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Decoding the Causes in Patients Presenting with Hemoptysis in a Tertiary Care Centre

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Abstract: ***The etiology of hemoptysis known today is very diverse, not only infections and lung disorders, but also neoplasms, cardiovascular abnormalities, and hematological disorders or systemic diseases. Pulmonary Tuberculosis is the leading factor in developing countries, whereas, in developed countries, bronchiectasis, lung cancer, and bronchitis are the main causes. The present study was done to find out different causes and risk factors of hemoptysis and compare the results with findings reported in the literature.103 patients were enrolled in the study. Out of 103 patients, 71 were male and 32 were female. The majority of patients were from 40 to 59 years of age. Mild hemoptysis was seen in 77 patients, 15 had moderate hemoptysis, and 2 had massive hemoptysis. Tuberculosis is the most common etiology followed by post - TB bronchiectasis, lung malignancy, bronchiectasis, pneumonia, and lastly Aspergilloma. In above 80 - year - old patients, malignancy was the most common cause of hemoptysis. We concluded that Tuberculosis is still the most common etiology of hemoptysis, especially in younger and middle age groups. Many patients with bronchiectasis are being misdiagnosed as tuberculosis. Hemoptysis due to lung cancer is on the rise. Active investigation with all the parameters available should be done for proper diagnosis.***

Keywords: Hemoptysis, Tuberculosis, Lung Cancer, Bronchiectasis

1. Introduction

Hemoptysis is defined as the coughing out of blood originating from the lungs or bronchial circulation or pulmonary parenchyma due to pulmonary or bronchial hemorrhage. It is a frightening symptom for patients and results from a significant underlying disease such as Pulmonary Tuberculosis or Bronchiectasis or diseases like Bronchogenic Carcinoma. [1 - 4]

Patients presenting with massive hemoptysis present an immediate diagnostic and therapeutic challenge. Expectoration of even a relatively small amount of blood is an alarming symptom and massive hemoptysis can be a life - threatening event. A patient's history can aid in diagnosing the volume of blood and distinguish between hemoptysis, pseudohemoptysis, and hematemesis. The etiology of hemoptysis known today is very diverse, not only infections and lung disorders, but also neoplasms, cardiovascular abnormalities, and hematological disorders or systemic diseases. The frequency of each disease as a cause of hemoptysis varies in different series, according to the geographical area. Among the causative factors of hemoptysis, Pulmonary Tuberculosis is the leading factor in developing countries, [1–4] whereas, in developed countries, bronchiectasis, lung cancer, and bronchitis are the main causes. [5–7] However, despite a thorough investigation, an important proportion of hemoptysis remains cryptogenic—up to 50%—as reported by a recent 5 - year retrospective study of the French nationwide hospital database. [11] Pulmonary Tuberculosis is responsible for the majority of cases of both massive and non - massive hemoptysis in developing countries like India. [8]

Hemoptysis can be classified as mild, moderate, and massive depending on the amount of blood coughed out: MILD: <100 ml in 24 hours, MODERATE: 100 - 400 ml in 24 hours, and MASSIVE: >400 ml in 24 hours [1]. Massive hemoptysis can lead to asphyxia, cardiac arrest, and sudden death of the patient. it can occur in any group of age, but it is common in the age of 20 - 40 years. it can be seen more in males than in females (3: 1) [9]. But fewer than 5% of patients presenting with hemoptysis expectorate large volumes of blood. [3] This can be life - threatening either as a result of compromised gas exchange or because of circulatory collapse secondary to acute blood loss. The associated mortality ranges from 7% to 30%. [4]

The cause of hemoptysis is diagnosed through a combination of history, physical examination, chest radiography, bronchoscopy, CT scan, and microbiological and histological investigations. The investigations of choice to diagnose the cause and localize the source of hemoptysis will vary depending on the past medical history and current presentation of a patient. Chest X - ray (CXR) remains the initial test performed in the majority of cases. It determines the site of bleeding in 45 to 65% of the cases and the cause in 25 to 35% [12, 10, 11]. However, as much as 10% of pulmonary malignancies are occult on CXR, 96% of which will be detected by computed tomography (CT). Hemoptysis is very much influenced by weather factors, particularly low atmospheric pressures. Fluctuations in atmospheric pressures may also play a role in hemoptysis. [4]

Aside from its ability to disrupt hemodynamic stability due to large blood loss, massive hemoptysis can also interfere with the gas exchange in alveoli and cause complications in asphyxia. [10]The present study was done to find out different causes of hemoptysis and find out the risk factors of

hemoptysis and compare the results with findings reported in the literature.

