

## Research Article

# Spectrum of acute and chronic leukemia at a tertiary care hospital, Haryana, India

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## ABSTRACT

**Background:** Leukemias are primary neoplasms arising from the malignant proliferations of blood cells or their precursors. Leukemias are classified into acute/chronic myeloid and lymphoid subtype. Typing of leukemia is essential for effective therapy because prognosis and survival rate are different for each type and sub-type.

**Methods:** A total of 356 patients diagnosed to have acute/chronic leukemia were included in our study. Only newly diagnosed cases were included in this study and patients on cancer treatment and other primary hematological malignancies like lymphomas, plasma cells disorders and metastatic deposits were excluded. Findings of bone marrow aspiration and peripheral blood were interpreted in respect to history and clinical examination. FAB classification of acute leukemia was applied for sub-typing.

**Results:** In our study, 66.8% of patients had acute leukemia while 33.2% had chronic leukemia. Overall male preponderance was found comprising 56.46% of all cases. Male to female ratio was 1.5:1. Acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML) were found in 29.7% and 37.3% of the patients respectively. Of chronic type leukemia, 28.3% patients had chronic myeloid leukemia (CML) and only 4.7% had chronic lymphocytic leukemia (CLL). L2 was the most common (49.2%) subtype in ALL, followed by L1 (43.3%). AML sub-typing revealed M3 was the most common (50%), followed by M2 (28.7%). Adult patients (70.5%) were more commonly affected than children (29.5%). In paediatric patients ALL was the predominant diagnosis (65.71%), whereas in adult AML cases were maximum (77.27%).

**Conclusions:** Detailed hematological analysis including peripheral blood and bone marrow aspiration smears examination with cytogenetic analysis are necessary for early and definite diagnosis and effective management of hematological malignancies.

**Keywords:** Leukemias, Acute/chronic myeloid and lymphoid subtype

## INTRODUCTION

Malignant proliferation of haematopoietic cells (leukemia) constitutes major proportion of haematopoietic neoplasms worldwide. Leukemias are classified into myeloid and lymphoid subtype.<sup>1</sup> Typing of leukemia is essential for effective therapy because prognosis and survival rate are different for each type and sub-type.<sup>2</sup>

Leukemia are of two types; acute and chronic. Acute leukemias are; acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML). In childhood, ALL is most common type than AML. In India, the incidence of ALL and AML are 35% and 15% of all hematological malignancies respectively. Chronic leukemias are classified into chronic myeloid leukemia (CML) and chronic lymphocytic leukemia (CLL).<sup>3,4</sup>

Diagnosis of different leukemia now depends on cellular morphological details and assessment of genetic changes in subtypes. French American British (FAB) morphologic classification of leukemia has been used since many years. Morphological assessment usually requires blood and bone marrow aspiration smears and marrow trephine biopsy sections with special cytochemical stains.<sup>5-7</sup>

## METHODS

The present retrospective study was carried out in the department of Pathology of Pt. BDS. PGIMS, Rohtak, Haryana, India over a period of 5 years. A total of 356 patients were diagnosed to have acute/chronic leukemia. Only newly diagnosed cases were included in this study and patients on cancer treatment were excluded. Other primary hematological malignancies like lymphomas and plasma cells disorders and metastatic deposits in marrow were also excluded.

Detailed relevant medical history was obtained and clinical examination was carried out. All the haematological parameters were noted. Blood counts were performed on automated haematology analyser and also verified on peripheral blood smear examination followed by bone marrow aspiration for definite diagnosis. The peripheral blood and bone marrow smears were stained with May-Grunwald Geimsa and leishman stain. Special stains were applied on marrow aspiration as well as peripheral blood smears. Findings of bone marrow aspiration and peripheral blood were interpreted in respect to history and clinical examination. FAB classification of acute leukemia was applied for sub-typing.

## RESULTS

In our study, 66.8% of patients had acute leukemia while 33.2% had chronic leukemia (Table 1).

**Table 1: Percentage of acute/ chronic leukemias.**

Type of leukemia	Total no. of cases	Percentage
Acute leukemia	238	66.8%
Chronic leukemia	118	33.2%
Total	356	100%

Acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML) were found in 29.7% and 37.3% of the patients respectively. Of chronic type leukemia, 28.3% patients had chronic myeloid leukemia (CML) and only 4.7% had chronic lymphocytic leukemia (CLL) (Table 2).

Overall male preponderance was found in our study with a percentage of 56.46% of total cases and 43.54% in females. Male to female ratio was 1.5:1. Out of 106 cases of ALL, 71 cases (66.98%) were males and 35 cases (33.12%) females. Male preponderance (n=80, 60.6%) was also seen in AML (n=132) over female gender

(n=52, 39.3%). Similar findings were noted in 101 cases of CML, out of which 55 patients (54.45%) were male and 46 cases (45.54%) were female. Fifteen cases (88.23%) out of 17 cases were male in CLL (Table 3).

**Table 2: Prevalence of different types of acute/ chronic leukemias.**

Type of leukemia	Total no. of cases	Percentage
ALL	106	29.7%
AML	132	37.3%
CLL	17	4.7%
CML	101	28.3%
Total	356	100%

**Table 3: Gender distribution in various leukemia sub-types.**

Type of leukemia	Male	Female	Total
ALL	71 66.98%	35 33.12%	106
AML	80 60.6%	52 39.30%	132
CLL	15 88.23%	2 11.77%	17
CML	55 54.45%	46 45.54%	101
Total	201 56.46%	135 43.54%	356

L2 was the most common (49.2%) subtype in ALL, followed by L1 (43.3%) (Table 4). AML sub-typing revealed M3 as the most common subtype (50%), followed by M2 (28.7%). Least common subtype was M7 (0.75%) (Table 5). Out of 101 cases of CML, only 6 patients were diagnosed as juvenile CML (Table 6).

