5 YFAR RETROSPECTIVE STUDY OF CHILD HOOD LEUKEAMIA

— GAAFAR IBN AUF SULIMAN, M.B., B.S., M.R.C.P., D.C.H.
— MIRGHANI ALI M.B.B.S., D.C.P.
MAHMOUD HOHAMED HASSAN, M.D., F.R.C.P. (ED.), F.R.C.P. (GLAS), D.C.H.
— AWAD OMER, Ph.D., F.R.C.P. (ED.), M.R.C. Path.
(From the departments of Paediatrics, Khartoum Hospital and Department of Pathology, Faculty of Medicine, University of Khartoum)

5 YEAR RETROSPECTIVE STUDY OF CHILDHOOD LEUKAEMIA

INTRODUCTION:

Leukaemias are progressive proliferative disorders of the bone marrow tissue. They grow at the expense of haemopoietic tissues which they eventually replace. Leukaemia cells proliferate in varying degrees in the spleen, liver and lymph nodes which may become enormously enlarged. The leukaemias are classified according to cytomorphological features into four main types. These are the chronic granulocytic, chronic lymphocytic. acute myeloblastic and acute lymphoblastic leukaemia. The chronic leukaemias, unlike the acute leukaemias are easy to identify on Romanowisky stains.

The well-differentiated and the poorly-differentiated lymphoblastic lymphomas which are primarily diseases of the lymphoid tissue, not infrequently involve the bone marrow and eventually the blood, presenting as frank leukaemic pictures referred to at times as leucosarcoma. The four types of human leukaemia, though share some of the common features mentioned above they differ in sex, age, geographical and racial distribution. Various epidemiological studies of childhood leukaemia have been carried out in an attempt to play a role in the pathogenesis of leukaemia (Ager et. al. 1965; Shimkin et.al. 1951).

The purpose of this study is to analyse the clinical presentation, age, sex as well as geographical distribution of the disease.

MATERIAL & METHODS:—

The available records of all the cases of childhood leukaemia investigated in the Haematology Department of Khartoum University, diagnosed from the newborn period to the age of 14 years, during the period 1970–1974 were studied. 43 cases fulfilled the diagnostic criteria of leukaemia as based on

clinical and haematological features. The peripheral blood counts, bone marrow morphology and cytochemical examination of the peripheral blood and marrow smears helped in sorting out the types of leukaemia. The techinques described by Daci and Lewis (1968) were used.

RESULTS

Table 1 shows the percentage of the various types of leukaemia encountered. The cases studied were grouped into chronic granulocytic leukaemia (10 cases 23.3%); acute leukaemia (29 cases, 67.4%) and leucosarcoma (4 cases, 9.3%).

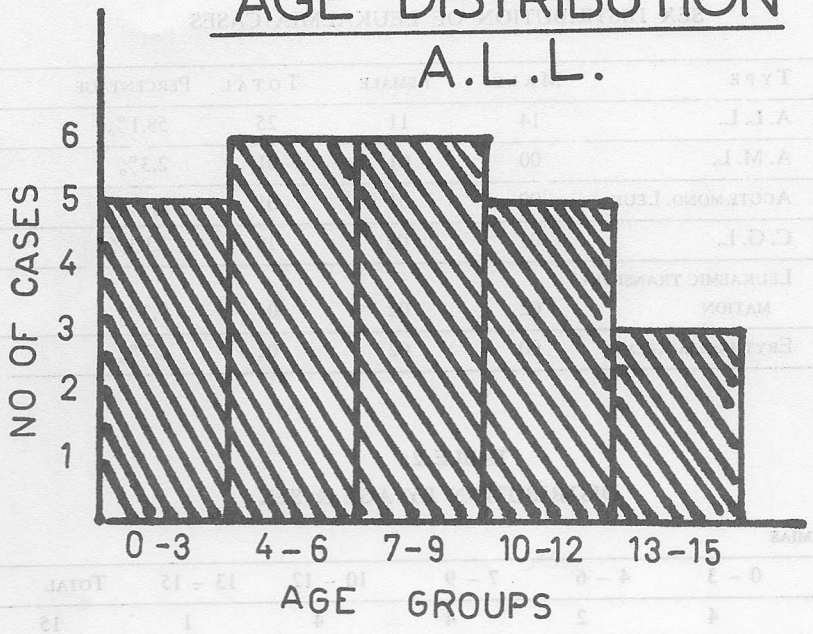
The age and sex distribution of the cases studied are shown in Tab 2. The youngest patient was 3 months and the oldest pateint was 14 years old It can be seen that females are more frequently affected than males (4:3).

Figure 1 compares the age peak incidence of acute lymphoblastic leukaemia among both sexes with no apparent significant difference. Figure II displays the age distribution and peak incidence in chronic granulocytic leukaemia. The highest incidence occurred between the ages 7 to 12. There is a remarkable preponderance in females compared to males (9:1).

Three out of the four cases of leucosarcoma i.e. lymphosarcoma cell leukaemia of the acute cell type, occurred in males. The age of the youngest patient was four years and the oldest was eleven years.

Figure III is a map showing the geographical distribution of leukaemia cases. It shows a decreasing incidence of acute lymphoblastic leukaemia as we go up the Nile Valley with a high incidence in Northern Sudan (96.6%), while the incidence of chronic granulocytic leukaemia increases as we go down the Nile Valley. 50% of the cases are from Southern Sudan.