2. Review of Literature

2.1 History

The word hemoptysis came from the Greek word "haima" meaning blood and "ptysis" which means spitting.

2.2 Definition

Hemoptysis is defined as coughing out of blood derived from the lungs or bronchial circulation or pulmonary parenchyma because of pulmonary or bronchial hemorrhage or bleeding originating from the lower respiratory tract. [1]

The quantity of blood expectorated varies from mere blood streaking of expectorated sputum to massive volumes of pure blood. [3] Bleeding can originate from any part of the respiratory tract including the nose or throat or a main bronchus, or from any part of the lungs. [2] However, it is a non - specific symptom and can occur in about 100 different clinical conditions. A few of the causes are: [11]

Pulmonary
- Bronchiectasis
- Broncholithiasis
- Lymphangioleiomyomatosis

Infectious
- Tuberculosis
- Bacterial and viral bronchitis and pneumonia
- Lung flukes and parasites
- Necrotizing pneumonia and lung abscess
- Aspergilloma

Cardiac
- Congenital heart disease
- Congestive heart failure
- Mitral stenosis

Iatrogenic
- Aortobronchial fistula from erosion of an aortic graft or aneurysm
- Endobronchial brachytherapy
- Erosion of airway stent
- Lung transplantation
- Mediastinal or lung radiation therapy
- Pulmonary artery rupture from right - sided heart catheterization
- Thrombolytic therapy
- Transbronchial lung biopsy or cryo - biopsy
- Transthoracic needle aspiration

Medications
- Anticoagulants (i. e., heparin, warfarin, dabigatran, enoxaparin, apixaban)
- Antiplatelets (i. e., clopidogrel, ticagrelor, prasugrel)
- Bevacizumab

Miscellaneous
- Blast injury
- Trauma

Malignancy

Rheumatologic
- SLE
- Bechet's Disease
- Good Pasture Syndrome

Vascular
- Arteriovenous malformations
- Hereditary hemorrhagic telangiectasia
- Pulmonary Thrombo - embolism

Hemoptysis can be further classified according to the relative frequency:

Common (>5% each)
- Bronchogenic Carcinoma
- Bronchiectasis
- Bronchitis
- Bacterial pneumonia
- Tuberculosis

Uncommon (1 - 4% each)
- Pulmonary Embolism
- Left Ventricular failure
- Mycetoma
- Nontuberculous mycobacterial infection
- Traumatic or iatrogenic lung injury

Rare (<1% each)
- Other primary lung neoplasms
- Metastatic neoplasms
- Nonbacterial pneumonia
- Broncholithiasis
- Foreign body aspiration
- Mitral Stenosis
- Amyloidosis
- Pulmonary arterio - venous malformation
- Pulmonary artery aneurysm
- Endometriosis
- Pulmonary sequestration
- Alveolar Hemorrhage syndromes

Good pasture syndrome
Wegener granulomatosis
Microscopic polyarteritis

Patho - physiology of Hemoptysis

Bronchial supply will gradually rise when pulmonary circulation is compromised (for instance, as a result of thromboembolic illness, vasculitis abnormalities, or hypoxia vasoconstriction), leading to an increase in flow in the anastomotic arteries. In conditions including bronchiectasis, chronic bronchitis, TB, pulmonary fungal infections, and lung abscesses, blood vessels become hypertrophied with thin walls and have the propensity to rupture into the alveoli and bronchi. The production of angiogenic growth factors

from tumours causes pulmonary artery alterations and neovascularization, as well as the involvement of collateral systemic vessels. Collateral blood vessels that have just developed are extremely brittle and are susceptible to rupturing into the respiratory system.

