Bacterial And Fungal Causes Of Hemoptysis In Patients Of A Tertiary Care Center In Western Uttar Pradesh

P. P. Mishra*, Ved Prakash Sharma, R. K. Patial@, Nitesh Mohan®, Vinay shekhar©**

*Assistant Professor Dept of Microbiology, **Associate Professor Dept of Microbiology , @ Professor & HOD Dept of Medicine, ®Associate Professor Dept of Pathology, © P.G. student Dept of Microbiology, Rohilkhand Medical College & Hospital, Bareilly U.P

Abstracts: Objective: To study the various bacterial, fungal and neoplastic causes of hemoptysis in patients of different age groups in a teaching hospital in western Uttar Pradesh (U.P) Materials & Methods: One hundred & Eighty patients who were admitted to the Department of Chest & T.B and in the Department of Medicine from Jan 2010 to Jan 2012 were included in this study. The patients were characterized on the basis of Clinical signs & symptoms, physical examination, complete blood count with platelets, bleeding time, clotting time, prothrombin time [clotting profile] chest radiography, CT scan, bronchoscopy, histopathological examination and microbial examination including culture of sputum & Bronchoalveolar Lavage. Results: Out of 180 patients admitted, 114 were males & 66 were females. The cause has been identified in 55 patients (32 males & 23 females) while in remaining cases the cause was undiscovered. Pulmonary tuberculosis was identified as the most leading cause of hemoptysis (38.16%) [*Mycobacterium tuberculosis* alone and *M. tuberculosis* with other bacteria in case of coinfection], followed by bacterial agents [*Staphylococcus aureus* (9.09%), *Klebsiella spp* (9.09%), *Pseudomonas aeruginosa* (5.45%) and *Streptococcus pneumoniae* (1.81%). Among the fungal agent we have found *Aspergillus spp* (10.9%) and *Mucor* in 1 case (1.81%). The other group of patients include the neoplasms (20.0%). Coinfection was seen among (14.54%) patients and the agents were [*Mycobacterium tuberculosis* & *Pseudomonas aeruginosa*] (5.45%), [*M. tuberculosis* & *S. aureus*] (3.63%), [*M.tuberculosis & klebsiella spp*] (1.81%), [*Klebsiella* & *S.aureus*] (3.63 %) Conclusion: In developing countries like India with such an increasing population, hemoptysis is one of the potentially life threatening symptom of underlying respiratory tract infection. An adequate & efficient evaluation of the etiological agents causing hemoptysis plays a pivotal role in management of such patients. The purpose of this study was to identify the different etiological agents along with the other causes of hemoptysis. [Mishra P et al NJIRM 2012; 3(5) : 32-35]

Keywords: Hemoptysis, Tuberculosis, Etiology, Aspergillus, Neoplasm

Author for correspondence: Prem Prakash Mishra, Department of Microbiology, Rohilkhand Medical College & Hospital, Bareilly U.P 243006. Mob: 08126427596 Email: prem6284@gmail.com

Introduction: Hemoptysis is defined as the spitting of blood derived from the lungs or bronchial tubes as a result of pulmonary or bronchial hemorrhage.[1] It is a major emergency in pulmonary medicine, although common in adults, blood tinged sputum is a rare presenting symptom in children. The blood in hemoptysis is bright red in color & may be admixed with sputum and frothy. While "hematemesis" is a condition in which blood is dark red or brown and may be mixed with food particles. [2] In case there is difficulty in distinguishing one from other estimation of pH is done. In hemoptysis pH is alkaline and in hematemesis pH is acidic. Hemoptysis is classified as nonmassive or massive based on the volume of blood loss; however, there are no uniform definitions for these categories. [3]

Although tuberculosis was once the major cause of hemoptysis, nowadays the etiologies are multiple and diverse. The etiology in children generally differs from that in adults. Hemoptysis in adults is most often caused by bronchitis, bronchogenic carcinoma, tuberculosis, or bronchiectasis.[4,5] While in children hemoptysis is most likely to be secondary to infection, tracheostomy-related problems, or foreign body aspiration.[6,7,8] It is therefore critical to understand and evaluate the various etiologies, diagnostic modules, which will help in management of hemoptysis.

Material and Methods: One hundred and eighty consecutive patients of hemoptysis who were admitted to the Department of Chest & T.B and Department of Medicine between the period of January 2010 to January 2012 were included in this study. Data were collected regarding Age, sex & clinical history. The patients were evaluated with detailed medical history (smoking, environmental exposure like arsenic, asbestos etc., occupation, etc.), physical examination (vital signs, cyanosis,

pallor, clubbing etc), chest radiography, C.T scan, bronchoscopy etc. Complete blood count with platelets, Bleeding time, clotting time, Prothrombin time clotting profile were performed. The pH of sputum was also determined to distinguish it from Hematemesis.

