

# Clinico-Pathological Evaluation of Acute and Chronic Forms of Leukemias

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## Abstract

**Background and aim:** Leukemias are neoplastic proliferations of haematopoietic cells and form a major proportion of haematopoietic neoplasms that are diagnosed worldwide. It represents one of the most important problems in the field of hematology. Diagnosis the type and subtype of leukemia is very important as the therapy, prognosis and survival rate changes with each type and subtype. This is a clinicopathological evaluation of leukemia undertaken at GMC Aurangabad, marathwada region of maharashtra.

**Methods:** Clinical history of seventy leukemia patients was recorded. Peripheral smear and bone marrow examination was done and various haematological parameters were noted. Cytochemistry was done in all 27 cases of acute leukemia.

**Results:** The present study is a clinic-pathological profile of 70 cases of leukemia. Eight (11%) patients were children less than presentations of 12 years and the rest 62 (89%) were adults. Out of 70 patients, 44 were males and 26 were females. Male to female ratio was 1.6: 1. Of the 70 cases, 27 (39%) cases were acute leukemias and 43 (61%) cases were chronic leukemias

**Conclusion:** The commonest type of leukemia observed in this study was CML and CLL was less frequent. In almost all age groups and types of leukemias, males predominated and presented with generalized weakness and fever. Peripheral smear examination, bone marrow studies and cytochemistry are the gold standards in the accurate diagnosis of leukemia but use of the recent techniques like immunophenotyping and cytogenetics is essential in difficult cases.

**Keywords:** Cytochemistry; Immunophenotyping; Cytogenetics

lymphoid, based on the origin of the leukemic stem cell clone. These two groups are further classified based on the aggressive of the illness and differentiation of the leukemic cells as: 1. Acute, an aggressive disease (Acute Myeloid Leukemia- AML; Acute Lymphoid Leukemia- ALL) 2. Chronic, a less aggressive form (Chronic Myeloid Leukemia-CML: Chronic Lymphoid Leukemia- CLL) [2]. Diagnosis the type and subtype of leukemia is very important as the therapy, prognosis and survival rate changes with each type and subtype. The diagnosis of leukemia has moved from evaluation by morphology and cytochemistry to assessment by modern methods immuno-phenotyping, molecular chemistry [3].

## Aims and objective

- To study the pattern of leukemias in marathwada region of Maharashtra
- To study clinical and haematological presentations of various types of leukemias
- To analyse the demographic data (age and sex distribution) in various types of leukemias

## Materials and methods

A Prospective study, in the department of Pathology, GMC Aurangabad. Clinical history of each patient was recorded. Various haematological parameters were noted. The peripheral smears were stained with Leishman's stain and examined. Cytochemical stains employed for the diagnosis were Myeloperoxidase (MPO) stain, Sudan Black B (SBB) stain and Periodic Acid Schiff (PAS) stain.

## Results

The present study is a clinic-pathological profile of 70 cases of leukemias. Eight (11%) patients were children less than presentations of 12 years and the rest 62 (89%) were adults. Out of 70 patients, 44 were males and 26 were females. Male to female ratio was 1.6: 1. Of the 70 cases, 27 (39%) cases were acute leukemias and 43 (61%) cases were chronic leukemias. The observations are as follows (Tables 1-5).

## Introduction

Leukemias are neoplastic proliferations of haematopoietic cells and form a major proportion of haematopoietic neoplasms that are diagnosed worldwide. Lympho-haematopoietic malignancies constitute 9.5% of cancer in men and 5.5% in women. Leukemias are 10<sup>th</sup> most common cancer in men and 12<sup>th</sup> in women and constitute 3% of total global cancer burden [1]. Leukemias are classified into two broad groups, myeloid and