Multiple studies were done in the past to evaluate the causes and risk factors in patients presenting with hemoptysis:

1) A study done by **Ashish Bhalla *et al***inthePost Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India named **"Etiology and outcome of moderate - to - massive hemoptysis: Experience from a tertiary care centre of North India"** [9] aimed to identify the etiology of hemoptysis in patients presenting to the emergency department. Over the course of 1.5 years, 110 patients who had complaints of hemoptysis and presented to the emergency room were prospectively screened. They came to the conclusion that the most frequent etiology was pulmonary tuberculosis (active/sequel), which accounted for 65% of cases. Other common causes were community - acquired pneumonia (10.93%), bronchiectasis (9.3%), lung cancer (7.18%), and other reasons (8.6%). For most patients, conservative therapy is sufficient to stop active bleeding.
2) A study was conducted by "**Saurabh Singh *et al* (2015)** [10]named **Etiology of hemoptysis: A retrospective study from a tertiary care hospital from northern Madhya Pradesh, India".** Their objective was to identify the various causes of hemoptysis and its outcome in an Indian cohort. The majority of cases of hemoptysis were caused by tuberculosis (79.2%), according to the findings. Lung cancer (7.2%), bronchitis (4.6%), and bronchiectasis (3.5%) were additional causes of hemoptysis. Thus, they concluded that Hemoptysis is the most common presentation of tuberculosis in India.
3) A study by **Sanjay Kumar Verma *et al* (2016)** [11], named "**A prospective study to know the etiology and the final outcome of haemoptysis patients attending a tertiary care centre in north India"** aimed to analyze the different aetiologies, severity, and mortality of patients with haemoptysis in a tertiary care centre. The majority (71%) of the patients had Tuberculosis (TB) and 54.2% of them had active TB. Other major causes were Chronic Bronchitis (8.6%), Bronchiectasis (5.4%), Lung cancer (4.5%), Lung abscess (2.3%), and idiopathic (2.3%).
4) However in a hospital - based descriptive study conducted in the Department of Pulmonary Medicine study conducted by **Ronald Win B *et al*** [12] in **2013 - 14**, 257 cases of hemoptysis were analyzed, and it was concluded that Post TB bronchiectasis (27%) was the commonest cause of hemoptysis followed by consolidation (14%), bronchiectasis (14%), malignancy (13%) and Tuberculosis (12%) were; the next four common cause of blood streaking and moderate hemoptysis.
5) A major multicentre study was conducted in Italy by **Michele Mondoni*et al* (2013 - 15)** [13], to investigate the hemoptysis etiology in association with its severity in an Italian population.606 participants were included in the trial, with a median age of 67 (IQR 52 - 76) years. . They concluded malignancy, bronchiectasis, and pneumonia were the main hemoptysis aetiologies. Pneumonia and acute bronchitis were the leading aetiologies of mild hemoptysis, while neoplasms and bronchiectasis were leading aetiologies of moderate - to - severe forms.
6) A study was conducted by **A. T Abal*et al* (1998 - 99**) by name of "**Haemoptysis: aetiology, evaluation, and outcome — a prospective study in a third - world country"** [14]**.** They prospectively evaluated 52 patients with hemoptysis admitted to the Chest Hospital, Kuwait for 1 year (January 1998 to December 1998) and follow - up was done for 1 year (January 1999 to December 1999). According to the study, bronchiectasis (21%) old pulmonary TB with bronchiectasis (17%) active pulmonary tuberculosis (15.4%), bronchitis (5.8%) aspergilloma (rheumatic heart disease) and carcinoid (2%) were the etiologies of haemoptysis.25% of patients had an unidentified etiology. In conclusion, the main causes of hemoptysis in this investigation were bronchiectasis and pulmonary tuberculosis. Localizing the bleeding site can be done with the help of a roentgenogram, CT scan, and fiberoptic bronchoscopy. Sequential estimation of hemoglobin could be used to gauge how severe the hemoptysis is.
7) In another study by **Rajendra Prasad *et al* (2008)** [4] named **Lessons from patients with hemoptysis attending a chest clinic in India**, four hundred and seventy - six consecutive patients of hemoptysis who were admitted to the Department of Pulmonary Medicine between January 1996 and December 2002 were evaluated. They concluded that Pulmonary tuberculosis was the leading cause of hemoptysis. There were 377 (79.2%) patients in the pulmonary tuberculosis group, 25 (5.7%) in the neoplasm group, 19 (4.0%) in the chronic bronchitis group, 18 (3.8%) in the bronchiectasis group, and 35 (7.3%) patients with hemoptysis due to other causes.
8) In a study conducted by **F Soares Pires *et al* (2008)** named "**Hemoptysis – etiology, evaluation and treatment in a university hospital"** [15], Between 1 January 2004 and 31 December 2008, clinical data of patients hospitalized for hemoptysis were reviewed in a retrospective analysis. The total number of patients involved in this study was 237, with a mean age of 57.9 years. Bronchitis and congenital cardiopathy were the most often diagnosed conditions in patients under the age of 18. Lung cancer was the second most common diagnosis in adults, followed by bronchiectasis (22.2% and 15.8%, respectively).51 patients had bleeding due to active infection, particularly lung TB, pneumonia, and tracheobronchitis. In 6.3% of cases, the cause of hemoptysis was not determined. A chest X - ray was taken of each subject. Fiberoptic bronchoscopy was used in 52.7% of patients and chest CT was conducted in 81.4% of those, with the former finding the bleeding source in 38.4% of cases and providing a final diagnosis in 17.6%. They concluded that hemoptysis was still a common symptom, with lung cancer and the after - effects of persistent infections serving as its principal causes. In their study, hemodynamic instability and malignancy were associated with a worse outcome.

