A PROSPECTIVE STUDY TO KNOW THE AETIOLOGY AND THE FINAL OUTCOME OF HAEMOPTYSIS PATIENTS ATTENDING A TERTIARY CARE CENTRE IN NORTH INDIA

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ABSTRACT

BACKGROUND

This study was designed to analyse the different aetiologies, severity and mortality of patients with haemoptysis in a tertiary care centre.

MATERIALS AND METHODS

A prospective analysis of patients with haemoptysis in Outpatient and Inpatient wards at Department of Tuberculosis and Respiratory Diseases and Department of Internal Medicine, G.S.V.M. Medical College, Kanpur (India) from January 2015 to June 2016.

RESULTS

Five hundred and forty six patients with haemoptysis were enrolled during the study period. There were 352 males (64.4%) and 194 (35.6%) females. Of the patients 79.8% (n=436) of patients were nonsmokers, 5.4% (n=30) were ex-smokers and 14.6% (n=80) were current smokers. 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%). Majority (82.6%) of the patients had mild haemoptysis and it was severe in 8.7% patients. There were about 1.25% (n=7) mortality due to severe haemoptysis. The mean duration of haemoptysis was 3±0.8, 5±1.2 and 6±1.4 days in mild, moderate and severe haemoptysis cases respectively.

CONCLUSION

The present study highlighted that pulmonary TB is still the most important cause of haemoptysis in India. Effective case finding and proper treatment could prevent such morbidity and mortality.

KEYWORDS

Haemoptysis, Tuberculosis, Chronic Bronchitis, Bronchiectasis.

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BACKGROUND

Haemoptysis is the expectoration of blood or blood-tinged sputum from the lungs or tracheobronchial tree and that elicits fear in both the patient and physician. The lung contains two separate vascular systems: the bronchial and the pulmonary vessels. In most cases (90%), haemoptysis originates from the systemic arterial circulation (bronchial arteries), whereas in five to ten percent cases it originates from the pulmonary arterial circulation.¹⁻² Haemoptysis is a nonspecific symptom and can occur in about more than 100 different clinical conditions. Depending on the underlying

disease, haemoptysis may result due to several pathological mechanisms; (A) Infarction of lung tissue (e.g. pulmonary emboli), (B) Vascular engorgement with erosion (e.g. acute infections such as viral or bacterial and chronic infection e.g. bronchiectasis or a toxic exposure such as cigarette smoke), (C) Local hyperaemia (e.g. seen in common bacterial pneumonia and contusion of lung), (D) Vascular engorgement of dilated bronchial vessels along with anastomoses between the pulmonary and bronchial circulations (e.g. occurs in tuberculosis, bronchiectasis, lung abscesses and cystic fibrosis), (E) Necrosis of pulmonary parenchyma (e.g. can be seen in chronic infections such as tuberculosis and in malignant tumours of the lung), (F) Disruption of the pulmonary capillaries can be seen either as a result of increased intravascular pressure (as in mitral stenosis and left ventricular failure) or as a result of disruption of the alveolocapillary basement membrane (e.g. Goodpasture's syndrome), (G) Local friction from the moving fungus ball (e.g. aspergillomas).³

The aetiology for haemoptysis varies among different series according to time of publication, the geographic location and the diagnostic tests employed. Most of the data

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from developed countries regarding haemoptysis suggest that bronchiectasis, lung cancer, chronic bronchitis, pneumonia are the leading causes and less commonly by tuberculosis.⁴⁻⁷

However, in developing countries, pulmonary tuberculosis still remains to be the major cause of haemoptysis with a high prevalence of the disease.⁸⁻¹⁰ In India, Pulmonary tuberculosis was the most common cause of haemoptysis in earlier study and other recent study in which tuberculosis was found in 79.2% of patients.¹¹⁻¹² Although tuberculosis is the major cause of haemoptysis, it does not imply that active tuberculosis is present and it may occur even after the disease has been apparently cured.