**Table 1:** Age and gender distribution of Leukemia cases.

| AGE         | Type of leukemia [No. (%)] |           |            |           |
|-------------|----------------------------|-----------|------------|-----------|
|             | AML                        | ALL       | CML        | CLL       |
| 0-10 Years  | 0                          | 4(33.33%) | 0          | 0         |
| 11-20 Years | 2(13.33%)                  | 5(41.66%) | 1(2.70%)   | 0         |
| 21-30 Years | 1(6.66%)                   | 1(8.33%)  | 2(5.40%)   | 0         |
| 31-40 Years | 4(26.66%)                  | 2(16.66%) | 3(8.10%)   | 0         |
| 41-50 Years | 5(33.33%)                  | 0         | 22(59.45%) | 1(16.66%) |
| 51-60 Years | 2(13.33%)                  | 0         | 4(10.81%)  | 4(66.66%) |
| ≥ 61 Years  | 1(6.66%)                   | 0         | 5(13.51%)  | 1(16.66%) |
| Gender      |                            |           |            |           |
| Male        | 9(60%)                     | 9(75%)    | 22(59.45%) | 4(66.66%) |
| Female      | 6(40%)                     | 3(25%)    | 15(40.54%) | 2(33.33%) |
| TOTAL       | 15                         | 12        | 37         | 6         |

**Table 2:** Distribution of patients according to type and subtype of leukemias.

| Type and subtype of Leukemia | No. (%)    |
|------------------------------|------------|
| AML (n=15)                   |            |
| M1                           | 1(6.66%)   |
| M2                           | 8(53.33%)  |
| M3                           | 2(13.33%)  |
| M4                           | 3(20%)     |
| M6                           | 1(6.66%)   |
| ALL (n=12)                   |            |
| L1                           | 5(41.66%)  |
| L2                           | 7(58.33%)  |
| CML (n=37)                   |            |
| CP                           | 24(64.86%) |
| AP                           | 9(24.32%)  |
| BC                           | 4(10.81%)  |
| CLL(n=6)                     |            |

|   |           |
|---|-----------|
| CLL   | 5(83.33%) |
| PLL   | 1(16.66%) |
| CP- Chronic phase, AP- accelerated phase      |           |
| BC-Blast crisis, PLL- Prolymphocytic leukemia |           |

**Table 3:** Distribution of patients according to clinical features of leukemias.

| Clinical Feature        | No. of Cases (%) |            |            |           |
|-------------------------|------------------|------------|------------|-----------|
|                         | AML(n=15)        | ALL(n=12)  | CML(n=37)  | CLL(n=6)  |
| Fever                   | 13(86.66%)       | 11(91.66%) | 30(81.08%) | 5(83.33%) |
| Weakness                | 15(100%)         | 12(100%)   | 36(97.29%) | 5(83.33%) |
| Loss of appetite        | 5(33.33%)        | 4(33.33%)  | 34(91.89%) | 4(66.66%) |
| Weight loss             | 12(80%)          | 10(83.33%) | 36(97.29%) | 5(83.33%) |
| Bone pain               | 10(66.66%)       | 9(75%)     | 28(75.67%) | 2(33.33%) |
| Bleeding Manifestations | 5(33.33%)        | 2(16.66%)  | 0          | 0         |
| Lymphadenopathy         | 7(46.66%)        | 8(66.66%)  | 10(27.02%) | 4(66.66%) |
| Splenomegaly            | 13(86.66%)       | 9(75%)     | 30(81.28%) | 4(66.66%) |
| Hepatomegaly            | 13(86.66%)       | 10(83.33%) | 31(83.78%) | 5(83.33%) |

**Table 4:** Cytochemical staining for acute leukemias.

| Cytochemistry      | AML        | ALL       |
|--------------------|------------|-----------|
| MPO +,SBB +, PAS - | 11(73.33%) | 0         |
| MPO +,SBB +, PAS + | 1(6.66%)   | 0         |
| MPO +,NSE +, PAS - | 3(20%)     | 0         |
| MPO -,SBB -, PAS + | 0          | 8(66.66%) |
| MPO -,SBB +, PAS + | 0          | 3(25%)    |
| MPO -,SBB -, PAS - | 0          | 1(8.33%)  |
| TOTAL              | 15         | 12        |

Cytochemical stains used in all cases of acute leukemia. Out of 15 cases of AML, 12 showed MPO/SBB positivity. Two cases of AML M3 showed strong positivity. One case of AML M4 was positive for MPO/NSE and negative for PAS. All 12 cases of ALL were negative for MPO. Eleven (91.66%) cases of ALL showed block positivity for PAS. One (8.33%) case was negative for MPO, PAS and SBB.

