Original Article
DOI: https://doi.org/10.70749/ijbr.v3i7.2179

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://ijbr.com.pk
ISSN: 2960-2793/ 2960-2807

Etiologies and Short-Term Outcomes of Hemoptysis: A Cross-Sectional Study

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ARTICLE INFO

Keywords: Hemoptysis, Patients, Symptom, Clinical, Etiology, Recovery, Diagnosis.

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Declaration
Authors' Contribution
All authors equally contributed to the study and approved the final manuscript

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 02-06-2025 Revised: 27-06-2025
Accepted: 07-07-2025 Published: 15-07-2025

ABSTRACT

Background: Hemoptysis, the expectoration of blood from the lower respiratory tract, is a clinically significant symptom that can range from benign to life-threatening. Understanding its etiologies and predicting outcomes is essential for effective patient management. **Objective:** To determine the etiological spectrum and short-term clinical outcomes of hemoptysis in patients presenting to a tertiary care hospital. **Methods:** This descriptive cross-sectional study included 134 patients presenting with hemoptysis at Indus Hospital, Karachi from December 2024 to May 2025. Data were collected through consecutive sampling. Demographic details, clinical history, comorbidities, radiographic and bronchoscopic findings, as well as final diagnoses and treatment outcomes, were recorded. **Results:** The majority of patients were male (63.4%) with a mean age of 45.7 ± 17.8 years. Tuberculosis was the leading etiology (47.8%), followed by bronchiectasis (18.7%) and chronic pulmonary aspergillosis (13.4%). Most patients presented with mild (50%) to moderate (32.1%) hemoptysis. The most frequent symptoms were cough (92.5%) and dyspnea (70.1%). Significant associations were found between smoking status ($p=0.019$), hemoptysis duration ($p=0.008$), bronchoscopy findings ($p=0.039$), comorbidities ($p=0.018$), diagnosis ($p<0.0001$), and treatment modality ($p<0.0001$) with clinical outcomes. Full recovery was observed in 56.7% of patients, while 32.1% showed clinical improvement, 9.0% showed no improvement, and 2.2% died. **Conclusion:** Tuberculosis remains the most common cause of hemoptysis in this setting. Smoking, comorbidities, abnormal bronchoscopy findings, and delayed presentation are associated with worse outcomes. Early identification of etiology and appropriate management are crucial for improving prognosis in patients presenting with hemoptysis.

INTRODUCTION

Hemoptysis has long been focal point for physicians and researchers, drawing their interest because of its potential significance in diagnosing and addressing respiratory diseases. This symptom involves coughing up blood that originates from the respiratory tract. The grading of hemoptysis varies significantly in the literature review and even small amount can produce significant deterioration and hemodynamic instability, impaired ventilation or cardiovascular collapse [1]. The cause of hemoptysis can be diverse encompassing infectious, neoplastic, inflammatory and vascular conditions, which adds complexity to its assessment and treatment [2]. Etiologies differ as per clinical setting as in outpatient acute respiratory tract infection, bronchiectasis and COPD are main culprits whereas bronchiectasis (49%) and lung cancers (9.5%) [3] are the ones that lead to hospitalization, with bronchiectasis been more common in non-smokers [4]. In a study conducted at Qatar in 2019 showed Pneumonia (12.8%), Bronchiectasis (11.8%) and Cardiovascular disorders (11.8%) were common causes of hemoptysis [5,21]. But according to WHO 2020 report Pakistan was one of the top 10 countries with highest rates of tuberculosis in 2019 making Tuberculosis as one of the leading causes of hemoptysis as well [6]. In another study, Respiratory infection was the most common cause in 125 (72.6%) patients. Respiratory infection subgroups included acute lower respiratory infection in 80 (46.5%) patients followed by pneumonia in 35 (20.3%) and chronic obstructive pulmonary disease in 10 (5.8%). Tuberculosis was found in (7%) of patients [2]. Hemoptysis can be categorized as mild (<30 ml/24 hours), moderate (>30 and <100 ml/24 hour) and massive hemoptysis (>100 ml/24 hours or causing hemodynamic compromise) [7]. Massive hemoptysis was known to cause mortality in greater than 70% of patients but after advancement in

diagnostic and therapeutic modalities, it has been quoted around 6.5–38% [8].

