

## Pulmonary Manifestations in Leukemia

<sup>1</sup>Hariprasad R,<sup>2\*</sup>Ravi kumar G,<sup>3</sup>Sundararajaperumal A

<sup>1</sup>Assistant Professor, Dept Of Thoracic Medicine, Govt Mohan Kumaramangalam Medical College, <sup>2</sup>Assistant Professor, <sup>3</sup>Associate Professor, Dept Of Thoracic Medicine, Chengelpattu Medical College & Hospital, Tamil Nadu

Corresponding author : \*Ravi Kumar G

### Abstract

**Background:** Pulmonary complications are common in patients with Leukemia. The most common pulmonary manifestations is infection with bacterial or opportunistic organisms.

**Aim:** To observe pulmonary manifestations in patients with leukemia.

**Materials & Methods:** 123 Patients with Leukemia were taken into the study. Sputum analysis, chest x-ray and CT chest were done in all patients.

**Results:** A total of 123 patients were recruited in our study, among them 42 patients were male and 81 patients were female. The highest incidence of Leukemia was noted in 16-30 years age group. Among 123 patients 60 had no abnormal defect, 57 had parenchymal infiltrate and 6 had pleural effusion in radiological investigations. In 57 patients with parenchymal infiltrate, 35 had focal and 22 had diffuse infiltrate. Bacterial pneumonia was reason for focal infiltrates in 25 patients and fungal organisms were reason for diffuse infiltrates in 17 patients. Among 51 patients of Acute Myeloid Leukemia, 30 persons and all 8 patients with Chronic Myeloid Leukemia had Upper Respiratory Tract Infection/ Acute Bronchitis. 18 patients with Acute Lymphoblastic Leukemia and 4 Chronic Lymphoid Leukemia patients had Upper Respiratory Tract Infection/ Acute Bronchitis. 89% (25/28) of bacterial and all fungal pneumonia were occurred in Acute Leukemia. All pleural effusion cases were occurred in chronic Lymphoid Leukemia. In pneumonia predominant organisms were gram negative bacteria followed by *Aspergillus fumigatus*.

**Conclusion:** URTI/ Acute bronchitis are the most common associated pulmonary manifestations in Leukemia. In pneumonia predominant organisms were gram negative bacteria followed by *Aspergillus fumigatus*.

**Keywords:** Leukemia, Parenchymal infiltrate, Bacterial Pneumonia, Fungal pneumonia

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### I. Introduction

Leukemia are a diverse group of disorders. Myeloid neoplasms are heterogeneous group of disease which has an origin in a progenitor cell that normally gives rise to terminally differentiated cells of myeloid series (erythrocytes, granulocytes, monocytes and platelets). Three categories of myeloid neoplasms are recognized, they are:

1. Acute Myeloid Leukemia, in which immature progenitor cells accumulate in the bone marrow
2. Myelodysplastic syndrome associated with ineffective hematopoiesis and leads to peripheral blood cytopenia
3. Chronic Myeloproliferative disorders in which increased production of one or more terminal differentiated myeloid elements usually leads to an elevation of peripheral counts.

Acute lymphoblastic leukemia/lymphoma (ALL) includes a group of neoplasms composed of immature precursor B (pre-B) or T (pre-T) lymphocytes. Chronic lymphocytic leukemia (CLL) is the most common variety of leukemia, accounting for 30% cases, which composed of mature B lymphocytes.

Pulmonary complications are common in patients with any of the hematological malignancies and it depends upon multiple factors, including the 1.type of leukemia 2.significant neutropenia and thrombocytopenia 3.nature and time course of treatment 4.patient's immunocompromised status, chemotherapy and radiotherapy 5. Complicating medical illness.

In hematological malignancy, the true incidence of pulmonary complications is difficult to assess because most articles reported are selected for patients with specific pulmonary complications or particular leukemia and the incidence of pulmonary manifestations varies over a wide range, depending upon symptoms, sputum analysis, chest radiographs, CT chest, Broncho alveolar lavage, histopathological findings alone are used as the index of disease.

