



## ANALYSIS OF TYPES OF LEUKEMIAS IN PAEDIATRIC AGE GROUP

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**ABSTRACT** **BACKGROUND:-** Leukemia is the most prevalent cancer globally among children, accounts for 31% of all pediatric malignancies, out of which ALL contribute 75%, AML 20%, CML 2-3%, JMML 1-3%, Acute undifferentiated leukemia <0.5%.

**MATERIAL & METHODS:-** It is prospective observational study in which we enrolled 114 patients of leukemia with age group <14 years diagnosed on R/M (Routine/Microscopy) and flow cytometry of BM (Bone marrow) sample. Patients with age group >14 years age and patients with lymphoma or myeloproliferative disorders were excluded.

**RESULTS:-** In our present study, most common age of presentation of leukemia was 1-5 years (40.35%) with male preponderance with M:F ratio of 2:1. Most common symptom was fever (69.11%). Most common sign was pallor (63.15%). We found ALL as most common type of childhood leukemia (84.21%). B-ALL was most common subtype of ALL seen in 73.19%. Overall survival was 89.47%.

**CONCLUSION:-** In our study most common age of presentation of leukemia was 1-5 years. There was male preponderance. Fever was most common symptom and pallor was most common sign. ALL was most common type of leukemia with B-ALL being most common subtype. Overall survival was 89.47%.

**KEYWORDS :** AML, ALL, CML, Types of Leukemia**INTRODUCCION:-**

Eighty four percent of childhood cancer occurs in low and middle income countries<sup>1</sup>. The leukemia is the most common malignant neoplasm in childhood, accounting for 31% of all malignancies that occurs in age group less than 15 years with an annual incidence of 3-4 cases per 1,00,000 children<sup>2</sup>.

Leukemia represents clonal expansion and arrest at a specific stage of a normal lymphoid or myeloid hematopoiesis<sup>3</sup>. These are classified based on pace of progression. The beginning of leukemia may be sudden (Acute) or slow and gradual (Chronic). Acute lymphoblastic leukemia (ALL), accounts for 75% cases of childhood leukemia, Acute myeloblastic leukemia (AML) 20%, Chronic myelogenous leukemia 2-3%, Juvenile myelomonocytic leukemia (JMML) 1-3% while Acute undifferentiated leukemia <0.5% which consist of the cases that does not fit in classification of ALL, AML, CML or JMML<sup>(2,3)</sup>.

For all acute lymphoblastic leukemia, the peak incidence is at 2 -5 years of age and occurs more in boys than in girls at all ages<sup>5</sup>. Whereas, Acute myeloid leukemia (AML) is most common acute type in adults<sup>6</sup> and the age adjusted incidence is higher in male than female (4.5 vs. 3.1)<sup>4</sup>. The incidence of leukemia varies among people of different ages, sexes and races, such disparities are mainly associated with level of exposure to environmental and genetic risk factors<sup>7</sup>. The aim of this article is to study and to provide updated review on incidences of childhood leukemias in Indian medical setting as there are very few centers in India to assess pediatric malignancies.

**MATERIAL AND METHODS :-**

It is prospective observational study conducted in pediatric IPD, OPD and DAYCARE of government cancer hospital, Aurangabad from June 2018 to June 2021. Patients were enrolled after approval from ethical committee. Written and informed consent of all leukemia patients was taken. All leukemia patients with age less than 14 years and diagnosis confirmed on R/M (Routine/Microscopy) and flow cytometry of BMA (Bone marrow aspiration) sample were included in our study. Patients with age more than 14 years, cases of lymphoma and myeloproliferative disorder were excluded. After enrollment, detail history was taken and physical examination done. All necessary investigations carried out like CBC (complete blood profile), LFT (Liver function test), KFT (Kidney function test), Tumor lysis profile, Bone marrow aspiration, Bone marrow biopsy, Flow

cytometry and cytogenetic. All patients were treated as per standard chemotherapy protocol. Patients were admitted as per the need. Also, treatment was given in the form of intravenous antibiotics, blood and blood products and other supportive measures as and when required. Outcome of all patients noted in the form of survivor and death.

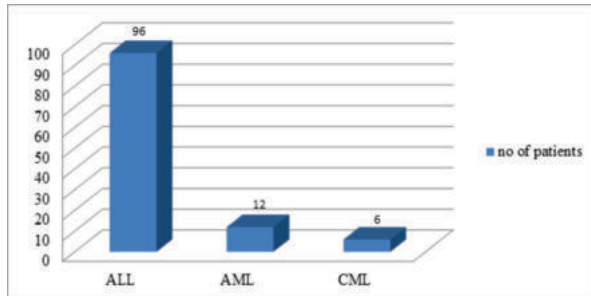
**RESULTS :-**

We enrolled total 114 patients of leukemia from June 2018 to June 2021 in our study.