The management of hemoptysis starts with evaluation of gas exchange and hemodynamic stability. Most patients respond to conservative management [9]. The initial focus should be on promptly securing the airway and implementing measures to contain the spread of hemorrhage [10]. Advanced cardiac life support (ACLS) should be implemented as soon as possible [8]. Subsequently, the cause is pinpointed mostly through sputum analysis but also by the use of fiberoptic bronchoscopy and chest imaging studies, aiming to stop the bleeding and forestall any future recurrences. According to etiology, treatment is started from cough suppressants, antibiotics to surgeries like pulmonary resection, video-assisted thoracoscopic surgery (VATS) etc [11]. and radiological procedure like Bronchial artery embolization with a success rate of 70–99% might be used [12]. Among outcome, the majority of patients [n = 92 (90.2%)] recovered and were discharged home; however, 10 (9.8%) patients died either during their early course of admission or within 1–2 months [5]. The purpose of this study is to evaluate the causes and short-term results of hemoptysis, with the goal of offering clinician's valuable information for early intervention by identifying these distinctions. The aim is to refine decision-making accuracy and ultimately enhance patient outcomes. While these causes are well-documented in literature, variations exist among countries both in terms of etiology.

Objective

The main objective of the study is:

- To determine the most common etiologies among patients with hemoptysis
- To determine the short-term outcomes in patients with hemoptysis and outcome.

METHODOLOGY

This Descriptive Cross-Sectional Study was conducted on hospitalized and outpatient department of Pulmonology, Indus Hospital Karachi from December 2024 to May 2025. Data were collected through Consecutive sampling technique. The sample size has been calculated by WHO sample size calculator on the following parameters:

- Confidence level = 95%
- Precision = 5%
- Tuberculosis as etiology of hemoptysis taken as 7% [2]

The total sample size came out to be 101 patients presenting with hemoptysis.

Inclusion Criteria

- Patient of either gender (male or female)
- Age >14 years to 60 years of age

Exclusion Criteria

- Patient with pseudo-hemoptysis: bleeding from nose, teeth, or hematemesis (confirmed by local examination)
- Patient who didn't consent for study
- Patient already on blood thinners
- Patient with raised creatinine

Data Collection

This research was proceeded with approval from the Institutional Review Board (IRB) at the College of Physicians and Surgeons Pakistan (CPSP). Informed consent was obtained from eligible patients. A detailed history was obtained, including demographic data such as gender, age, occupation, and smoking status. Information regarding comorbidities, including diabetes mellitus, chronic obstructive pulmonary disease, bronchiectasis, cardiovascular diseases, hypertension, and current or past tuberculosis, was also recorded. Clinical symptoms associated with hemoptysis, including dyspnea, weight loss, and bleeding from other orifices, were documented. Investigations were ordered according to clinical indications and supervisor guidance. These included sputum examination, chest X-ray, and contrast-enhanced CT scan of the chest when renal function allowed. Additional investigations such as CT angiography or bronchoscopy were performed where clinically indicated.

Data Analysis

Data were entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 26. For the quantitative variable, the mean (SD) was reported since the distribution was normal. Frequency and percentage were reported for categorical variables. To assess the association between two categorical variables, the Chi-square test (or Fisher's test when necessary) was employed. A $p < 0.05$ was considered statistically significant.

RESULTS

A study included 134 patients who came with hemoptysis and met the inclusion criteria, with the majority being male (63.4%) compared to females (36.5%). The average age of participants was 45.70 ± 17.812 years. The most common occupation among participants was housewife (32.09%), followed by elementary occupation (19.403%), then service & sales worker and student, both found in the same ratio i.e., 8.209%. In terms of clinical characteristics of patients, smoking status showed that 74.6% were non-smokers, while only 5.25% were active smokers. Additionally, 37.3% had a history of tuberculosis, with the majority (62.7%) having no such history. With respect to the medication history, only 3 (2.2%) patients were on anticoagulant therapy. Related to the most common comorbidities among patients, diabetes (11.2%) and hypertension (11.2%) were found in the highest percentage, followed by ischemic heart disease (3.7%) and asthma (2.2%). Other comorbid conditions that accounted for 2.2% include HIV, COPD, and DCMP (Table 1).

