SURFACE MAKERS OF LYMPHOBLASTS IN ACUTE LYMPHOBLASTIC LEUKAEMIA

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SUMMARY

58 children with acute lymphoblastic leukaemia (ALL) were studied for the effect of initial clinical and laboratory features and surface markers of lymphoblasts on the prognosis. 18.9% *of them had T cell leukaemia while* 3.4% *had B-cell leukaemia. Six pre-treatment features were related to T-cell ALL, i.e. - age over 6 years, boys, presence of mediastinal enlargement, haemoglobin over 8g/dl, markedly elevated leucocyte count and CNS involvement.* 90% *of T-Cell ALL survived for less than 6 months. Both the cases of B-cell leukaemia died within 8 weeks. Identification of T and B cell leukaemia warrants more aggressive treatment for these patients to achieve remission and survive longer.*

The presenting clinical and laboratory features of children with acute lymphoblastic leukaemia (ALL) are recognised as key determinants for prognosis in childhood ALL. Certain clinical features are associated with shorter duration of remissions. Lymphoblast surface makers are important criteria in the prognosis of the disease[1].

58 children with ALL admitted into the Institute of Child health, Madras during the period May 1980 to August 1984 were studied for the effect of initial clinical and laboratory features as well as surface markers of lymphoblasts on the prognosis of these children.

Material and Methods

The subjects were 58 children with ALL admitted during the period May 1980 to August 1984.

Blast cells from initial bone marrow aspirates were obtained. The diagnosis of ALL was made when blast cells showed no evidence of auer rods and no myeloid or monocytic differentiation. In patients where the peripheral blood contained more than 90% blasts, peripheral blood was taken for lymphoblast surface markers. Central nervous system (CNS) leukaemia was determined by the presence of blast cells in CSF. T-rosettes were enumerated by the method of Jondal *et al*[2] and B (EAC) rosettes by the method of Bianco *et al*[3].

Results

Of the 58 children studied, 11 (18.9%) were identified as having E^+ ALL, since they had lymphoblasts that formed rosettes with sheep erythrocytes at 37°C. The range of E^+ lymphoblasts was 72 to 95% with a mean of 82.5%.

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As indicated in Table 1, majority of children with T-cell leukaemia were boys over 6 years. The mean duration of illness before hospitalisation was 3-6 weeks. 6 of them (54.5%) had mediastinal enlargement; 54.5% had an initial haemoglobin value of above 8 gm/dl while 5 (55.4%) had a leucocyte count of above 100 x 10^9/l. 90% had thrombocytopenia. 6 of the children (54.5%) had CNS leukaemia of whom 3 had bilateral facial palsy. 3 children had testicular relapse.

Table 1 : Clinical and Laboratory Features of T Cell Leukaemia

No.	Age/ Sex	Duration of illness (wks)	Mediastinal adenopathy	Hb g/dl	(T) WBC count x10^9/l	Platelets	T cells (%)	CNS or Testicular relapse
1	10 M	1	+	6	102	D	88	—
2	3.5 F	6	—	4	306	D	75	CNS
3	10 M	4	—	6	1500	D	77	—
4	10 M	4	—	11	9.8	D	95	CNS
5	11 M	2	+	12.5	26	D	85	CNS & Testes
6	9 M	2	+	11	128	D	75	—
7	10 M	6	+	12.5	35	D	95	CNS
8	9 M	1	+	6.5	894	D	90	CNS
9	9 M	6	+	10	8.8	N	80	CNS & Testse
10	9 M	4	—	6	20	D	72	Testes
11	10 M	4	—	10.8	480	D	76	—

In spite of intensive chaemotherapy with vincristine, adriamycin and steroids for remission induction, preventive CNS therapy with 1800 rads of cranial irradiation plus intrathecal methotrexate followed by maintenance therapy, survival was less than 6 months in all except 1 child who lived for nearly 10 months.

Table 2 indicates the differences in the clinical signs in T-cell and Null cell leuakemias. The group with null cell leukaemias was mostly below 6 years with equal distribution in boys and girls. Haemoglobin was below 8 gm/dl in 73%. Total leucocyte count was below 100 x 10^9/l in 80%. Mediastinal enlargement was present in only 4%, while CNS leukaemia occured in 2%. Two of these children are in continuous remission

or 3 years, 4 for 2 years and 4 for nearly 1 year. Many (60%) did not continue treatment or died soon after admission.

Table 2 : **Comparison of Clinical features between T Cell and Null Cell ALL**

Features	Category	No. of Patients	
		T (11)	Null (45)
Age (Years)	⩾ 6	10	12
	< 6	1	33
Sex	Boys	10	22
	Girls	1	23
Mediastinal Enlargement	Present	6	2
	Absent	5	43
Haemoglobin (g / dl)	⩾ 8	6	12
	< 8	5	33
Leukocyte Count ($x10^9/l$)	> 100	5	9
	10 – 99	6	36
Platelets	Decreased	10	41
	Normal	1	4
CNS Leukaemia	Present	6	1
	Absent	5	44

Association of Clinical Features

Six pre-treatment features were related to E+ lymphoblasts (age, sex, mediastinal enlargement, haemoglobin, leucocyte count and CNS involvement).

EAC Rosettes

2 children (3.4%) had B-cell leukaemias. There was involvement of vertebrae in one of them. Morphologically the lymphoblasts had cytoplasmic vacuoles. Both died within 6 to 8 weeks of therapy.

Discussion

The incidence of T-cell leukaemia has been variously reported as 15 to 20%[4], 20 to 25%[5], 24%[1] of ALL in children. In the present series, it was 18.9% of the ALL. The clinical features of patients with T-cell leukaemia are distinctive.

Six initial clinical characteristics were related to the presence of E^+ lymphoblasts (1) age over 6 years (2) boys, (3) haemoglobin over 8 gm/dl (4) markedly elevated leucocyte count (5) mediastinal enlargement and (6) CNS involvement. These features were related to a poor clinical outcome despite intensive chemotherapy. Sen and Borella[6] initially related the presence of mediastinal enlargement, age over 5 years, boys and elevated leukocyte count with E^+ blasts.

Dow L. W. *et al* [1] have made similar observations, but in addition to the above features they also related lymph nodes greater than 2 cms. in any diameter, lymphadenopathy outside the cervical region and liver enlargement greater than 5 cms. to the presence of E+ lymphoblasts. These features were not found to be relavant to T-cell leukaemia in the present series.

Tsukimoto *et al*[7] found that the presence of a T-cell marker on leukaemic blasts was not related to age in a series of 37 patients with ALL. Brout *et al*[8] found no-correlation between E+ lymphoblasts and either age or sex in their 100 patients but 30% of those patients were over 20 years of age.

Leukaemia presentation of E+ ALL is a later development of malignant extramedullay diseases while E-ALL presumably arises within the marrow and presents initially as leukaemia. The higher haemoglobin levels among T-cell ALL as compared to null cell ALL, with low platelet count and extensive marrow infiltration prevailing in both groups, implies that haematopoises is suppressed later in the course of T-cell ALL. As the platelets are short lived, they show an early decrease in concentration while the longer lived erythrocytes remain close to normal concentrations for some time. With continuing suppression, the number of erythrocytes also drops[1].

The identification of the type of lymphoblast can lead to more effective treatment. In cases of T-and B cell leukaemias, in addition to the normal remission induction with vincristine and steroids, one or two more drugs have to be included to achieve remission and for longer survival.

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