findings, an HRCT of the chest was conducted on all potential participants(18).

Conversely, the exclusion criteria were designed to ensure the specificity and reliability of the study's findings. Patients diagnosed with Interstitial Lung Disease (ILD) and Traction Bronchiectasis were excluded from the study to prevent confounding factors associated with these conditions. Additionally, individuals with cystic fibrosis, including those known to have the condition and those diagnosed during the evaluation phase, were also omitted. Furthermore, patients with a history of childhood onset of bronchiectasis were not considered for this study, focusing the research on adult-acquired forms of the disease(19).

The study aimed to recruit a sample size of 120 patients, determined to be statistically significant for identifying the causes and contributing factors of non-CF bronchiectasis in the targeted population. Sampling was conducted using a purposive technique, selecting participants who met the inclusion criteria and agreed to partake in the study through written informed consent(20).

Data collection was systematically carried out by a researchers. Information was gathered through a structured questionnaire designed to capture detailed patient history, clinical presentation, and HRCT findings. The questionnaire also included sections for recording demographic information, including age, gender, and residential background, to allow for a comprehensive analysis of the data(21).

Data analysis was performed using SPSS version 23. Descriptive statistics were employed to summarize the demographic and clinical characteristics of the study population. Frequency of the causes were measured.

Results

Table-1 presents the mean age and HRCT findings score among adults diagnosed with non-cystic fibrosis bronchiectasis in a tertiary care setting. The average age of the cohort was found to be approximately 52 years, with a standard deviation of 15.74, indicating a wide age range among participants. The HRCT findings score, which quantifies the severity of bronchiectasis observed in

high-resolution computed tomography, had a mean value of 1.98 with a standard deviation of 0.47, suggesting variability in disease severity across the study population.

Table-1: Demographic Characteristics and HRCT Findings in Adult Non-CF Bronchiectasis Patients

Variable	Mean	Standard Deviation
Age (years)	51.99	15.74
HRCT Findings Score	1.98	0.47

Table-2 outlines the gender distribution of the adult patients diagnosed with non-cystic fibrosis bronchiectasis who were included in the study at a tertiary care hospital in Khyber Pakhtunkhwa, Pakistan. Out of the 120 participants, 79 were male, constituting approximately 65.8% of the sample, while 41 were female, making up the remaining 34.2%. This distribution highlights a male predominance in the patient cohort, reflecting gender-based differences in the prevalence of non-CF bronchiectasis within the studied population.

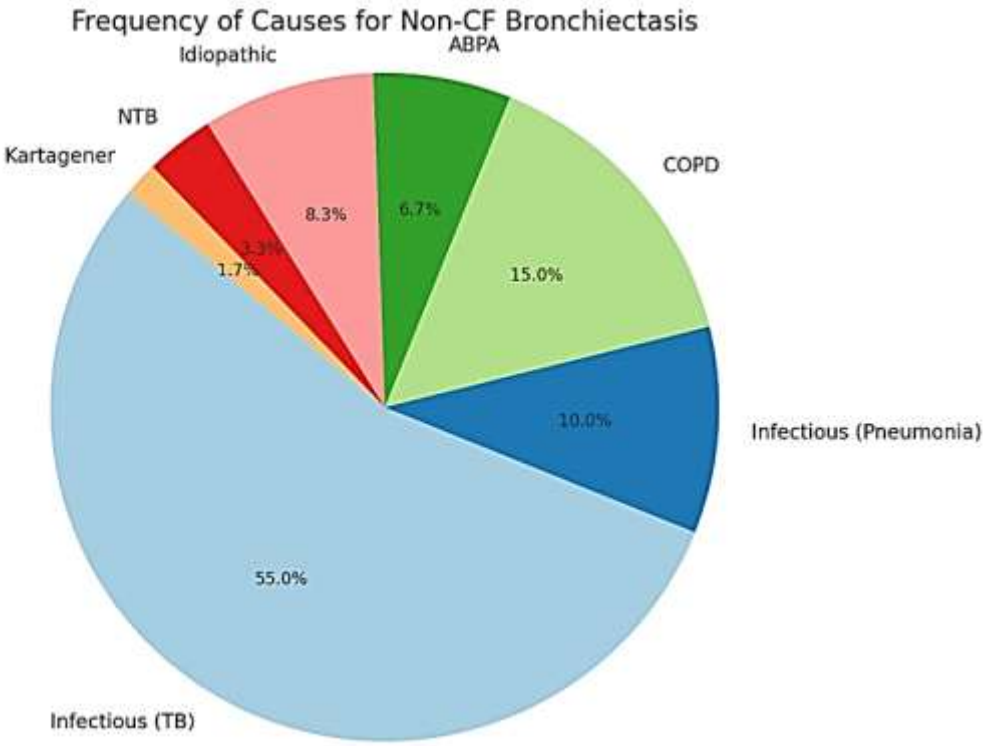
Table-2: Gender Distribution in Adult Non-CF Bronchiectasis Patients