The sputum is evaluated for bacterial agents by Gram staining, Zeihl- Neelsen staining and culture on Blood Agar HIMEDIA, Mac Conkey Agar HIMEDIA, Chocolate Agar HIMEDIA and Lowenstein Jensen media HIMEDIA for M. tuberculosis. The isolates were identified by standard biochemical tests. Potassium Hydroxide mount was performed for the fungal hyphae and spores. These were then cultured on Sabouraud Dextrose Agar with chloramphenicol and were confirmed by Lacto Phenol Cotton Blue mount.

A complete blood picture including W.B.C count T.L.C & D.L.C, Hb, Platelet count, Erythrocyte Sedimentation rate E.S.R has been performed. For neoplastic processes, histopathological evidence has been evaluated for determination of malignancy.

Result: A total of 180 patients {114 (63.33%) males and 66 (36.66 %)} of various age groups with hemoptysis were admitted in the wards of the Hospital during the study period as shown in **Table 1**.

Table 1: The Sex And Age Group Of Patients Presented With Hemoptysis.

AGE GROUP	MALE	FEMALE
0-10 yrs	12	06
yrs	44	21
>40 yrs	58	39
Total=180	114	66

The patients of more than 40 years of age have highest incidence. Based on the data of the clinical history, the various risk factors like chronic smoking, exposure to asbestos and harmful chemicals, tuberculosis, recurrent respiratory tract infections and immunocompromised conditions are documented in **table 2.**

Table 2: The Various Risk Factors In The Admitted Patients That May Be Associated With Hemoptysis:

Sl.no	RISK FACTORS	Number of patients
1	History of chronic smoking	63
2	Pulmonary tuberculosis	17
3	Recurrent respiratory tract infections	47
4	Environmental exposure to asbestos, cement, & other chemicals	19
5	Immunocompromised conditions	19
6	No significant factors	61
Note: various patients had multiple risk factors		

The cause has been identified in 55 patients 32 (58.18%) males and 23(41.81%) females. Among the causative agents M. tuberculosis (27.27%) was found to be the leading cause, followed by the neoplastic cases (20.0%), *Aspergillus spp* (10.9%), *S.aureus* (9.09%), Klebsiella spp (9.09%), *Pseudomonas aeruginosa* (5.45%), *S. pneumonia* (1.81%), *Mucor spp* (1.81%). Polymicrobial causes include *M. tuberculosis* and *Pseudomonas* (5.45%), *M. tuberculosis* and *S.aureus* (3.63%), *M. tuberculosis* and *Klebsiella spp* (1.81%), *Klebsiella* and *S.aureus* (3.63%). The frequency and the percentage of causative agents were shown in **table 3**.

Table 3: Various Etiological Agents:

SL NO.	ETIOLOGICAL AGENTS	FREQUENCY	PERCENTAGE (%)
1	*M. tuberculosis*	15	27.3
2	*Neoplasms*	11	20.0
3	*Aspergillus spp*	06	10.9
4	*S.aureus*	05	9.1
5	*Klebsiella spp*	05	9.1
6	*P.aeruginosa*	03	5.4
7	*S. pneumoniae*	01	1.8
08	*Mucor spp*	01	1.8

09	*M. tuberculosis* and *P.aeruginosa*	03	5.4
10	*M. tuberculosis* and *S.aureus*	02	3.6
11	*M. tuberculosis* and *Klebsiella spp*	01	1.81
12	*Klebsiella* and *S. aureus*	02	3.63

M. tuberculosis= Mycobacterium tuberculosis
S.aureus = Staphylococcus aureus
P.aeruginosa = Pseudomonas aeruginosa
S. pneumoniae = Streptococcus pneumoniae

Discussion: Studies from different part of the world revealed that the etiological pattern of hemoptysis differs in the developed countries than that of the developing countries like India. Pulmonary tuberculosis being the most common cause of hemoptysis in India, while in western countries It is becoming less important cause of bleeding from lungs.[9] Our studies shows the incidence of Pulmonary tuberculosis responsible for hemoptysis as 38.16 % Mycobacterium tuberculosis alone and M. tuberculosis with other bacteria in case of coinfection. Similar pattern was reported by Rao in 1960[10] and other studies from developing countries[11-14] The neoplastic cases responsible for hemoptysis were found to be 20 % in our study which is somewhat similar to a study from United states showing 23% cases[15] The incidence of malignancy in various other developed countries has ranged from 5-44 %[16-22]

Among the fungal agents predominantly Aspergillus spp. (10.9%) and mucor spp (1.81%) are among the leading causes of hemoptysis. The agents causing lower respiratory tract infections such as bronchitis or pneumonia were found to be (30.88%) S.aureus (9.09%), Klebsiella spp (9.09%), Pseudomonas aeruginosa (5.45%), S.pneumoniae (1.81%), Mucor spp (1.81%), klebsiella + S.aureus (3.63%). In a retrospective study [15] of inpatient and outpatient of hemoptysis in the United States, bronchitis caused 26% of cases, pneumonia caused 10 % and tuberculosis accounted for 8%. Another study shows 40% of the cases to be acute lower respiratory tract infections, either pneumonia or tracheobronchitis [23]. The incidence of coinfection in our study was found to be 14.52%. Among the risk factors chronic smoking, pulmonary tuberculosis along with other factors or the multiple risk factors were found in patients admitted. The incidence of hemoptysis was more common in males as compared to females, more in adults as compared to children which may be due to increased exposure to risk factors.

