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Original Article

Clinico-hematological profile of paediatric patient admitted with acute leukemia in tertiary care centre of central India

Saurabh Kumar[1], Shweta Anand[1], T P Sahu[2]

From Departments of [1]Paediatrics and [2]Medicine, Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India

Correspondence to: Saurabh Kumar, Department of Paediatrics, Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India. E-mail: varshneysaurabh2@gmail.com

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ABSTRACT

Background: Leukemia is the most prevalent childhood cancer. Acute lymphoblastic leukemia (ALL) constitutes 75% of all cases. **Objective:** To find out the most common clinical and hematological findings of pediatric patients with acute leukemia at a tertiary care center of central India. **Materials and Methods:** This retrospective study was done on 30 pediatric patients diagnosed with acute leukemia in the Department of Pediatrics and Oncology at Chirayu Medical College and Hospital, Bhopal. This study included children aged from 6 months to 15 years, who were admitted from June 2014 to June 2015. Data were retrospectively collected by reviewing medical records of these patients. Clinical history, physical examination, hematological, and radiological data were analyzed. **Results:** ALL was the most common hematological malignancy observed at our hospital. In addition, it was found to be more prevalent in males and fever was the most common presenting symptoms followed by fatigue and anorexia. Hepatosplenomegaly and pallor were the most common findings on clinical examination. Among patients with ALL, subtype L1 was the most common type. Among patients with acute myeloid leukemia, M2 and M3 subtypes were most commonly documented.

Key words: *Acute leukemia, Acute lymphoblastic leukemia, Acute myeloid leukemia*

Leukemia is a malignant neoplasm of the hematopoietic stem cells characterized by diffuse replacement of bone marrow by neoplastic cells [1]. The most prevalent childhood cancer is leukemia, and acute lymphoblastic leukemia (ALL) constitutes 75% of all cases. Leukemia usually presents with nonspecific symptoms such as anorexia, fatigue, and irritability [2]. As the disease progresses, pallor, bleeding tendency, hepatosplenomegaly, and lymphadenopathy may appear. Uncommon initial manifestations are joint pain, proptosis, abdominal pain, melena, diarrhea, and dysphagia among others. In various studies, a correlation between the prognosis and various clinical and laboratory finding at the time of diagnosis (sex, white blood cell counts, organ infiltration: Liver, spleen, lymph node) has been quoted [3,4]. The present study aims to find the most common clinical and hematological findings of pediatric patients with acute leukemia at a tertiary care center of central India.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Pediatrics and Department of Oncology at Chirayu Medical College and Hospital, Bhopal, from June 2014 to June 2015. This study included children of ages 6 months-15 years admitted with a new diagnosis of acute leukemia. Following definition was used for confirmatory diagnosis of leukemia: Acute leukemia >20% of the blast in bone marrow, or hyperleukocytosis - leukocyte count >1,00,000/mm^3. The French–American–British classification was used for morphological classification of ALL [5,6].

A predesigned pro forma was made in which patient characteristics were entered. Medical records were studied and data were collected which included age, sex, income, and education of the parents. In addition, clinical features such as fever, hepatomegaly, splenomegaly, lymphadenopathy, gum bleeding, and other rare presentations such as joint pain, gastrointestinal bleeding, abdominal pain, proptosis, and dysphagia were noted. Chest X-ray in all cases, along with radiograph of relevant joints involved in symptomatic cases, was performed.

The diagnosis of leukemia was based on findings of complete blood count, bone marrow examinations which included cytological stains such as periodic acid–Schiff and Sudan black. Written informed consent was obtained for any invasive procedure(s). Fine-needle aspiration cytology was performed wherever it was clinically indicated. Bone marrow examination was considered the gold standard for diagnosis. Immunophenotyping was done only in difficult cases due to economic constraints, and hence it is not included in the analysis. Secondary and relapsed cases of acute leukemia were excluded.

Statistical Analysis

The data were entered in the Microsoft Office Excel 2007, 10% of the data were reentered to check for the data entry errors.

The data were analyzed using Epi-info software (available free online). The quantitative data were summarized as percentage while quantitative as mean and standard deviation.