Table 1

Demographics and Clinical Characteristics

VARIABLE	FREQUENCY N=134 (%)
GENDER	
Male	85(63.433)
Female	49(36.567)
AGE (years)	
Mean±SD	45.70 ±17.812
<25 years	20(14.925)
25-50 years	63(47.015)
51-85 years	51(38.06)
OCCUPATION	
Armed Forced Occupation	2(1.493)

Craft & Related Trade Worker	10(7.463)
Elementary Occupation	26(19.403)
Housewife	43(32.09)
Manager	1(0.746)
Plant and machine operator	10(7.463)
Professional	4(2.985)
Retired	9(6.716)
Service and sales worker	11(8.209)
Student	11(8.209)
Technician & Associate Professional	1(0.746)
Unemployed	6(4.478)
SMOKING STATUS	
Active Smoker	7(5.224)
Ex-Smoker	26(19.403)
Non-Smoker	100(74.627)
Occasional Smoker	1(0.746)
PAST HISTORY OF TUBERCULOSIS	
Yes	50(37.313)
No	84(62.687)
CO MORBIDITY	
Diabetes	15(11.2)
Hypertension	15(11.2)
Ischemic Heart Disease	5(3.7)
Asthma	3(2.2)
HCV	2(1.5)
Metabolic Disorder	2(1.5)
Substance User	4(3)
Other	3(2.2)
None	98(73.1)
TAKING ANTICOAGULANT	
Aspirin	3(2.239)
None	131(97.761)

Patient's hemoptysis characteristics were categorized based on their quantity, duration, and the presence of features of massive hemoptysis. Regarding the quantity, 67 patients (50%) had mild hemoptysis, while moderate hemoptysis was found in 43(32.09%) patients and severe hemoptysis in 15(11.194%) patients. In terms of duration, 73 patients (54.4%) had hemoptysis persisting for 4 weeks or less, while 61 patients (45.5%) had hemoptysis lasting for more than four weeks. The clinical signs of massive hemoptysis, like dizziness, dyspnea, and related symptoms, were reported only in 23 patients (17.16%). Regarding the presenting symptoms, the most common were cough (92.5%), dyspnea (70.1%), and weight loss (48.5%). Fever was present in only 19.4% of patients. Other less common symptoms that were found in only 8 patients (6%) includes generalized weakness, chest pain, orthopnea, epigastric discomfort, body aches, vertigo, pedal edema, and anorexia. Bronchoscopy was performed only in 34 patients (25.4%). Out of these, 15 patients (44.1%) had normal results, 14 (41.2%) had positive results for fungal cultures, and 3(8.8%) showed positive bacterial cultures, with only one patient (2.9%) with active bleeding and one(2.9%) with pedunculated growth. (Table 2)

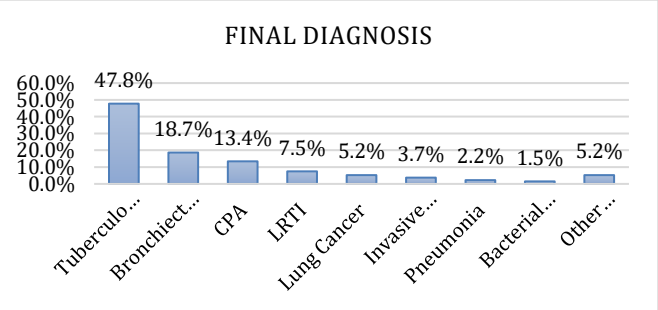
Table 2

Characteristics of hemoptysis Presentation, Associated Symptoms& Bronchoscopy findings