Variable	Frequency (%age)
Male	79 (65.8%)
Female	41 (34.2%)

Table-3: Causes of Non-Cystic Fibrosis Bronchiectasis in Adults

Cause	Frequency (%age)
Infectious (TB)	66 (55%)
Infectious (Pneumonia)	12 (10%)
COPD	18 (15%)
ABPA	8 (6.7%)
Idiopathic	10 (8.3%)
NTB	4 (3.3%)
Kartagener	2 (1.7%)

Table-3 categorizes the causes of non-cystic fibrosis bronchiectasis identified in adults at a tertiary care hospital in Khyber Pakhtunkhwa, Pakistan. The findings indicate that infectious diseases are the leading cause, with tuberculosis (TB) accounting for 55% of the cases. Pneumonia also constitutes a significant infectious cause at 10%. Other notable causes include Chronic Obstructive Pulmonary Disease (COPD) at 15%, Allergic Bronchopulmonary Aspergillosis (ABPA) at 6.7%, idiopathic origins at 8.3%, non-tuberculous mycobacteria (NTB) infections at 3.3%, and Kartagener syndrome at 1.7%. This distribution underscores the diversity of etiological factors contributing to non-CF bronchiectasis in the studied population, with a pronounced emphasis on infectious causes, particularly TB.



Discussion

The current study on the causes of adult bronchiectasis in non-cystic fibrosis patients presenting in a tertiary care hospital of KPK indicates a significant prevalence of infectious causes, with tuberculosis (TB) accounting for 55% and pneumonia for 10% of the cases. This contrasts with the findings from McShane et al. (2013) and Altenburg et al. (2015), where the emphasis was on a diverse range of etiologies beyond infectious diseases, including idiopathic and environmental factors, though specific percentages were not provided. The current study also identified COPD (15%), ABPA (6.7%), idiopathic (8.3%), non-tuberculous mycobacteria (NTB) (3.3%), and Kartagener syndrome (1.7%) as other causes(9). Notably, the current study presents a mean age of 51.99 years with a standard deviation of 15.74, and a male predominance (65%), which is consistent with the demographic insights provided by McShane et al. (2013) and Altenburg et al. (2015). However, the high percentage of TB-related bronchiectasis cases in the KPK study underscores regional differences in etiological factors, possibly reflecting the endemic status of TB in the region. The HRCT findings score average of 1.98 with a standard deviation of 0.47 in the current study provides a quantitative measure of disease severity, a factor not detailed in the comparative studies, suggesting a potential area for future research focus on diagnostic imaging scores and their correlation with clinical outcomes(22).

The current study, focusing on adult bronchiectasis in non-cystic fibrosis patients in a tertiary care hospital of KPK, reveals infectious diseases, notably tuberculosis (TB) at 55% and pneumonia at 10%, as the predominant causes. This finding contrasts with Pasteur et al. (2000), where a broader spectrum of etiologies, including immune defects and ciliary dysfunction, were identified, indicating variability in causative factors based on geographic and demographic contexts(23). Martínez-García et al. (2007) further emphasize the role of chronic colonization by Pseudomonas aeruginosa and systemic inflammation in lung function decline, factors not explicitly quantified in the current study but implicitly significant given the high infectious disease rates(24). Imam & Duarte (2020) highlight the evolving recognition and management strategies for bronchiectasis, echoing the current study's implications for tailored therapeutic approaches based on specific causative factors(20). The emphasis on infectious etiology in the KPK study, compared to the diverse causes and management strategies discussed by Imam & Duarte (2020), Martínez-García et al. (2007), and Pasteur et al.

(2000), underscores the importance of regional epidemiology in guiding bronchiectasis research and treatment paradigms.

Conclusion

The conclusion of this study underscores the significant finding that post-tuberculosis (TB) bronchiectasis emerges as the leading cause of non-cystic fibrosis bronchiectasis among adults presenting at a tertiary care hospital in Khyber Pakhtunkhwa (KPK). Accounting for 55% of the cases, this etiology highlights the critical public health challenge posed by TB in the region. The data compellingly advocate for targeted public health interventions and enhanced clinical management strategies focused on TB prevention and treatment. Addressing the high incidence of post-TB bronchiectasis is paramount for mitigating the burden of chronic pulmonary disease in this population, emphasizing the need for regionalized approaches to bronchiectasis care that consider the predominant etiological factors within specific geographical contexts.

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