RESULTS

A total of 35 children between 6 months and 15 years of age were enrolled in the study. Five children were excluded as they did not fit the inclusion criteria. Of 30 children, 22 (73.3%) children had ALL, 6 (20%) had acute myeloid leukemia (AML), and 2 (6.6%) had biphenotypic leukemia. Among children with ALL, B-cell subtype was the majority, and found in 14 (63%) children, followed by T-cell subtype noted in 6 (27%) children. Burkitt lymphoma was found in 2 (9%) children. In our study, the mean age for ALL was 6.1±1.7 years (range 10 months-10 years). The mean age for AML was 10.5 years (range 4-15 years). The male:female ratio in our study was 2.2:1.

Among the presenting symptoms, fever and fatigue were most commonly documented, followed by bleeding and abdominal distension. Hepatosplenomegaly and lymphadenopathy were the most frequent findings on clinical examination. Skin bleeding was more often documented in B-cell leukemia. In children with AML, proptosis was present in 4%. History suggestive of central nervous system involvement was present in 5 children. Lumbar puncture was performed on these children, of which one patient was diagnosed with central nervous system involvement of ALL. Clinical features of the study population are shown in Table 1.

Mean hemoglobin was 6.19±2.1 g/dL at presentation. Mean leukocyte count was 50,000±5400/mm^3 and 35,000±6700/mm^3 in ALL and AML, respectively, while mean platelet count was 42,000±7650/mm^3 and 30,000±8790/mm^3 in ALL and AML, respectively (Table 2). The bone marrow was hypercellular comprising sheets of blast cells in most of the cases. Average blast cells were 85±12.3% and 40±13.7% in ALL and AML, respectively. The majority of the patients with B-cell ALL (90%) were CALLA-positive. Among ALL, L1 (54%) was the most commonly noted subtype, followed by L2 (36%) and then L3 (9%). Among AML, M2 and M3 were 33 % each, M1 and M4 were 16% each (Table 3).

Table 1: Clinical features of study population

Clinical features	n (%)
Symptoms	
Fever	22 (73)
Fatigue	20 (66.6)
Pallor	19 (63.6)
Bleeding	18 (60)
Anorexia	16 (53.3)
Weight loss	13 (43.3)
Skin rash	12 (40)
Abdominal distension	9 (30)
Abdominal pain	4 (13.3)
Joint pain	3 (10)
Signs	
Hepatomegaly	19 (63)
Splenomegaly	18 (60)
Lymphadenopathy	15 (50)
Proptosis	4 (13)
Ascites	3 (10)
Meningeal sign	1 (3.3)
Total	30 (100)

DISCUSSION

In the present study, incidence of ALL and AML was found to be 73.3% and 20%. This is comparable to the study conducted by Young et al. [7]. In our study, mean age for occurrence of ALL is 6.1±1.7 years (10 months-10 years) and in AML is 10.5 years (4-15 years). Of 30 patients, 21 were male and 9 were female. The male:female ratio was 2.2:1, showing male preponderance. This finding is similar to the study done by Jussawalla et al. [8].

Fever (73%) was the most common symptom in our study. Similar findings are also documented in a study by Karimi et al. [9]. Severe anemia and thrombocytopenia were common presenting features in our study. These observations are also similar to the findings documented in studies done by Rani et al., and Dores et al. [10,11]. Leukocytosis was observed in 48% cases and hyperleukocytosis was observed in 26.6% of cases of acute leukemia.

While considering AML, leukocytosis was seen in 66.6% and hyperleukocytosis was seen in 16.6%. The prevalence of hepatomegaly (63%), splenomegaly (60%), and lymphadenopathy (50%) was similar to that reported in other studies [9,10]. Central nervous system involvement was seen in 3.3% of the cases. The distribution of subtypes of ALL (ALL1 [54%], ALL2 [36%], and ALL3 [10%]) is similar to the study done by Poplack [12]. Among AML, M1 and M4 were each 16% and M2 and M3 were 33% each. Three patients of acute leukemia presented with joint pain and 1 patient (ALL) had bone pain.

The etiology of bone pain in acute leukemia could be due to direct leukemic infiltration of periosteum or bone infarction. Four cases of acute leukemia presented with abdominal pain. Abdominal pain and gastrointestinal bleeding have been reported as initial manifestations of acute leukemia previously by Robazzi et al. [13]. Among the non-specific symptoms, our study found a lower incidence of fatigue (66.6%) in contrast to the high rate of 92% documented in literature among all the patients of leukemia [14]. This lower incidence may be due to lack of appreciation in children. Anorexia was also observed in 40% of children which is also a non-specific symptom. One child presented with testicular involvement due to direct infiltration of organ. The limitation of this study was small number of cases.