The purpose of the study was to evaluate the different causes of haemoptysis and to assess the severity of haemoptysis in terms of various diseases.

MATERIAL AND METHODS

The study was conducted in both the outpatient department and inpatient wards at Department of Tuberculosis and Respiratory Diseases and Department of Internal Medicine, G.S.V.M. Medical College, Kanpur (India) from January 2015 to June 2016. After getting informed consent from the patients, they were included in the study. Patients with bleeding from upper respiratory tract or gastrointestinal tract with bleeding diathesis and on anticoagulant or antiplatelet drugs were excluded from the study. The present study was approved by Institute's Ethics Committee.

After taking a detailed clinical history, patients were subjected to thorough clinical examination and relevant investigations were done.

All patients were instructed to collect the expectorated blood in a glass container and the amount of haemoptysis was recorded by the hospital medical staff and calculated as millilitre equivalent (i.e. one glass container = 100 mL). The episodes of haemoptysis were stratified into three groups according to the amount of blood expectorated, i.e. mild: < 100 mL/day; moderate: 100–400 mL/day; and massive if > 400 mL/day or any haemoptysis with signs of asphyxia.

Complete blood count, liver function test, kidney function test, serum electrolyte, fasting and post prandial blood sugar, urinalysis, sputum for AFB, chest X-ray - PA view, bleeding profile. HRCT, ECG, ECHO, Laryngoscopy, Bronchoscopy and other tests were carried out when required. Diagnosis of pulmonary tuberculosis was based on chest radiography and sputum examination for acid fast bacilli as per RNTCP Guidelines.¹³ Patients were classified as old pulmonary TB if following criteria were met: Chest radiograph showed inactive processes such as calcified granuloma/fibrosis, sputum smear negative for AFB, no other symptoms other than haemoptysis. For bronchogenic carcinoma, diagnosis was based on histopathology.

The final diagnosis was made after thorough clinical evaluation and appropriate investigations as mentioned above.

All patients were given appropriate treatment for the control of haemoptysis along with necessary measures for management of the primary disease. Patients with severe haemoptysis were managed with standard critical care protocol with airway protection measures, parenteral fluids/blood transfusion and anti-fibrinolytics.

The duration of haemoptysis was recorded for all enrolled patients irrespective of the severity of haemoptysis.

RESULTS

Out of 546 patients, 352 were males (64%) and 194 (36%) were females with a mean age of 32.78 years and 26.86 years respectively for males and females (Table 1). About 80% of the patients were nonsmokers and 14.6% were current smokers and the rest 5.4% were ex-smokers.

Based on the aetiology, the patients were categorised into different groups [Table 1]. In present study, pulmonary tuberculosis was associated to be the leading cause (71%) of haemoptysis.

Tuberculosis was associated in 71% of the patients with 54.1% of the patients having active pulmonary tuberculosis, while 45.8% of the patients had old pulmonary tuberculosis. While the other causes of haemoptysis were COPD, Bronchiectasis, Bronchogenic carcinoma, Pneumonia and Lung abscess. The other less common causes of haemoptysis were Allergic Bronchopulmonary Aspergillosis, Solitary Pulmonary Nodule, Tropical Pulmonary Eosinophilia and Chest Trauma (Table 2).

In present study, majority of patients (82.6%) had mild haemoptysis, while the moderate and severe forms were observed in 8.6% and 8.7%, respectively. The severity of haemoptysis among active pulmonary tuberculosis as mild, moderate and severe were 85%, 6% and 7% respectively. The severity of haemoptysis among old treated pulmonary tuberculosis as mild, moderate and severe were 88%, 3% and 8% respectively (Table 3).

Life-threatening haemoptysis was seen in only 8.7%. All the patients were treated conservatively with bed rest, cough suppressants, sedative and other supportive care. Haemoptysis was stopped between four to seven days in majority of patients (89.7%).

