

Types of Acute Leukemia in Children Aged 5-18 years Presenting to A Tertiary Care Hospital in Northern Pakistan

Ansa Kulsoom Rehman¹
Shahtaj Khan²
Sundus Iftikhar³
Saira Nasr Malik⁴
Komal Iqbal⁵

Abstract

Objective: To identify the common types of acute leukemias in children aged 5-18 years presenting to Tertiary Care Hospital.

Methodology: The descriptive cross-sectionally designed with a consecutive sampling technique study was conducted at the Department of Pathology, Hayatabad Medical Complex, Peshawar from 1st April-30th September 2017. The main outcome measures will be the classification of acute leukemia in children aged 5-18 years presenting to Tertiary Care Hospital. A total of three hundred & eighty-nine (n=389) patients were recruited for our study. After informed consent from parents of children, detailed clinical history and examination were carried out. Blood counts were performed on an automated haematology analyzer (Sysmex XN-450). Peripheral blood and bone marrow smears were stained with Giemsa and myeloperoxidase stain. Trepine biopsies were stained with haematoxylin and eosin. Findings of bone marrow aspiration and trephine biopsies were interpreted in the light of history, clinical examination, and peripheral blood findings. FAB classification of acute leukemias was applied for sub-typing.

Results: Among 389 patients, 80% (n=311) had acute lymphoblastic leukemia, while 20% (n=78) had acute myeloid leukemia.

Conclusion: Acute lymphoblastic leukemia is more prevalent in children aged 5-18 years, compared to acute myeloid leukemia.

Keywords: Acute Leukemias, Acute Lymphoblastic Leukemia, Acute Myeloid Leukemia.

^{1,2,4,5}Department of Pathology, Hayatabad Medical Complex, Khyber Pakhtunkhwa

³Department of Pathology, Institute of Kidney Disease, Hayatabad Medical Complex, Khyber Pakhtunkhwa,

Address for Correspondence
Dr. Ansa Kulsoom Rehman
Department of Pathology,
Hayatabad Medical Complex,
Khyber Pakhtunkhwa
ansakrehman85@gmail.com

Introduction

Leukemia is considered a blood cancer and is the most common malignancy among children in the United States and Canada. Leukemia is recognized as a distinct clinical entity. The present work is concerned with the clinico-epidemiological aspects of the disease which will eventually help in the early diagnosis.

Leukemia is considered as blood cancer and is the most common malignancy among children in the United States and Canada.^{1,2} Leukemia as a distinct clinical entity was recognized in 1845 for the first time.³ Tremendous advances have been made in the understanding of the molecular biology and management of this disease in the past few years.⁴ Acute

leukemia is a heterogeneous group of hematological malignancies characterized by clonal expansion of immature myeloid or lymphoid precursors (blasts). The blasts progressively replace the normal hematopoietic tissue and may invade other organs of the body.⁵ Therefore anemia, infection, and hemorrhages due to bone marrow failure are the most common complications of this disease which may lead to death.⁶ The incidence of Leukemia is about 8-10 per100,000 persons/year.⁷

Among childhood cancers, acute leukemias are the most common ones. In children, acute lymphoblastic leukemia (ALL) is the most common form accounting for 80% of cases while acute myeloid leukemia (AML) is the commonest type in adults.⁸ In one of the studies highest incidence was found to be in Yousafzai tribe (52%) followed by Afghans (Refugees & natives) (16%), Bangash (8%), Mohmand (4%), Marwat /Banochi (4%) and Mahsud /Wazir (2%). The tribe was not known in 14% of the total cases.⁹ A study was conducted in Peshawar where ninety- two patients were diagnosed as

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suffering from acute leukemias (15%). ALL was the most common (46%), followed by AML (38%) and undifferentiated acute leukemias (16%). Males were affected more than females (60% vs. 40%). ALL and AML were predominant in paediatric (64%) and adults (77%) patients respectively. Patients from Afghanistan accounted for 33% of all cases followed by Peshawar (14%). Fever (77%), pallor (33%) and bleeding disorders (23%) were the main presenting complaints.¹⁰ Of acute leukemias, 49% of patients had acute lymphoblastic leukemia (ALL) and 31% had acute myeloid leukemia (AML). Of chronic leukemias, 16% of patients had chronic myeloid leukemia (CML), 2% had chronic lymphocytic leukemia and 2% had chronic myelomonocytic leukemia (CMML).¹¹