Aims: To evaluate the various etiologies of Hemoptysis

Objectives

1) To Study risk factors of Hemoptysis
2) To compare the results with findings reported in the literature.

3. Material and Methods

The study was a hospital - based prospective studydone in the Department of Respiratory Medicine, Muzaffarnagar Medical College, Muzaffarnagar, U. P for a total of 18 months duration (12 months for data collection and 6 months for data analysis).103 patients were enrolled in the study

Inclusion Criteria: All Patients with complaints of hemoptysis attending OPD/IPD of the Respiratory Medicine Department and the Emergency of the tertiary center from 1 - 12 - 2020 to 1 - 6 - 2022 were enrolled in the study after informed consent

Exclusion Criteria:

1) Patient not giving consent
2) Age < 12 years.
3) Patients previously diagnosed with the cause of hemoptysis

4. Observations and Results

Age Distribution (n=103)

Table 1: Percentage of Hemoptysis cases according to age group

Age Group (in Years)	Frequency	Percentage
<20	6	5.8
20 - 39	24	23.3
40 - 59	43	41.74
60 - 79	26	25.24
80 and above	4	3.8
Total	103	100

The study showed that most of the patients were in the age group of 40 - 59 (41.74%) followed by the age group of 60 - 79 (25.24%) and closely followed by the by age group of 20 - 39 (23.3%).

Gender Distribution (n=103)

Table 2: Gender Distribution of Cases

Sex	Frequency	Percentage
Male	71	66.9%
Female	32	33.1%
Total	103	100

Our study revealed that majority of the patients were male (66.9%). We had an almost 2: 1 male predominance in our study. There was both overall (66.9%) and age - wise male preponderance in our study (66.9%).

Distribution of Patients by Smoking Index (n = 77)

Table 3: Smoking Index Distribution according to Gender

Smoking Index	Male Smokers	Female Smokers	Total
<100	8	0	8
100 - 299	18	7	25
300 and above	26	8	34
Total	52	15	77

Out of 103 patients who presented with hemoptysis, 77 patients were smokers out of which 52 were males.34 patients had smoking index above 300.50 patients were active smokers and 27 were former smokers.