In patients with Leukemia, the most common pulmonary complication is infections with bacterial or opportunistic pathogens. Pleural effusions may occur as an isolated finding or associated with parenchymal abnormalities, other manifestation are stasis of blast cell, blast cell lysis, Hyper leukocytic reaction, Hemorrhage, Complication of chemotherapy, Alveolar proteinosis.

Not many studies are available regarding pulmonary manifestations in leukemia patients. Hence in this study we discussed about various pulmonary manifestations in these disorders.

## **II. Materials and methods**

**Study Design:** This is Prospective (Observational) study designed to find the Pulmonary manifestations of patients with leukemia in a tertiary care Institution.

**Study Center:** Department of thoracic medicine, Rajiv Gandhi Government general Hospital & Madras Medical College, Department of Hematology, Rajiv Gandhi Government general Hospital & Madras Medical College, Chennai-3

**Study Duration:** Ten months

**INCLUSION Criteria:** 1. age >12 years. 2. Any patient diagnosed with Leukemia Presenting with respiratory symptoms /having respiratory signs during examination / with radiological abnormalities

**Exclusion Criteria:** 1. Patients Those Who Are Not Willing To Give Consent.

2. Patients too ill for a detailed work up were excluded

123 inpatients in the Hematology & Thoracic medicine department with respiratory manifestations who satisfied the above inclusion & exclusion criteria were enrolled in this study. After obtaining informed consent from them they were examined clinically after a detailed history.

These patients were subjected to various diagnostic tests including Complete blood count, Random blood sugar, Renal function test, Liver function test, HIV testing, Sputum for Acid Fast Bacilli, Sputum for Gram stain, Sputum for aerobic bacterial culture, Sputum for fungal smear & culture, Sputum for malignant cells, Chest X ray, High resolution CT. Patients with pleural effusion in chest x ray were subjected to diagnostic thoracentesis, and the pleural fluid has been sent for, Biochemical analysis like sugar, protein and lactate Dehydrogenase, Cell count, Cytology for malignant cells, Acid fast stain, Gram stain & aerobic bacterial culture, Fungal smear & fungal culture.

## **III. Results**

A total of 123 patients were recruited in our study, among them 42 patients were male and 81 patients were female. The highest incidence of Leukemia was noted in the 16-30 years age group, there was a female preponderance. The distribution of Leukemia in 123 patients, in which 51 patients had Acute Myeloid Leukemia (AML), 8 patients had Chronic Myeloid Leukemia (CML), 47 patients had Acute Lymphoblastic Leukemia (ALL), 17 patients had Chronic Lymphoid Leukemia (CLL).

Cough and expectoration was the common symptom followed by fever.

Regarding radiological findings among 123 patients, 60 had no abnormal defect, 6 patients had pleural effusion and 57 patients had parenchymal infiltrates. Out of 57 patients with parenchymal infiltrate, 35 had focal and 22 had diffuse infiltrate. All Chronic Myeloid Leukemia had no abnormal defect in radiography. Among 51 Acute Myeloid Leukemia patients, 30 had no abnormal defect, 12 persons had focal infiltrates and 9 patients had diffuse infiltrate. Among 47 Acute lymphoblastic leukemia patients 18 had no abnormal defect, 18 persons had focal infiltrates and 11 patients had diffuse infiltrate. Out of 17 Chronic Lymphoid Leukemia, 4 patients had no abnormal defect, 5 patients had focal infiltrate and 2 had diffuse infiltrate and 6 persons with pleural effusion.