The rationale of the current study is to identify the common types of acute leukemias. There is limited data regarding the prevalence of different types of acute leukemias in the Northern part of Pakistan. The present work is concerned with the clinico-epidemiological aspects of the disease which will be of great help in the early diagnosis of the disease because most of these patients present with different signs and symptoms and if one is not aware of the variable presentation of acute leukemia, the diagnosis may be delayed for quite a long time which in turn will affect the prognosis of the disease.

Methodology

The study was cross-sectionally designed with a consecutive (Non-Probability) sampling technique. After the approval of the synopsis by the College of Physicians & Surgeons of Pakistan, Karachi, the study was started for six months at the Department of Pathology, Hayatabad Medical Complex, Peshawar. The sample size was calculated by taking 31% proportion of AML in children, 95% confidence interval, and 4.6% margin of error under WHO recommendation for sample size proportion. A total of three hundred & eighty-nine (n=389) samples of the patients were collected for study results. Following inclusion criteria patients newly diagnosed: with acute leukemia by bone marrow examination, aged 5-18 years either male or female registered at Pathology Department were recruited for the cross-sectional study. While patients unable to give informed consent and diagnosed other than leukemia

like anemia and myelodysplastic syndrome were excluded from the study.

After the approval of the study from the hospital ethical committee, patients were selected according to inclusion and exclusion criteria to avoid selection bias. Followed by the patient's subjection to bone marrow examination for the evaluation of the underlying cause. Bone marrow examination included both aspiration and trephine biopsy. Further, detailed relevant history was taken and clinical examination was carried out. Blood counts were performed on an automated haematology analyzer (Sysmex XN-450). Peripheral blood and bone marrow smears were stained with Giemsa and myeloperoxidase stain. Trephine biopsies were stained with haematoxylin and eosin. Findings of bone marrow aspiration and trephine biopsies were interpreted in light of history, clinical examination and peripheral blood findings. FAB classification of acute leukemias was applied for sub-typing. Descriptive variables were recorded in specially designed Performa.

The data was analyzed using SPSS version 20 software computer programmed. Mean \pm standard deviation was calculated for numerical variables like age. Count and percentages were calculated for categorical variables like gender, acute lymphoblastic leukemia, and acute myeloid leukemia. Common types of acute leukemias were stratified among age and gender to see the effect modifiers. Post-stratification chi-square test was applied keeping p-value \leq 0.05 as statistically significant. All the results were presented in the form of tables and graphs generated through Origin Pro 2018®.

Results

A total of 389 patients were analyzed, 292(75%) were between 5-10 years, and 97(25%) were of 11-18 years of age. Mean age of our study population was 9.5 + 4.31 years (Fig: 1-A). Two hundred twenty six (58%) were males and 163(42%) were females(Fig:1-B). Out of 389 patients 311(80%) were concluded as acute lymphoblastic leukaemia on final diagnosis and 78(20%) as acute myeloid leukaemia (Fig: 2-A). In 311 acute lymphoblastic leukaemia patients 180 (58%) were males, and 131(42%) were females. In 78 acute myeloid leukaemia patients 46(59%) were males and 32(41%) were females(Fig:2-B).

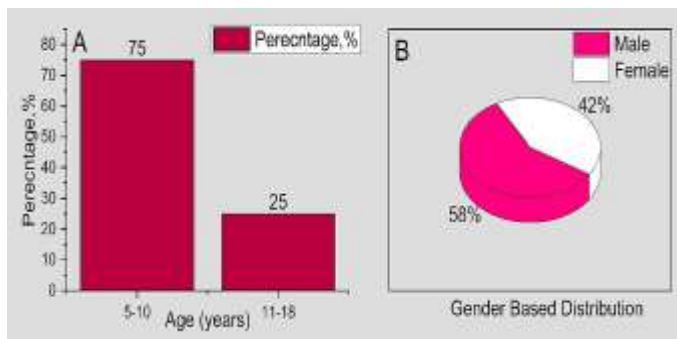


Figure No 1. Age and Gender wise distribution of Patients discreet variables.