VARIABLE	FREQUENCY N=134(%)
QUANTITY OF HEMOPTYSIS	
Streaks	9(6.716)
Mild	67(50)
Moderate	43(32.09)
Severe	15(11.194)
DURATION OF HEMOPTYSIS	
Within 4 weeks	73(54.478)
More than 4 weeks	61(45.522)
FEATURES OF MASSIVE HEMOPTYSIS	
Yes	23(17.164)
No	111(82.836)
PRESENTING SYMPTOMS	
Cough	124(92.5)
Dyspnea	94(70.1)
Weight Loss	65(48.5)
Fever	26(19.4)
Other symptoms	8(6)
None	3(2.2)
BRONCHOSCOPY PERFORMED	
Performed	34(25.373)
Not Performed	100(74.627)
BRONCHOSCOPY RESULT, N=34(%)	
Normal	15(44.118)
Active Bleeding	1(2.941)
Bacterial C/S positive	3(8.824)
Fungal C/S: Positive	14(41.176)
Pedunculated Growth	1(2.941)

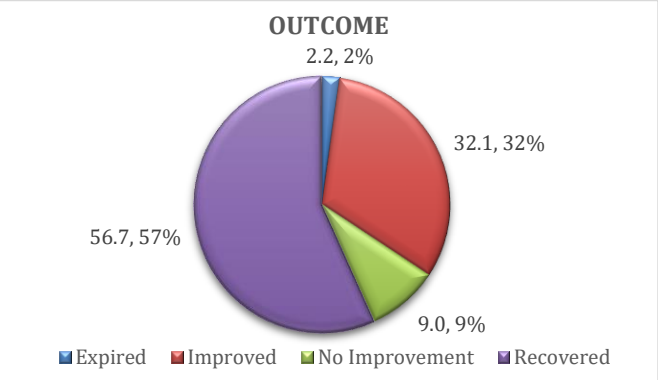
The most common etiologic finding of hemoptysis was found to be tuberculosis, affecting 47.8% of patients. This was followed by bronchiectasis, which was found in 25 patients (18.7%). A fungal infection, Chronic Pulmonary Aspergillosis (CPA), was present in 18 patients (13.4%). Other causes, like Lower Respiratory Tract Infection (LRTI) found in 10 (7.5%) patients, and lung cancer in 7 (5.2%) patients. Additionally, pneumonia was found to be responsible for 2.2% of cases, invasive aspergillosis for 3.75%, and bacterial infections for 1.5%. Less common causes, which made up 5.2% of cases, included conditions like telangiectasia, vasculitis, HIV, interstitial lung disease, cardiovascular disease, and drug-related issues. (Figure 1)

Figure 1



Patient outcomes were categorized into complete recovery, clinical improvement, no improvement, and death. Out of 134 patients, more than half (n=76, 56.7%) showed complete recovery. Clinical improvement was seen in 43(32.1%) patients. However, despite the treatment, 9.05% showed no clinical improvement, and 3 patients (2.2%) showed a poorer outcome trend as they passed away during their care. (Figure 2)

Figure 2



In Table 3, the association between patient demographics & clinical characteristics with clinical outcome was reported. In terms of gender distribution, there was no statistical difference (p=0.583), with 63.4% being male and 36.6% being female. Additionally, there was no significant association between patients' history of tuberculosis and anticoagulant medication with clinical outcome, as their p-value is equal to 0.053 and 1.000, respectively. In contrast, smoking status showed a significant association with outcome (p=0.019). All the patients that were expired were either active smokers (3.33%), occasional (3.33%) or ex-smokers (3.33%). Among the fully recovered and clinically improved patients, non-smokers were the ones with a higher ratio (76.3%) and (79.1%), respectively. This suggests that, as smoking affects the lungs, it might lead to poorer outcomes for hemoptysis patients. So, being a non-smoker can help to improve prognosis. Radiographic findings that involved bronchoscopy were performed only in 34 patients, but there is no significant difference (p=0.131). However, the findings on bronchoscopy were significantly associated with clinical outcome (p =0.039). This difference suggests that a notable abnormality in bronchoscopy findings will result in poor clinical outcomes. As data showed, the patients who had active bleeding (50%) and pedunculated growth (50%) seen during bronchoscopy had expired.