Severity of Hemoptysis (n=103)

Table 4: Percentage of Hemoptysis patients according to severity

Severity of Hemoptysis	No. of Patients	Percentage
Mild (<100 ml/day)	86	83.34%
Moderate (100 - 400ml/day)	15	14.5%
Severe (>400ml/day)	2	1.9%
Total	103	100%

In this study 83.34% of patients had mild hemoptysis, 14.5% of patients had moderate hemoptysis and 1.9% of patients had massive hemoptysis. All mild and majority of moderate hemoptysis patients were managed conservatively. In most of the severe and moderate cases, the causative factor was tuberculosis.

Etiology of Hemoptysis (n=103)

Table 5: No. and Percentage of patients according to etiology of Hemoptysis

Etiology	No. of patients	Percentage
Pulmonary Tuberculosis	57	55.33%
Post TB Bronchiectasis	16	15.5%
Bronchiectasis	10	9.7%
Lung Malignancy	14	13.5%
Pneumonia	4	3.8%
Aspergilloma	2	1.9%
Total	103	100

In this study, we found that Tuberculosis is still the most common cause of hemoptysis, followed by Post TB Bronchiectasis, the third most common being Lung Cancer closely followed by Bronchiectasis. Other causes of hemoptysis were Pneumonia and Aspergilloma**.** As Tuberculosis is the major cause of hemoptysis in our study, we further studied cases of Pulmonary Tuberculosis with hemoptysis.

Hemoptysis and Smoking

Table 6: Etiology of hemoptysis smokers vs former smokers vs non - smokers

Etiology	Active smokers (n = 50)		Former Smokers (n = 27)		Never smokers (n= 26)	
Tuberculosis	32	64%	13	48%	12	46.15%
Post TB bronchiectasis	5	10%	4	14.8%	7	26.9%
Lung Malignancy	8	16%	5	18.5%	1	3.8%
Bronchiectasis	4	8%	3	11.1%	3	11.5%
Pneumonia	1	2%	1	3.7%	2	7.6%
Aspergilloma	0	0%	1	3.7%	1	3.8%

Though tuberculosis remains unequivocally the major cause of hemoptysis among all 3 groups, yet the 2nd major cause of hemoptysis is lung malignancy among smokers and former smokers at 16% and 18.5% respectively. Lung malignancy was responsible for hemoptysis among 3.8% of non - smokers. Post - tubercular sequelae/bronchiectasis was the second most common cause among non - smokers at 26.9%.

Pulmonary Tuberculosis and TrueNat

Table 7: Frequency of Pulmonary tuberculosis by TrueNat

Sputum for TrueNat	No. of Patients	Percentage
Negative	9	15.7%
Positive	48	84.21%
Total	57	100

Among 57 tubercular patients (new + relapse), 48 were sputum for Truenat positive and 9 were negative and were diagnosed either radiologically and bronchoscopically.

Hemoptysis Among Patients of Tuberculosis (Active, Relapse, Defaulter, Healed) (n=73)

Table 8: Hemoptysis among Tubercular Patients

Type of TB	No. of Cases	Percentage of Cases
New	52	71.23%
Old Inactive	16	21.91%
Defaulter	3	4.1%
Relapse	2	2.7%
MDR	0	0%
Total	73	100

Majority of patients with hemoptysis belonged to tubercular group. Among 73 patients 52 were new cases, 16 belonged to old inactive group, 3 in defaulter group and 2 in relapse group.

Severity of hemoptysis and Tuberculosis

Table 9: Severity of Hemoptysis in Tubercular Patients

Type of Hemoptysis	No. of Patients	Percentage
Mild	64	87.67%
Moderate	9	12.32%
Severe	2	2.7%
Total	73	100%

Our study revealed that 100% of massive hemoptysis was due to tuberculosis and its sequelae. Majority of patients belonging to tubercular group had mild hemoptysis.12% of patients had moderate hemoptysis.