CONCLUSION

From our study, we concluded that ALL is most common hematological malignancy. Fever was the most common presenting symptom followed by fatigue and anorexia. Hepatosplenomegaly was most common finding on clinical examination. Among ALL,

Table 2: Laboratory investigations

Parameters	B-cell (14)	T-cell (6)	Burkitt (2)	AML (6)	Biphenotypic (2)
Leukocyte counts (mm^3)					
<4000	2	1			
4000-10,000	3			1	1
10,000-50,000	3	1	2	2	
50,000-100,000	2	2		2	
>100,000	4	2		1	1
Platelet counts (mm^3)					
<10,000	3			2	
10,000-50,000	3	2	2	3	2
50,000-100,000	3	2		1	
100,000-200,000	4	2			
>200,000	1				

AML: Acute myeloid leukemia

Table 3: Bone marrow diagnosis

Diagnosis	n (%)
ALL	22 (73)
L1	12 (54)
L2	8 (36)
L3	2 (9)
AML	6 (20)
M1	1 (16)
M2	2 (33)
M3	2 (33)
M4	1 (16)
Biphenotypic	2 (7)
Total	30 (100)

AML: Acute myeloid leukemia

L1 was most common type. Among AML, M2 and M3 were more common. Further larger studies are required to corroborate our findings.

REFERENCES

1. Tubergen DG, Bleyer A. The leukemia. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF, editors. Nelson Textbook of Paediatrics. 18th ed. Philadelphia, PA: Saunders; 2007. p. 2116-23.
2. Lanzkowsky P, editor. Leukemia. In: Manual of Paediatric Hematology and Oncology. 4th ed. Burlington: Elsevier Academic Press; 2005. p. 415-52.
3. Armstrong J, Pomeroy M, Fennelly JJ, Cahalane S. Prognostic factors in childhood acute lymphoblastic leukaemia. Ir J Med Sci. 1990;159:40-3.
4. Wessels G, Hesseling PB, Buurman M, Oud C, Nel ED. An analysis of prognostic variables in acute lymphocytic leukaemia in a heterogenous South African population. J Trop Pediatr. 1997;43:156-61.
5. Bennett JM, Catovsky D, Daniel MT, Flandrin G, Galton DA, Gralnick HR, et al. Proposals for the classification of the myelodysplastic syndromes. Br J Haematol. 1982;51(2):189-99.
6. Brunning RD, Bennett JM, Flandrin G, Flandrin G, Matutes E, Head D, et al. Myelodysplastic syndromes: Introduction. In: Jaffe ES, Harris NL, Stein H, Vardiman JW, editors. World Health Organization Classification of Tumors: Pathology and Genetics of Tumors of Haematopoietic and Lymphoid Tissues. Lyon, France: IARC Press; 2001. p. 63-7.
7. Surveillance, epidemiology and end results incidence and mortality data, 1973-77. Natl Cancer Inst Monogr. 1981;(57):1-1082.
8. Jussawalla DJ, Yeole BB, Natekar MV. Cancer in children in greater Bombay (1964-72). A comparative study. Indian J Cancer 1975;12(2):135-43.
9. Karimi M, Mehrabani D, Yarmohammadi H, Jahromi FS. The prevalence of signs and symptoms of childhood leukemia and lymphoma in Fars Province, Southern Iran. Cancer Detect Prev. 2008;32(2):178-83.
10. Rani S, Beohar PC, Mohanty TK. Leukaemia in children – A ten-year study. Indian Pediatr. 1981;18:461-6.
11. Dores GM, Devesa SS, Curtis RE, Linet MS, Morton LM. Acute leukemia incidence and patient survival among children and adults in the United States, 2001-2007. Blood. 2012;119(3):34-43.
12. Poplack DG. All in childhood, symposium in paediatric oncology. Paediatr Clin N Am. 1985;32:669-97.
13. Robazzi TC, Silva LR, Mendonça N, Barreto JH. Gastrointestinal manifestations as initial presentation of acute leukemias in children and adolescents. Acta Gastroenterol Latinoam. 2008;38(2):126-32.
14. Whitlock JA, Gaynon PS. Acute lymphocytic leukemia. In: Lee GR, Foerster J, Lukens J, Paraskevas F, Greer JP, Rodgers GM, editors. Wintrobe's Clinical Hematology. 10th ed. Baltimore: Lippincott Williams & Wilkins; 1999.

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