Table 3

Association of Demographic and Clinical Characteristics with Patient Outcomes in Hemoptysis

QUESTION	OUTCOME				TOTAL	P- VALUE
	Expired	Improved	No Improvement	Recovered		
GENDER, N=134(%)						
Male	3(100)	29(67.4)	7(58.3)	46(60.5)	85(63.4)	0.593₣
Female	0(0)	14(32.6)	5(41.7)	30(39.5)	49(36.6)	
SMOKING STATUS, N=134(%)						
Active Smoker	1(33.3)	1(2.3)	1(8.3)	4(5.3)	7(5.2)	0.019*₣
Ex-Smoker	1(33.3)	8(18.6)	3(25)	14(18.4)	26(19.4)	
Non-Smoker	0(0)	34(79.1)	8(66.7)	58(76.3)	100(74.6)	
Occasional Smoker	1(33.3)	0(0)	0(0)	0(0)	1(0.7)	
PAST HISTORY OF TUBERCULOSIS,N=134(%)						
Yes	1(33.3)	23(53.5)	3(25)	23(30.3)	50(37.3)	0.053₣
No	2(66.7)	20(46.5)	9(75)	53(69.7)	84(62.7)	
TAKING ANTICOAGULANT, N=134(%)						
Aspirin	0(0)	1(2.3)	0(0)	2(2.6)	3(2.2)	1.000₣
None	3(100)	42(97.7)	12(100)	74(97.4)	131(97.8)	
QUANTITY OF HEMOPTYSIS, N=134(%)						
Streaks	0(0)	4(9.3)	0(0)	5(6.6)	9(6.7)	0.647₣
Mild	1(33.3)	20(46.5)	4(33.3)	42(55.3)	67(50)	
Moderate	1(33.3)	14(32.6)	6(50)	22(28.9)	43(32.1)	
Severe	1(33.3)	5(11.6)	2(16.7)	7(9.2)	15(11.2)	
DURATION OF HEMOPTYSIS, N=134(%)						
Within 4 weeks	2(66.7)	15(34.9)	6(50)	50(65.8)	73(54.5)	0.008*₣
More than 4 weeks	1(33.3)	28(65.1)	6(50)	26(34.2)	61(45.5)	
FEATURES OF MASSIVE HEMOPTYSIS, N=134(%)						
Yes	1(33.3)	8(18.6)	4(33.3)	10(13.2)	23(17.2)	0.218₣
No	2(66.7)	35(81.4)	8(66.7)	66(86.8)	111(82.8)	
BRONCHOSCOPY PERFORMED, N=134(%)						
Performed	2(66.7)	14(32.6)	3(25)	15(19.7)	34(25.4)	0.131₣
Not Performed	1(33.3)	29(67.4)	9(75)	61(80.3)	100(74.6)	
BRONCHOSCOPY RESULT, N=34(%)						
Normal	0(0)	7(50)	2(66.7)	6(40)	15(44.1)	0.039*₣
Active Bleeding	1(50)	0(0)	0(0)	0(0)	1(2.9)	
Bacterial C/S positive	0(0)	0(0)	0(0)	3(20)	3(8.8)	
Fungal C/S: Positive	0(0)	7(50)	1(33.3)	6(40)	14(41.2)	
Pedunculated Growth	1(50)	0(0)	0(0)	0(0)	1(2.9)	