**Table 4: Prevalence of subtypes of ALL.**

Type of leukemia	Total no. of cases	Percentage
L1	46	43.3%
L2	52	49.2%
L3	8	7.5%
Total	106	100%

**Table 5: Prevalence of subtypes of AML.**

AML	Total no. of cases	Percentage
M0	4	3.03%
M1	10	7.5%
M2	38	28.7%
M3	66	50%
M4	7	5.5%
M5	4	3.03%
M6	2	1.5%
M7	1	0.75%
Total	132	100%

In our study, adult patients (70.5%) were more than children (Table 7). In children, maximum numbers of cases were diagnosed as ALL (65.71%). Maximum

number of AML (n=132) cases were found in adult (77.27%) as compared to children (22.73%) (Table 8).

**Table 6: Prevalence of subtypes of CML.**

Types of CML	Total no. of cases	Percentage
Juvenile CML	6	5.9%
CML	95	94.1%
Total	101	100

**Table 7: Distribution of leukemia cases in children and adult.**

Age (years)	Total no. of cases	Percentage
≤15	105	29.5%
>15	251	70.5%
Total	256	100%

**Table 8: Distribution of leukemia cases in children and adult.**

Types	Children	Adult	Total
ALL	69 65.09%	37 34.91%	106
AML	30 22.73%	102 77.27%	132
CLL	- -	17 100%	17
CML	06 5.95%	95 94.05%	101
Total	105 29.5%	251 70.5%	356

In ALL, male (68.11%) predominance were found over female in children (Table 9). In adult, CML was more commonly found in male over female (Table 10). Maximum cases of ALL were found below 10 years. In age groups of 21-30 and 31-40, maximum cases of AML were observed. CML cases were more in age group in 31-40 years (Table 11).

**Table 9: Distribution of leukemia cases in children.**

Type of leukemia	Male	Female	Total
ALL	47 68.11%	22 31.89%	69
AML	20 66.66%	10 33.34%	30
CML	02 33.34%	04 66.66%	06
CLL	- -	- -	-
Total	69 65.71%	36 34.29%	105

**Table 10: Distribution of leukemia cases in adult.**

Type of leukemia	Male	Female	Total
ALL	24 64.86%	13 35.14%	37
AML	60 58.82%	42 41.18%	102
CML	53 55.78%	42 44.22%	95
CLL	15 88.23%	02 11.77%	17
Total	152 60.55%	99 39.45%	251

**Table 11: Distribution of cases of leukemia in various age groups.**

Age groups (years)	Type of leukemia				Total no. of cases	
	ALL	AML	CML	CLL		
0-10	50	21	02	-	73	
11-20	11-15	19	09	04	-	32
	16-20	16	14	06	-	36
21-30	07	27	20	-	54	
31-40	08	27	25	-	60	
41-50	04	15	15	01	35	
51-60	01	07	11	09	28	
61-70	-	08	12	02	22	
71-80	01	04	05	04	14	
81-90	-	-	01	01	02	
Total	106	132	101	17	356	

## DISCUSSION

Diagnosis of primary hematological malignancies has multiparametric approach which includes evaluation of morphological cellular details and phenotypic or genotypic pattern.<sup>4,7</sup> Acute leukemias (ALL and AML) are more common than chronic hematological malignancies (CLL and CML) all over the world. ALL is more common than AML in the children.<sup>2,3</sup>

In our study, 66.8% of patients had acute leukemia while 33.2% had chronic leukemia. Same results were found in other studies. Nasim N et al found 80% acute leukemia cases and Humayan et al showed 90% of acute type in their study.<sup>8,9</sup> This similar observation (ALL>AML) was also observed by Rego MF et al.<sup>10</sup>

Overall male preponderance was found in our study with a percentage of 56.46% in males and 43.54% in females (ratio ≈ 1.5:1). Similar results of gender distribution have been reported in different studies. Harani MS et al, Jmili NB et al, Ullah K, and Salkar AB also found higher male to female ratio 1.5:1, 1.2:1, 1.7: 1 and 2:1 respectively.<sup>2,11-13</sup> Overall, there were 66% males and 34% females with male to female ratio being 1.94:1 as seen in study conducted by Gupta R et al.<sup>14</sup> Hasanbegovic E also observed similar male preponderance.<sup>15</sup> In ALL and AML cases, male patients were more than female. However female predominance was seen in CML cases in our study.

A total 105 leukemia cases were diagnosed in children (≤15 years), in which ALL subtype was the most prevalent (n=69 cases). This similar finding was observed with other studies namely Nasim N et al and Gupta R et al.<sup>8,14</sup> Maximum number of AML (n=132) cases were found in adult (102) as compared to children (30) in our study. Similar results were seen by Nasim N et al and

Gupta R et al.<sup>8,14</sup> Same observation also found in studies conducted by Paul B et al.<sup>16</sup>

AML-M3 was most common AML subtype in our study which is consistent with findings of study by Nasim et al.<sup>8</sup> However Humayun et al found M1 as most common subtype.<sup>9</sup> Gupta R et al and Salkar AB et al observed M2 subtype as most common in AML cases.<sup>2,14</sup> In ALL, L2 was the most common subtype in our study. Similar L2-ALL predominance was observed by Nasim N et al and Salkar AB et al, however Humayun et al and Gupta R showed L1 as the most common subtype.<sup>2,8,9,14</sup>

## CONCLUSION

Early recognition of signs and symptoms which are more suspicious for leukemia, are helpful in early diagnosis of hematological malignancies. Detailed hematological analysis including peripheral blood and bone marrow aspiration smears with cytogenetic analysis are necessary for early and definite diagnosis as well as effective management of hematological malignancies (leukemia).

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