Males (n, %)	352 (64%)
Females (n, %)	194 (36%)
Mean Age (± SD) years	
Males	32.78 (±3.8)
Females	26.86 (±2.4)
Smokers	
Current (n, %)	80 (14.7%)
Ex-Smoker (n, %)	30 (5.5%)
Non-smoker (n, %)	436 (79.8%)
Severity of haemoptysis	
Mild (n, %)	451 (82.6%)
Moderate (n, %)	47 (8.6%)
Severe (n, %)	48 (8.8%)
Mean duration of haemoptysis (± SD) days	
Mild haemoptysis cases	3±0.8
Moderate haemoptysis cases	5±1.2
Severe haemoptysis cases	6±1.4
Mortality	
Mild cases (n=451)	0 (0)
Moderate cases (n=47)	1 (0.2%)
Severe cases (n=48)	6 (1.25%)

Table 1: Demographic Data of Study Patients

Sl. No.	Disease Classification	Males	Females	Total
1	Active Pul TB	120 (34%)	90 (46.3%)	210 (38.4%)
2	Old Treated Pul TB	114(32.3%)	64 (32.9%)	178 (32.6%)
3	Chronic Bronchitis	39 (11%)	8 (4.1%)	47 (8.6%)
4	Bronchiectasis	18 (5.1%)	12 (6.1%)	30 (5.4%)
5	Bronchogenic Carcinoma	20 (5.6%)	5 (2.5%)	25 (4.5%)
6	Pneumonia	11 (3.1%)	4 (2%)	15 (2.7%)
7	Lung Abscess	12 (3.4%)	1(0.5%)	13 (2.3%)
8	Idiopathic	7 (1.9%)	6 (3%)	13 (2.3%)
9	ABPA	3 (0.8%)	2 (1%)	5 (0.9%)
10	Solitary Pulmonary Nodule	2 (0.5%)	2 (1%)	4 (0.7%)
11	Tropical Pul Eosinophilia	3 (0.8%)	-	3 (0.5%)
12	Chest Trauma	3 (0.8%)	-	3 (0.5%)
Total		352 (64.4%)	194 (35.3%)	546

Table 2: Showing Sex-Wise Aetiology of the Study Population (n=546)

Sl. No.	Disease	Mild (N, %)	Moderate (N, %)	Severe (N, %)	Total
1	Active Pul TB	180 (39.9%)	14(29.7%)	16(33.3%)	210
2	Old Treated TB	157 (34.8%)	6(12.7%)	15(31.2%)	178
3	Chronic Bronchitis	45(9.9%)	1(2.1%)	1(2%)	47
4	Bronchiectasis	11(2.4%)	13(27.6%)	6(12.5%)	30
5	Bronchogenic Carcinoma	18(3.9%)	3(6.3%)	4(8.3%)	25
6	Pneumonia	10(2%)	2(4.2%)	3(6.2%)	15
7	Lung Abscess	10(2%)	3(6.3%)	0	13
8	Idiopathic	10(2%)	3(6.3%)	0	13
9	ABPA	2(0.4%)	1(2.1%)	2(4.1%)	5
10	Solitary Pulmonary Nodule	4(0.8%)	0	0	4
11	Tropical Pul Eosinophilia	1(0.2%)	1(2.1%)	1(2%)	3
12	Chest Trauma	3(0.6%)	0	0	3
Total		451 (82.6 %)	47 (8.6 %)	48 (8.7 %)	546 (100%)