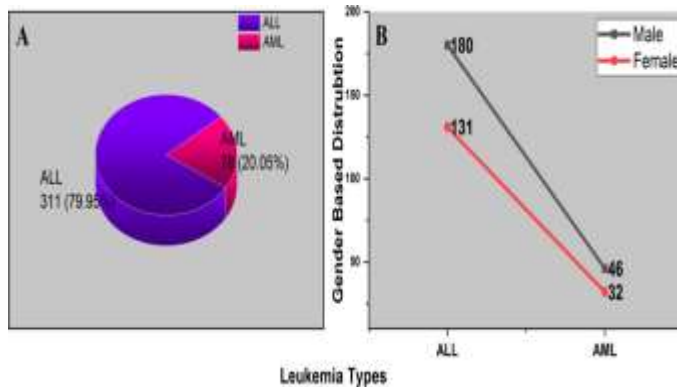


Figure No 2. Leukemia Types distribution of Patients.

Post-stratification chi-square test of a common type of acute leukemias with age, gender is given in Table no I & II.

Table No I: Stratification of common types of acute leukemias W.R.T age distribution

Acute Leukemias		5-10 Years	11 – 18 years	Total	*P-value
Acute Lymphoblastic Leukemia	Yes	233	78	311	0.895
	No	59	19	78	
Total		292	97	389	
Acute Myeloid Leukemia	Yes	59	19	78	0.895
	No	233	78	311	
Total		292	97	389	

* P-value was calculated through chi-square t-test.

Discussion

Our study showed among 389 patients, 75% were in the age of 5-10 years, 25% were in 11-18 years range. The mean age was 9.5 years with SD ± 4.31. Fifty-eight percent (58%) of patients were male and forty-two percent (42%) of patients were females. Eighty percent

Table No II: Stratification of common types of acute leukemias W.R.T Gender distribution.

Acute Leukemias		Male	Female	Total	*P-value
Acute Lymphoblastic Leukemia	Yes	180	131	311	0.8606
	No	46	32	78	
Total		266	163	389	
Acute Myeloid Leukemia	Yes	46	32	78	0.8606
	No	180	131	311	
Total		226	163	389	

* P- value was calculated through chi-square t-test.

(80%) of patients had acute lymphoblastic leukemia while twenty percent (20%) had acute myeloid leukemia. Similar results were observed in another study conducted by Shahab et al in which ninety-two percent were diagnosed as suffering from acute leukemias (15%). ALL was the most prevalent (46%), followed by AML (38%) and undifferentiated acute leukemias (16%). Males were affected more than females (60% vs 40%).¹² ALL and AML were predominant in paediatric (64%) and adult (77%) patients respectively. In another study conducted by Nasim *et al* reported 49% of patients had ALL and 31 % had AML. Of Chronic leukemias, 16% of patients had chronic myeloid leukemia (CML), 2% had chronic lymphocytic leukemia and 2% had chronic myelomonocytic leukemia (CMML).¹¹

Acute leukemias were found to be more common in males compared to females; ALL vs AML (62% vs 38%) and (57% vs 43%) respectively. This is consistent with previous studies and literature.¹² Some studies have reported female predominance.¹³

The median age of our study patients was 9.5 years. This shows that majority of the participants were of the pediatric age group. ALL have two peaks, one in infancy and the other around 60 years of age. We did not receive many patients from the latter age group compared to the former. Therefore, the median was 9.5 showing that as many as fifty percent (50%) of ALL patients in this study were below the age of 10 years. These findings are consistent with the literature.¹⁴

Conclusion

Our study concluded that the most common acute leukemias were acute lymphoblastic leukemia i.e. 80% and least common were acute myeloid leukemia 20%, in

children aged 5-18 years presenting to the Tertiary Care Hospital.

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