***P-value<0.05, **P-value<0.0001, †Pearson Chi Square test, ₣ Fisher's Exact Test**

Table 4, highlights the relationship between various factors of patients, like comorbidities, clinical symptoms, diagnosis, and their treatment, with the clinical outcome associated with hemoptysis. In terms of comorbid conditions, there is a statistically significant association (p =0.018). Specifically, the most favorable outcome was observed in patients that has no comorbid disease, as 54 out of 98 patients showed full recovery and 35 patients showed clinical improvement. Presenting symptoms of patients showed no significant difference (p = 0.098), with cough and dyspnea being the commonest and most frequently reported symptoms. In terms of diagnosis and treatment given, there was a strong link with patient outcomes (p < 0.0001), respectively. As tuberculosis was the most common diagnosis, affecting 64 patients (47.8%), it showed a favorable outcome, with 39 patients (51.3%) fully recovered and 20(46.5%) with clinical improvement. Other disease conditions like bronchiectasis, chronic pulmonary aspergillosis (CPA), and LRTI also showed either a positive recovery trend or clinical improvement. However, lung cancer showed poor outcomes, as 2(66.7%) patients expired and 4(3.33%) showed no improvement. This suggests that if the disease is severe, it might be linked to a poor prognosis. Additionally, based on the diagnosis, the most common treatment given was anti-tuberculosis medication (n = 63, 47%), with 38 patients showing full recovery, and 20 patients showing clinical improvement. Antibiotics and antifungals also showed a good recovery trend. This highlights the importance of timely diagnosis and customized treatment provided based on individual patient needs.

Table 4

Association of Comorbidities, Symptoms, Diagnosis, and Treatments with Patient Outcomes in Hemoptysis

QUESTION	OUTCOME				TOTAL	P- VALUE
	Expired	Improved	No Improvement	Recovered		
CO MORBIDITY, N=134(%)						
Diabetes Mellitus	0(0)	6(14)	3(25)	6(7.9)	15(11.2)	
Hypertension	0(0)	4(9.3)	1(8.3)	10(13.2)	15(11.2)	
Ischemic Heart Disease	0(0)	1(2.3)	0(0)	4(5.3)	5(3.7)	
Asthma	0(0)	0(0)	1(8.3)	2(2.6)	3(2.2)	
HCV	1(33.3)	1(2.3)	0(0)	0(0)	2(1.5)	0.018*†
Metabolic Disorder	0(0)	1(2.3)	0(0)	1(1.3)	2(1.5)	
Substance User	0(0)	0(0)	2(16.7)	2(2.6)	4(3)	
Other	0(0)	1(2.3)	0(0)	2(2.6)	3(2.2)	
None	2(66.7)	35(81.4)	7(58.3)	54(71.1)	98(73.1)	
SYMPTOMS, N=134(%)						
Cough	3(100)	40(93)	10(83.3)	71(93.4)	124(92.5)	
Dyspnea	3(100)	33(76.7)	11(91.7)	47(61.8)	94(70.1)	
Weight Loss	2(66.7)	22(51.2)	9(75)	32(42.1)	65(48.5)	0.098†
Fever	1(33.3)	4(9.3)	1(8.3)	20(26.3)	26(19.4)	
Other symptoms	1(33.3)	2(4.7)	0(0)	5(6.6)	8(6)	
None	0(0)	1(2.3)	0(0)	2(2.6)	3(2.2)	
DIAGNOSIS, N=134(%)						
Tuberculosis	1(33.3)	20(46.5)	4(33.3)	39(51.3)	64(47.8)	
Bronchiectasis	0(0)	11(25.6)	0(0)	14(18.4)	25(18.7)	
ChronicPulmonary Aspergillosis (CPA)	0(0)	10(23.3)	1(8.3)	7(9.2)	18(13.4)	
Lower Respiratory Tract Infection (LRTI)	0(0)	0(0)	0(0)	10(13.2)	10(7.5)	0.000**†
Invasive Aspergillosis	0(0)	0(0)	2(16.7)	3(3.9)	5(3.7)	
Lung Cancer	2(66.7)	1(2.3)	4(33.3)	0(0)	7(5.2)	
Pneumonia	0(0)	0(0)	1(8.3)	2(2.6)	3(2.2)	
Bacterial Infection	1(33.3)	1(2.3)	0(0)	0(0)	2(1.5)	
Other Causes	0(0)	4(9.3)	0(0)	3(3.9)	7(5.2)	
TREATMENT, N=134(%)						
Anti-Tuberculosis Medications	1(33.3)	20(46.5)	4(33.3)	38(50)	63(47)	
Antibiotics	1(33.3)	0(0)	1(8.3)	23(30.3)	25(18.7)	
Antifungals	0(0)	9(20.9)	3(25)	9(11.8)	21(15.7)	
Bronchial toilet	0(0)	9(20.9)	0(0)	5(6.6)	14(10.4)	
BAE	0(0)	4(9.3)	0(0)	1(1.3)	5(3.7)	0.000**†
Biopsy	1(33.3)	0(0)	3(25)	0(0)	4(3)	
Physiotherapy	0(0)	9(20.9)	0(0)	6(7.9)	15(11.2)	
Under Observation	0(0)	2(4.7)	1(8.3)	0(0)	3(2.2)	
Other	1(33.3)	2(4.7)	0(0)	3(3.9)	6(4.5)	