**Table1: General characteristics of patients with leukemia in pediatric age group.**

Characteristics	No. of patients	Percentage
<b>Age</b>		
Less than 1 year	2	1.75%
1-5 years	46	40.35%
5-10 years	43	37.71%
10 -14 years	23	20.17%
<b>Sex</b>		
Male	76	66.66%
Female	38	33.33%
<b>Symptoms</b>		
Fever	79	69.29%
Neck swelling	68	59.64%
Abdominal distension	56	49.12%
Malaise/ fatigue	37	32.35%
Bone pain	37	32.35%
Bleeding manifestation	35	30.70%
Weight loss	22	19.11%
CNS symptoms	1	1.4%
<b>Signs</b>		
Pallor	72	63.15%
Lymphadenopathy	68	59.64%
Hepatosplenomegaly	62	54.39%
Bleeding manifestations/ petechiae	42	36.84%
Bone pain/ sternal tenderness	39	34.21%
CNS signs	1	1.4%
Chloroma	1	1.4%

Table 1 shows general characteristic of leukemia patients. In our study, most common age of presentation of leukemia was 1 – 5 years (40.35%). In present study, males 76(66.66%) were affected more than females 38(33.33%) with Male: Female ratio of 2:1. Fever was most common presenting symptom found in present study among 79(69.11%) patients. While, pallor was most common sign seen in 72(63.15%) patients.



**Figure 1: Types of leukemia in pediatric age group.**

Figure 1, shows that ALL was most common type of leukemia seen in 96(84.21%) among all childhood leukemia patients in our study. We did not get any patient of JMML and undifferentiated leukemia.

**Table 2: Subtype of Acute Lymphoblastic leukemia seen in pediatric age group.**

Subtypes of ALL	No. of patients	Percentage
B-cell ALL	71	73.19%
T- cell ALL	25	25.77%
Philadelphia positive ALL	1	1.03%

In present study, we found B- ALL is the most common subtype of ALL seen in 71 (73.19%) patients as shown in Table 2.

**Table 3: Outcome of leukemia in pediatric age group**

Outcome	No. of patients	Percentage
Survival	102	89.47%
Death	12	10.52%

In present study, we found total survival was 89.47% and deaths were 10.52% as shown in Table3.

**DISCUSSION:**

In present study we enrolled total 114 leukemia patients. In present study most common age of presentation of acute leukemia was 1 to 5 years seen in 40.35%. Similar finding was seen in most of the studies like S. Asthana et al<sup>1</sup>. Whereas Saumitra Biswas et al<sup>6</sup> in their study found, 5-10 year as most common age group of presentation. This could be because later study was done in West Bengal which is different geographic area.

In our study, we found male preponderance (66.66%) in leukemia was more as compare to female. Similar results were seen in most of the studies like Saumitra Biswas et al and Dong et al<sup>6</sup>. While Gurney et al<sup>7</sup> in their study found higher incidences of leukemia in girls. This difference could be attributed as later study evaluated incidence of leukemia during first year of life and also it was conducted in USA being different geographic area.

Fever was most common presenting symptom according to our study seen in 69.11% patients. Similar results were seen in most of studies like Saumitra Biswas et al<sup>6</sup>. Pallor was most common sign in our study seen in 63.15% patients. Similar results were seen in most of the studies like Saumitra Biswas et al<sup>6</sup>. Whereas according to Clarke RT, et al<sup>8</sup> study, done in pediatric age group, hepatomegaly (64%) was most common sign in pediatric leukemia. This could be explained as later study is larger study (n= 3084) and it is meta-analysis involving 33 studies.

According to our study the most common type of leukemia was ALL (acute lymphoblastic leukemia) seen in 84.21% patients. This result is similar to studies like Martin Belson et al<sup>9</sup>. However, Yang Xie et al<sup>10</sup> in their study found AML (acute myeloblastic leukemia) as the most common type of leukemia. This difference could be there as later study was conducted in adult patients with age group 20-40 years. We found B-ALL (73.19%) as most common subtype of ALL in our study. Most other studies like Hjalgrim L.L. et al<sup>11</sup> also found that B-ALL as most common subtype. According to our study survival rate was 89.47%.

Similar results were seen in most of the studies such as study by H Inaba and C.G. Mullighan et al<sup>12</sup>. While, Mariana Cardoso et al<sup>13</sup> found overall survival rate of 57% in their study. This could be explained as later study was conducted only on pediatric AML patients having comparatively bad prognosis.

**CONCLUSION:-**

In our study most common age of presentation of leukemia was 1-5 years with male preponderance. Fever was most common symptom and pallor was most common sign. ALL was most common type of leukemia with B-ALL being most common subtype. Overall survival was 89.47%. Such higher survival rate can be explained by early diagnosis and prompt treatment according to newer advanced treatment protocols.

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