Conclusion: Hemoptysis in the patients requires prompt and thorough evaluation and treatment. In developing countries like India Pulmonary tuberculosis is still the major cause of hemoptysis, but there are other major causes of hemoptysis too, so it should be considered that hemoptysis not always reflects underlying pulmonary tuberculosis. An efficient systematic evaluation is imperative to identify the underlying etiology and infection before opting for blind treatment such as antituberculous treatment.

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References:

1. Stedman TL. Stedman's Medical dictionary. 27th ed. Philidelphia: Lipincott Williams & Wilkins, 2000.
2. Turcios NL, Vega M. The child with hemoptysis. Hosp Pract 1987; 22: 217-218.
3. Thompson AB, Teschler H, Rennard SI. Pathogenesis, evaluation, and therapy for massive hemoptysis. Clin Chest Med. 1992;13:69–82.
4. Johnston H, Reisz G. Changing spectrum of hemoptysis: underlying causes in148 patients undergoing diagnostic flexible fiberoptic bronchoscopy. Arch Intern Med. 1989;149:1666-1668.

5. Hirschberg B, Biran I, Glazer M, et al. Hemoptysis: etiology, evaluation, and outcome in a tertiary referral hospital. Chest. 1997;112:440-444.
6. Tom LW, Weisman RA, Handler SD. Hemoptysis in children. Ann Otol Rhinol Laryngol. 1980;89:419-424.
7. Fabian MC, Smitheringale A. Hemoptysis in children: the Hospital for Sick Children experience. J Otolaryngol. 1996;25:44-45.
8. Thompson JW, Nguyen CD, Lazar RH, et al. Evaluation and management of hemoptysis in infants and children: a report of nine cases. Ann Otol Rhinol Laryngol.1996;105:516-520.
9. Bidwell JL, Pachner RW. Hemoptysis: Diagnosis and management. Am Fam Physician. 2005;72:1253–60.
10. Rao PU. Hemoptysis as a symptom in a chest clinic. Indian J Chest Dis. 1960;2:219.
11. Ashraf O. Hemoptysis: A developing world perspective. BMC Pulmonary Med. 2006;6:1.
12. Abal AT, Nair PC, Cherjan J. Hemoptysis: Aetiology, evaluation and outcome-a prospective study in a third-world country. Respir Med. 2001;95:548–52.
13. Stebbings AE, Lim TK. Cause, treatment and outcome of patients with life-threatening hemoptysis. Singapore Med J. 1999;40:67–9.
14. Domoua K, N'Dhatz M, Coulibaly G, Aka-Danguy E, Traore F, et al. Hemoptysis:main etiologies observed in a pneumology department in Africa. Rev Pneumol Clin. 1994;50:59–62.
15. Reisz G, Stevens D, Boutwell C, Nair V. The causes of hemoptysis revisited. A review of the etiologies of hemoptysis between 1986 and 1995. Mo Med. 1997;94:633–5.
16. Johnston RN, Lockhart W, Ritchie RT, Smith DH. Hemoptysis. Br Med J. 1960;1:592–5.
17. Santiago S, Tobias J, Williams AJ. A reappraisal of the causes of hemoptysis. Arch Intern Med. 1991;151:2449–51.
18. Pursel SE, Lindskog GE. Hemoptysis: A clinical evaluation of 105 patients examined consecutively on a thoracic surgical service. Am Rev Respir Dis. 1961;84:329–36.
19. Van Kralingen KW, van Kralingen-Heijboer AC, Zimmerman M, Postmus PE. Management of hemoptysis in a Third World city hospital: a retrospective study. Tuber Lung Dis. 1995;76:344–8.
20. Souders CR, Smith AT. The clinical significance of hemoptysis. N Engl J Med. 1952;247:790–4.
21. Moersch HJ. Clinical significance of Hemoptysis. JAMA. 1952;148:1461–5.
22. Baric D. The origin of hemoptysis in patients admitted to the pneuno-phtisiology department of the Zadar Hospital between 1970 and 1980. Bull IUAT. 1984;59:205–6.
23. Turcios NL, Vega M. The child with hemoptysis. Hosp Pract. 1987;22:214, 217-218.

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