***P-value<0.05, **P-value<0.0001, †Pearson Chi Square test, ₣ Fisher's Exact Test**

DISCUSSION

This study aimed to evaluate the etiologies and short-term outcomes of hemoptysis among 134 patients in a tertiary care setting. The majority of the patients were male (63.4%) with a mean age of approximately 45 years, consistent with findings from previous studies where adult males were more frequently affected due to higher exposure to risk factors like tuberculosis and smoking. The high percentage of housewives and individuals from elementary occupations reflects a largely lower socioeconomic profile, which has been previously associated with increased respiratory morbidity due to overcrowding, poor ventilation, and limited healthcare access. Tuberculosis was identified as the most common etiology of hemoptysis, seen in nearly half of the cases [13]. This is consistent with regional epidemiology where tuberculosis remains endemic. Other notable causes included bronchiectasis, chronic pulmonary aspergillosis, and lower respiratory tract infections. Less frequent but clinically significant causes included malignancy and invasive fungal disease [14]. Patients with tuberculosis, bronchiectasis, and chronic pulmonary aspergillosis generally showed favorable outcomes, likely due to the availability of effective antimicrobial and antifungal regimens. In contrast, malignancy and invasive aspergillosis were associated with poor prognosis [15]. Regarding symptom severity and duration, nearly 11 percent of patients had severe hemoptysis, and 45 percent had symptoms persisting beyond four weeks. Chronic duration was significantly associated with poorer outcomes. This finding underlines the importance of early identification and intervention, as delayed presentation may reflect underlying disease progression or lack of access to care. Smoking status showed a statistically significant association with clinical outcomes [16]. All patients who expired were either current or former smokers. Non-smokers constituted the majority of those who recovered completely. This supports the understanding that smoking impairs pulmonary healing, promotes chronic inflammation, and worsens disease outcomes [17]. Bronchoscopy was performed in a subset of patients and revealed abnormal findings such as active bleeding, fungal growth, and pedunculated lesions in a significant number of cases. The association between bronchoscopy findings and clinical outcome was statistically significant [18]. Specifically, patients with active bleeding or mass-like lesions had worse outcomes, reinforcing the prognostic relevance of bronchoscopy in guiding clinical decisions. Comorbid conditions also influenced outcomes. Patients with diabetes,

hypertension, or other chronic illnesses had poorer outcomes compared to those without comorbidities [19, 20]. This trend reflects a reduced physiological reserve in patients with underlying systemic disease, limiting their ability to respond to respiratory complications. Treatment personalised to etiology resulted in better outcomes. Patients receiving anti-tuberculosis drugs, antibiotics, or antifungals demonstrated a higher rate of clinical improvement and recovery. In contrast, those requiring palliative or limited intervention strategies such as biopsy or observation alone had less favorable outcomes.

CONCLUSION

It is concluded that tuberculosis remains the most prevalent cause of hemoptysis in the studied population, followed by bronchiectasis and chronic pulmonary aspergillosis. Early identification and targeted treatment of the underlying etiology significantly improve clinical outcomes. Patients with comorbidities such as diabetes and hypertension, prolonged symptom duration, or abnormal bronchoscopy findings were more likely to have poor prognoses.

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