Chest X - ray (n=103)

Table 10: Percentage of Patients According Chest X - ray Abnormality

Chest Xray	Frequency	Percentage
Normal	06	5.8%
Abnormal	97	94.2%
Total	103	100%

All patients with normal chest X - ray where further investigated with HRCT chest and Bronchoscopy. In this study, out of 97 abnormal chest X rays, maximum no. of patients (38 patients) had cavity, 16 patients had evidence of collapse, 14 patients had mass lesionsand 11 had infiltration.

Lesions on CT Chest (n=79)

Table 11: Percentage of Patients According to lesions on CT chest

Type of Lesions	Frequency	Percentage
Bronchiectasis	26	32.91%
Mass	14	17.72%
Features s/o Tuberculosis	15	18.98%
Fungal Ball	2	2.5%
Cavity	14	17.72%
Consolidation	08	10.12%
Abscess	00	0%
Total	79	100

Chest CT was performed in 36 patients for further evaluation of hemoptysis after the initial screening with Chest X - ray and Sputum for Truenat. The findings were as follows:

Bronchiectasis including post tubercular bronchiectasis was the most common finding (32.91%) followed by features suggestive of tuberculosis (18.98%), followed by findings suggestive of lung cancer (17.72%). Patients were further evaluated by fibreoptic bronchoscopy. One patient with normal CXR findings had features suggestive of underlying malignancy on the CT chest.

Fiber - optic Bronchoscopy Findings (n = 25)

Table 12: Fibre - optic Bronchoscopy findings

Findings	Frequency	Percentage
Malignancy	4	16%
Tuberculosis	7	28%
Pneumonia	2	8%
No abnormality	12	48%
Total	25	100%

Fibre - optic bronchoscopy was done in 25 patients who had normal chest x - ray findings and also in whom CT scan findings were suggestive of malignancy or suspicious of tuberculosis or couldn't point to a diagnosis. Bronchoscopy was normal in 48% (n=12) and abnormal in 52% (n=13). Tuberculosis was the most common finding at 28% followed by malignancy at 16%. Pneumonia had a frequency of 2% and in 12 patients, bronchoscopy couldn't reveal any pathology. However, it is to note that in 5 patients with normal chest x - ray, bronchoscopy revealed underlying tuberculosis as their BAL for Truenat turned positive. The

diagnostic yield of bronchoscopy was only in detecting endobronchial lesions.

5. Discussion

A total of 103 patients were enrolled in our study from December 2020 to June 2022.

Tuberculosis and Post Tubercular Bronchiectasis are the leading cause of hemoptysis in our study followed by Lung Malignancy. The same result was seen in several other studies. [2 - 5]Rao's 1960 study [34] showed that pulmonary TB was the most frequent cause of hemoptysis, and our study, in which 56% of patients with hemoptysis had tuberculosis, confirms that this is still the case. Pulmonary tuberculosis is the primary cause of hemoptysis, according to numerous studies from developing and Asian nations. [2, 3, 16, 17] It was found as the whole bronchiectasis being the second leading cause of hemoptysis in this region. Post Tubercular Bronchiectasis accounted for 15% of cases and Bronchiectasis accounted for 10%. **Rajendra Prasad *et al*** [1] found that Pulmonary tuberculosis (79.2%) was the most prevalent etiology followed by malignancy (5.7%). **K. R. Patel *et al*** [7] concluded that pulmonary tuberculosis was the most common cause of hemoptysis and bronchogenic carcinoma ranked as the second most common cause. Our study too reflected almost similar findings. However studies from developed countries reflect different findings. A study by **Kassis*et al*** (2010) conducted in New York city, came to a conclusion that the most common cause of hemoptysis in their study population was Bacterial pneumonia (29 patients), acute bronchitis (10 patients), tuberculosis (7 patients), bronchiectasis (5 patients) and finally malignancy (4 patients). A retrospective study involving 221 patients was undertaken by **Bo Ram Lee *et al*** [18] in Korea. They found that Bronchiectasis (32.6%), active pulmonary tuberculosis (18.5%), fungus ball (10.8%), and lung cancer (5.9%) accounted for most causes of hemoptysis. Thus, studies from affluent nations have revealed that nontuberculous causes and cancer are the main causes of hemoptysis.