Table 3: Severity of Haemoptysis in Study Patients

Sl. No.	Name of Authors	Total Patients	Causes								
			BACA (%)	Bronchie ctasis (%)	Chronic Bronchitis (%)	TB (%)	Lung Abscess (%)	Pneumonia (%)	Infar ction (%)	Cardiac (%)	Idiopathic (%)
1	Jackson CL ¹⁴	436	20	32	17		12	6	-	-	8
2	Heller R ¹⁵	413	2	7	15	39	1	3	1	2	16
3	Abbott OA ⁵	497	21	21	2	22	6	2	2	1	4
4	Levitt N ¹⁶	717	12	15	-	47	5	1	-	7	5
5	Moersch HJ ⁶	200	24	27	9	6	5	3	1	1	8
6	Souders CR ⁷	100	3	37	12	2	2	-	-	9	18
7	Pursel SE ¹⁷	105	19	23	5	13	3	5	3	-	15
8	Lyons HA ¹⁸	200	12	21	-	61	4	-	-	-	2
9	Gong H Jr ¹⁹	129	24	40	-	3	-	3	2	4	11
10	Johnston H ²⁰	148	19	1	37	7	2	5	1	1	3
11	Santiago S ²¹	264	29	0.5	23	6	-	11	-	-	22
12	Alaoui AY ²²	291	34	15	3.5	19	-	7	-	-	3
13	Knott-Craig CJ ²³	120	5	51	-	73	-	4	-	-	8
14	McGuinness G ²⁴	57	12	25	5	16	-	12	-	-	19
15	Domoua K ²⁵	142	4.2	11.2	-	49.3	-	13.3	-	-	-
16	Hirshberg B ⁸	208	19	20	18	1	-	16	-	-	8
17	Abal AT ¹⁰	52	-	21.2	5.8	15.4	-	-	-	-	25
18	Fidan A ²⁶	108	34.3	25	-	17.6	-	10.2	-	-	-
19	Unsal E ²⁷	143	18.9	22.4	5.6	11.2	-	4.9	-	-	13.2
20	Rakotoson JL ²⁸	114	1.3	-	-	66.6	-	-	-	-	-
21	Present Study	546	4.5	5.4	8.6	71	2.3	2.7	-	-	2.3

Table 4: Showing Comparison of Various Studies with Present Studies other than Tuberculosis

Sl. No.	Name of Authors	Years of the Study	Total Patients	Numbers Active TB	Numbers Old Tuberculosis
1	Prasad R ¹²	2009	476	329 (69.1%)	48(10.08%)
2	Pragati R ²⁹	2015	140	37(26.4%)	33(23.5%)
3	Patel R ³⁰	2015	50	19(38%)	11(22%)
4	Adesh Kumar ³¹	2016	462	73(15.8%)	110(23.8%)
5	Nazir Shah ³²	2014	246	45 (18.2%)	22(8.9%)
6	Present Study	2016	546	210(38.4%)	178(32.6%)
Table 5: Showing Distribution of Haemoptysis Patients in Active Tuberculosis and Old Treated Tuberculosis Groups reported by various Indian Studies					

DISCUSSION

Review of literatures revealed that aetiological pattern of haemoptysis has changed in the developed countries with pulmonary tuberculosis becoming less important as a common cause.^{33,15-24}

Tuberculosis was reported as an important cause of haemoptysis in older articles. In the series of Abbot from Atlanta in the 1940s, the main diagnosis was active tuberculosis in 22% and bronchiectasis in 21% of the cases.⁵ While in present study the main aetiology was active pulmonary tuberculosis, old pulmonary tuberculosis in 38.4% and 32.6% cases and followed by chronic bronchitis in 8.6% cases.