## Discussion

Present study was conducted at Department of Pathology, Government Medical College, Aurangabad and total 70 cases of leukemias were studied. Leukemias are broadly classified into AML, ALL, CML and CLL depending upon clinical course of disease, laboratory and morphological features of leukemic cells

in Peripheral smear and Bone marrow aspirate. Of the 70 cases, 27 (39%) cases were acute leukemias and 43 (61%) cases were Chronic leukemias.

**Table 5:** Comparison of distribution of the various types of Leukemias.

| Study           | Total cases | AML | ALL | CML | CLL | Others |
|-----------------|-------------|-----|-----|-----|-----|--------|
| Kaushal, et al. | 26          | 2   | 9   | 14  | 1   | -      |
| Idris M, et al. | 60          | 18  | 12  | 7   | 9   | 14     |
| Kusum, et al.   | 129         | 49  | 33  | 35  | 2   | 10     |
| Arathi, et al.  | 80          | 17  | 20  | 35  | 8   | -      |
| Persent study   | 70          | 15  | 12  | 37  | 6   | -      |

Higher incidence of chronic leukemia has been reported by [4,7]. CML was the commonest type of leukemia and CLL was the least common in their study. These findings were similar to our study. We found a Male Preponderance in our study with M:F ratio of 1.6: 1 also found overall male preponderance similar to our study [1,4,6,7].

The age range of 1.5 to 78 years is in concordance with study [8]. In our study out of 15 cases of AML, 13 (86.66%) were adults and 2 (13.33%) were children. This correlates with the findings of [8]. Who had 75 adult AML and 24% childhood AML? In our study out of 12 cases of ALL, 9 (75%) were children and 3 (25%) were adult. All the CML and CLL cases were adults mainly 41-50 years' age group and >45 years age group respectively [9]. Found that ALL was more commonly noted in children (<15) whereas AML was more commonly noted in adult (>15 Years). Both CML and CLL were observed only in adults in their study. These findings were in concordance with our study.

In present study out of 15 cases of AML, we found AML-M2 as the commonest type followed by M3 and M4. No cases of AML M0, M5 and M7. These findings correlate with study [10]. In our study, maximum CML cases in Chronic Phase (CP) 24(64.86%) cases, 9(24.32%) cases in Accelerated Phase (AP) and 4(10.81%) cases were in Blast Crisis (BC) which consists with Study [11].

Different types of leukemias have different clinical presentation. In our study weakness followed by fever were the most common symptoms. Bleeding manifestation were seen mainly in acute leukemias specially AML-M3. Bone pain was also seen more commonly in AML cases. Lymphadenopathy more common in ALL. Hepatosplenomegaly were found in acute as well as chronic cases. In present study out of 12 cases of ALL, 11 (91.66%) cases showed block positivity for PAS. In study, Out of the 20 cases, 11 (55%) cases showed block PAS positivity [7]. In the study done by 20% cases showed PAS positivity [12].

## Conclusion

We conclude that myeloid neoplasms were more common than lymphoid neoplasms in our study. The commonest type of leukemia observed in this study was CML and CLL was less frequent. In almost all age groups and types of leukemias, males predominated and presented with generalized weakness and

fever. Hepatosplenomegaly were seen in majority of the patients. Peripheral smear examination, bone marrow studies and cytochemistry are the gold standards in the accurate diagnosis of leukemia but use of the recent techniques like immunophenotyping and cytogenetics is essential in difficult cases.

## Conflicts of Interest

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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