Like in several studies, we had a male preponderance among the patients presenting with hemoptysis. Analysis of age distribution revealed that the maximum no. of the study population was of 40 - 59 years of age. Minimum age of 17 years and maximum age of 85 years was seen. In a study by **Abal AT *et al*** (2001), in which 52 patients with hemoptysis were evaluated, it was found that 42 patients were male (80.8%) and 10 patients were female (19.2%) with a mean age of 42.2 (16 ± 86) years. There was no correlation between the severity of hemoptysis and high smoking index in their study. A study by **Ashish Bhalla *et al*** [9] concluded that among 64 patients who had hemoptysis 50 were males and 14 were females. The mean age was 41.7 years. **Bhatta DR *et al*** found 6.5% cases of Pneumonia among cases of Haemoptysis. [35] In our study pneumonia accounted for 3.8% [4] of cases. Most of the patients of hemoptysis in our study are from the 30 - 50 years group. A similar observation was seen in other studies. [6] hemoptysis was seen more among smokers and ex - smokers in our study. A similar observation was seen in the Subodh K Naval study. [6] Studies from the Western world showed nontuberculous causes as etiology. [7] Malignancy is an important etiology in several studies. Other non - tuberculous causes should be identified in a case of hemoptysis even in the Indian setting.

The severity of hemoptysis was categorized into mild, moderate, and massive. Mild hemoptysis was observed in 83.34% of cases, moderate was seen in 14.56% and massive was seen in 1.9% of cases. As per a study by **K. R. Patel *et al*** [7] concluded the majority of the patients (92%) presented with mild to moderate hemoptysis and only 8% of patients had severe hemoptysis. This finding correlated with several other studies where massive hemoptysis was seen in very few percentages of cases.

In several published research examining the epidemiology of hemoptysis in affluent countries, the incidence of malignancy ranges from 5% to 44%. [8, 16 - 19] Studies conducted in India have not revealed a noticeably high incidence of lung cancer as the cause of hemoptysis. In the present study, malignancy was responsible for active hemoptysis in 13.5% of patients only. Other Indian studies have reported similar findings (0%–6.6%). [11 - 13, 20 - 22] It implies that whereas malignancy is a significant factor in hemoptysis in affluent countries where it predominates over infections, it is less common in India. However, the increasing incidence of malignancy is a cause for concern. Thus, any suspicious lesions on Chest X - ray or any unexplained hemoptysis in smokers should be evaluated with CT Chest. In our study, all those with lung cancer had mild hemoptysis. This correlates with other studies where lung cancer was associated with mild hemoptysis. All of those were in the age group of > 60 years and had a smoking index above 300. However, it is to note that in older patients malignancy as a cause of hemoptysis is far more common. As demonstrated by the study of **Wong CMM *et al***, Bronchogenic cancer (49.3%), pneumonia (11.3%), bronchiectasis (8.6%), cryptogenic (5.6%), and active TB (4.2%) were the most common causes of hemoptysis in the older age group. Comparatively, the rates for the younger patients were 19.1%, 16.9%, 12%, 15.7%, and 27%, respectively.

In the present study in whom no diagnosis was obtained by conventional methods and a normal chest x - ray, CT scan, and bronchoscopic evaluation were done.6 patients had normal chest x - ray among whom 4 were diagnosed to be having tuberculosis and 2 had carcinoma. Various authors have described a diagnostic yield of 30% - 70% in evaluating patients with hemoptysis having a normal chest x - ray. Naidich et al. advocated the use of CT scan as only a screening technique in hemoptysis, whereas Hopnik et al. found that CT did not make any difference to case management A study was done by **Khezorollah** [13] with 50 patients having hemoptysis with a normal chest x - ray. A definite diagnosis was made in 45 patients (90%). A study done by **M Thirumaran*et al*** aimed to evaluate if a detailed workup is necessary for patients with hemoptysis with a normal chest radiograph. Based on a 9.6% malignancy rate in their sequential series, they drew the conclusion that additional research into hemoptysis in smokers with a normal CXR is warranted regardless of the quantity or frequency of hemoptysis. They advised having a CT scan performed on these patients, followed by a bronchoscopy.