Cause for the disease process was established in 25 of 35 patients with focal infiltrate and 17 of 22 patients with diffuse infiltrate. Out of the 25 patients with focal infiltrate in which the cause could be established, all persons had bacterial infection. In 17 patients with diffuse infiltrate in which the cause could be established, 14 patients had fungal infection and remaining persons had bacterial infection. We done sputum analysis in all 123 patients, 81 patients had no growth in culture. 28 patients had bacterial growth among them gram negative organisms showed more predominance. Main organisms were *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* followed by *Staphylococcus aureus*. 14 patients had fungal growth, mainly *Aspergillus fumigatus*. Among 51 patients of Acute Myeloid Leukemia, 30 persons and all 8 patients with Chronic Myeloid Leukemia had Upper Respiratory Tract Infection/ Acute Bronchitis. 18 patients with Acute Lymphoblastic Leukemia and 4 Chronic Lymphoid Leukemia patients had Upper Respiratory Tract Infection/ Acute Bronchitis. 89% (25/28) of bacterial and all fungal pneumonia were occurred in Acute Leukemia. All pleural effusion cases were occurred in chronic Lymphoid Leukemia.

#### IV. DISCUSSION

Hematological malignancies are a diverse group of disorders, in which various pulmonary manifestations are noted. Infections are common causes for increased morbidity and mortality in those patients with leukemia, among which lung is the commonest site

- 1) Principle reason for pulmonary abnormalities and hospitalization in those with hematological malignancies was infection
- 2) Pulmonary infections were more common in patients with acute leukemia
- 3) A Rano et al in his study, says that infections by bacterial organisms mainly those caused by *Pseudomonas aeruginosa* and *Staphylococcus aureus* were the most frequent infections. Fungal organisms, mainly *Aspergillus* species were the second most common infectious cause of pulmonary infiltrates
- 4),5). Although evidence of tissue invasion by fungal organism has classically been required to confirm the diagnosis of fungal infections, the presence of *Aspergillus* species in sputum or bronchial lavage culture should be considered indicative of invasive fungal disease until proved otherwise and warrants institution of specific anti-fungal therapy(6).

A study about "pulmonary infiltrates in leukemia" by Maj Michael F. Tenholder et al says that, in 82% of patients presented with focal disease due to infection, the infection were primarily bacterial in origin in 86% of patients, with only 13% of patients with focal infiltrates were infected by opportunistic organisms. The episodes of diffuse pulmonary infiltrates occur during treatment were infectious only in 35% of patients. In contrast to the group with focal disease, 93% of patients with diffuse infiltrate were infected with opportunistic organisms. Bacterial and opportunistic infections are primary complications of acute leukemia. Infiltrates with local distribution are frequently bacterial infections and for diffuse distribution opportunistic organisms are frequent etiology(7). In our study, 123 patients were included. Among them 80% (98/123) patients were belonged to Acute Leukemia. Regarding radiological findings 60 patients had no abnormal defect, 57 patients had parenchymal infiltrate and 6 patients had pleural effusion. In 57 patients, 35 had focal infiltrate and 22 had diffuse infiltrate. 91% (50/57) patients with parenchymal infiltrate were belonged to Acute Leukemia. Of the 35 patients with focal infiltrate the cause was established in 25 patients, all had bacterial infections. Among 22 patients with diffuse infiltrate etiology was identified in 17 patients, fungal organisms were the cause in 82% of patients. Out of 123 patients, sputum culture results positive only in 42 patients. Predominant organisms were *Pseudomonas* followed by *Klebsiella* and *Aspergillus*. Upper Respiratory Tract Infection/ Acute Bronchitis were the most common respiratory diagnosis in patients with Leukemia in our study, followed by bacterial & fungal pneumonia. Incidence of both bacterial & fungal pneumonia occurs only in Acute Leukemia.

#### V. Conclusion

1. Upper Respiratory Tract Infection and Acute Bronchitis are the most common associated respiratory disorder in patients with Leukemia.
2. Bacterial pneumonia predominantly present as focal infiltrates and fungal pneumonia as diffuse infiltrates.
3. Predominant organisms are gram negative bacteria (*Pseudomonas aeruginosa* & *Klebsiella pneumoniae*) followed by fungal (*Aspergillus fumigatus*) organisms.

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\*Ravi kumar G. "Pulmonary Manifestations in Leukemia." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 16.9 (2017): 30-32