Domoua K et al done a retrospective study in 142 cases to ascertain the main aetiologies of haemoptysis observed in the Pneumophthysiology Unit and they highlighted that the main aetiologies were pulmonary tuberculosis, acute pneumonia, bronchiectasis, pulmonary aspergilloma and bronchogenic cancer in 49.3%, 13.3%, 11.2%, 7.7% and 4.2% cases of haemoptysis, respectively.²⁵ While in present study pulmonary tuberculosis, chronic bronchitis, bronchiectasis and bronchogenic carcinoma were found in 71%, 8.6%, 5.4% and 4.5% cases respectively. Hirshberg B et al did a retrospective analysis of 208 patients with haemoptysis and found that Bronchiectasis, Lung Cancer, Bronchitis and Pneumonia in 20%, 19%, 18% and 16% cases, respectively.⁸ Another study from Kuwait done to evaluate the aetiology of haemoptysis in 52 patients and they observed haemoptysis in bronchiectasis, old pulmonary tuberculosis, active pulmonary tuberculosis, bronchogenic cancer and chronic bronchitis in 21.2%, 17.3%, 15.4%, 9.6% and 5.8% cases, respectively.¹⁰

Fidan A et al done retrospective analysis of 108 patients admitted to the hospital for haemoptysis and reported that Lung cancer was the leading cause of haemoptysis (34.3%) followed by bronchiectasis (25.0%), tuberculosis (17.6%), pneumonia (10.2%) and pulmonary embolism (4.6%).²⁶

Unsal E et al did a study among 143 patients with haemoptysis and found that Bronchiectasis was the most common cause of haemoptysis (22.4%) followed by lung cancer (18.9%), active tuberculosis (11.2%) and inactive tuberculosis (10.5%).²⁷ Rakotoson JL et al carried out a prospective study in 114 cases of haemoptysis and they found that active pulmonary tuberculosis was the most common aetiology (66.66%) and less commonly by bronchogenic carcinoma (1.7%) and aetiology was undetermined in a significant number of cases (15.78%).²⁸ The details of various other studies are summarised in Table No. 4.

However, in developing countries, pulmonary tuberculosis is still found to be the major cause of haemoptysis.^{9,11,25} In India, Pulmonary tuberculosis was the most common cause of haemoptysis in various study and it is

still the leading cause of haemoptysis as evident from the present study.¹¹

Prasad R et al done a prospective study to evaluate the various aetiologies of haemoptysis and they highlighted that pulmonary tuberculosis was the leading cause of haemoptysis (79.2%), Bronchogenic carcinoma (5.7%), chronic bronchitis (4%), Bronchiectasis (3.8%) and others (7.3%).¹²

Patel KR et al did a prospective study in 50 cases and reported that tuberculosis was associated in 60% of the patients with 38% of the patients having active pulmonary tuberculosis and majority of the patients (60%) had mild haemoptysis, while moderate haemoptysis was present in 32% of patients and only four patients (8%) had severe haemoptysis.³⁰ The data in present study found that tuberculosis was associated with 71% cases and of which active pulmonary tuberculosis and old treated pulmonary tuberculosis were in 38.4% and 32.6% cases, respectively. The present study also highlighted that among tuberculosis group, mild form of haemoptysis was encountered in 86% cases followed by severe form in 7% cases.

Pragati Rao et al evaluated 140 cases of haemoptysis and they found pulmonary tuberculosis (65%), bronchogenic carcinoma (10%), pneumonia (6.4%), bronchiectasis (4.2%), lung abscess (2.8%) and bronchitis (1.4%).²⁹ Kumar A et al did a study in 462 patients of haemoptysis and concluded that sputum AFB-negative post-tubercular sequelae (24%) was the leading cause.³¹ (The details of various Indian studies are summarised in Table No. 5).^{12,29-32}

All the patients had full investigations to find out the aetiology of haemoptysis, but we could not find the aetiology in 2.5% of the cases. Saunders and Smith⁷ Santiago et al,²¹ Set et al³⁴ and Miller et al³⁵ also noted the similar findings.

CONCLUSION

The present study highlighted that pulmonary tuberculosis is still the most important cause of haemoptysis in India, but it can occur in higher frequency in both active pulmonary tuberculosis and old treated pulmonary tuberculosis cases. This study also showed that haemoptysis may occur in various other diseases also apart from tuberculosis. Present study also raises the awareness among general physician about various aetiologies of haemoptysis other than pulmonary tuberculosis.

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