Fibre - optic bronchoscopy was done in 25 patients who had normal chest x - ray findings and also in whom CT scan findings were suggestive of malignancy or suspicious of tuberculosis or couldn't point to a diagnosis. Bronchoscopy was normal in 48% (n=12) and abnormal in 52% (n=13). Tuberculosis was the most common finding at 28% followed by malignancy at 16%. This was comparable with the results of O'Neil et al that made a definitive diagnosis in 52.1% of his patients. [20] In our study, malignancy was found in 16% of the patients. This was comparable with the data from the previous studies which have reported bronchogenic carcinoma to be present in 4% to 22% of patients with hemoptysis and normal or non - localizing chest radiographs. Specifically, Lederle and coworkers found bronchogenic carcinoma in 4.7% of 106 bronchoscopies performed in men over age 40 with normal and nonlocalizing chest radiograph. [16]

In the current study, bacteria were isolated from the bronchial washing fluids of 8% of patients in whom bronchoscopy was done. *P. aeruginosa* and *K. pneumoniae*, were detected which is consistent with previous reports. .

The outcome of hemoptysis was generally good, with rest of the patients surviving and discharged home, although rates of mortality in non - trauma patients have been reported to be as high as 30–50% in the various studies published [13, 14].

6. Summary and Conclusion

The present study "DECODING THE CAUSES IN PATIENTS PRESENTING WITH HEMOPTYSIS IN A TERTIARY CARE CENTRE" was concluded in the Department of Respiratory Medicine. . The results and observations of this study are as follows:

- Out of 103 patients, 71 were male and 32 were female
- The majority of patients were from 40 to 59 years of age
- Mild hemoptysis was seen in 77 patients, 15 patients had moderate hemoptysis and 2 patients had massive hemoptysis
- Death due to massive hemoptysis occurred in 1 patient
- Sputum - positive tuberculosis was found in 48 patients
- Among the Tubercular category of patients (both new and inactive or healed), mild hemoptysis was seen in 64 patients, moderate hemoptysis in 9 patients, and 2 patients had severe hemoptysis.
- Tuberculosis was the most common etiology among smokers, former smokers and non - smokers, but among smokers and former smokers, lung malignancy was the second most common cause, post tubercular bronchiectasis being the second most common cause among non - smokers.
- 6 patients had normal Chest X - rays and were further evaluated with CT Chest
- CT chest was done in 79 patients, out of which finding bronchiectasis was the most common, followed by finds of Tuberculosis and mass lesions.
- Bronchoscopy was done in 25 patients, out of which the most common results were Tuberculosis and malignancy.
- Tuberculosis is the most common etiology followed by post - TB bronchiectasis, lung malignancy, bronchiectasis, pneumonia, and lastly Aspergilloma.
- There were 4 patients of pneumonia. Staphylococcus aureus was isolated from the sputum/BAL culture in two patients, Pseudomonas aeruginosa, and Klebsiella from one patient each.
- Pulmonary tuberculosis with hemoptysis was most common in the 20 - 39 years age group and mostly in males
- In above 80 - year - old patients, malignancy was the most common cause of hemoptysis

Thus it can be concluded that in our study region, Tuberculosis is still the most common etiology of hemoptysis, especially in the younger and middle age groups.

7. Future Scope

As India moves towards Tuberculosis elimination and also an increased public awareness regarding Tuberculosis, the cases of tuberculosis are bound to come down in recent years. Also worrisome is an increasing trend of lung carcinomas. Regular evaluation regarding the causes of hemoptysis can reveal the most prevalent causes and can direct a physician towards better detection and management of the etiologies of hemoptysis

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