Table III shows the clinical features of the acute lymphoblastic leukaemia patients on presentation. The commonest findings were fever and anaemia which occurred in 73% of the cases. Enlargement of the spleen, liver and lymph nodes occurred in the acute lymphoblastic leukaemia patients, in whom all the cases showed enlargement of two or more of these organs. Thus eight patients (44.4%) showed enlargement of all three, while in the remaining (55.6%) two organs were enlarged. The four patients presented with lymphosarcoma had huge lymph nodes. Four of the acute leukaemia cases were myeloblastic, two of which showed erythroleukaemic differentiation. All the chronic granulocytic leukaemia cases presented with easy fatigability, weight loss, abdominal pain and/or discomfort, due to the large spleen, symptoms of anaemia and fever. The spleen was below the umblicus in all cases, and reaching the pelvic brim in 8 of these cases. The liver was enlarged in 50% of the cases. Palpable lymph nodes were detected in 3 of these chronic granulocytic leukaemia patients.


AGE DISTRIBUTION
A.L.L.
NO OF CASES
6
5
4
3
2
1
0-3
4-6
7-9
10-12
13-15
AGE GROUPS

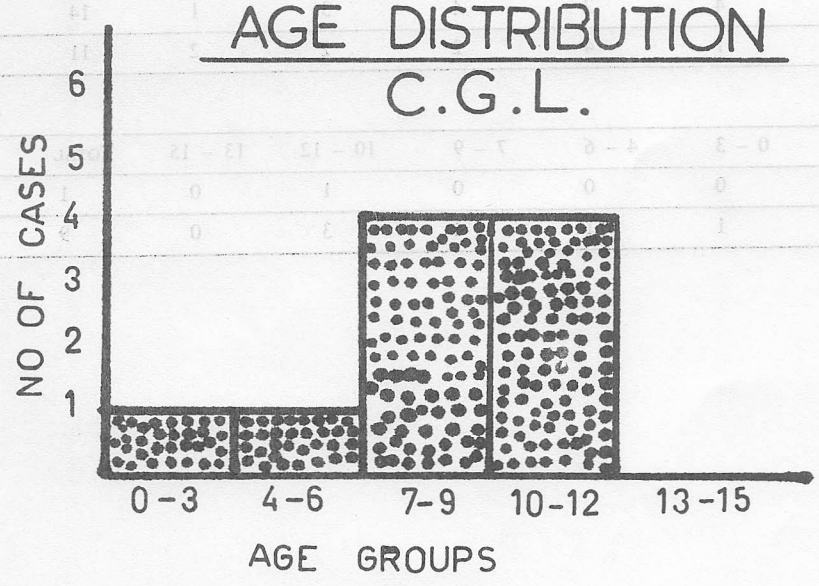

AGE DISTRIBUTION
C.G.L.
NO OF CASES
6
5
4
3
2
1
0-3
4-6
7-9
10-12
13-15
AGE GROUPS

TABLE 1:
SEX DISTRIBUTION OF LEUKAEMIA CASES

Type	Male	Female	Total	Percentage
A. L. L.	14	11	25	58.1%
A. M. L.	00	01	01	2.3%
Acute mono. Leuk	00	01	01	2.3%
C. G. L.	01	09	10	23.3%
Leukaemic transformation	02	02	04	9.3%
Erythroleukaemia	00	02	02	4.7%

TABLE 2:
DISTRIBUTION BY AGE & SEX

All leukaemias

Age	0 – 3	4 – 6	7 – 9	10 – 12	13 – 15	Total
Males	4	2	4	4	1	15
Females	2	5	6	5	2	20

All

Age	0 – 3	4 – 6	7 – 9	10 – 12	13 – 15	Total
Males	4	2	4	3	1	14
Females	1	4	2	2	2	11

C.B.L.

Age	0 – 3	4 – 6	7 – 9	10 – 12	13 – 15	Total
Males	0	0	0	1	0	1
Females	1	1	4	3	0	9

Spleen

TABLE 3:

ACUTE LYMPHOBLASTIC LEUKAEMIA

	SYMPTOMS									SIGNS			
	No Fever	Cough	Lymph adeno pathy	Bleeding	Appetite	Weight loss	Bone Pains	Tiredness	Jaundise	Pallor	Lymph adeno pathy	Liver	Spleen
1	–	–			–	–	–	–				–	–
2	–	–	–	–		–				–	–	–	–
3	–					–	–			–	–	–	–
4	–	–							–			–	–
5	–	–			–		–				–	–	–
6	–											–	–
7	–			–	–	–	–	–		–	–		
8	–									–	–	–	
9	–			–						–	–	–	–
10			–	–	–	–				–	–	–	–
11	–							–		–	–	–	–
12	–			–	–	–	–			–	–	–	
13	–						–					–	–
14			–							–	–		–
15	–	–								–	–	–	–
16	–									–	–	–	–
17	–			–		–	–			–		–	–
18				–				–		–	–		–

TABLE 4:

HAEMATOLOGICAL PARAMETERS

	C. G. L.	A. L. L.	A. M. L.	Leuco Sarcoma	Erythro Leukaemia
Hb grams %	4.5 – 8.9	2.1 – 11.8	4 – 6	6 – 11	4.1 – 5
WBC/uL	14000–39000	2100–592000	20000–55000	580–357000	1900–23000
Blasts	15 – 7	4 – 37	40 – 77	3 – 5	81 – 70
Platelets uL	Normal	60000–16000	Scanty	20000–40000	Scanty

The peripheral blood counts are shown in Table IV. As can be seen these patients had a haemoglobin range from 2.1 – 11.8 grams% with a mean of 6.4g. The total white cell count was between 2,100 – 592,000/uL at the time of presentation. Five of the lymphoblastic leukaemia patients presented with a total white cell count of less than 5,000/uL and these were in fact cases of subleukaemic leukaemia. The differential white cell count in the peripheral blood films showed that 6–97% of the cells were blast cells. The platelets in all cases ranged from scanty to low in the periheral blood films examined. Only 6 patients had bleeding tendency.

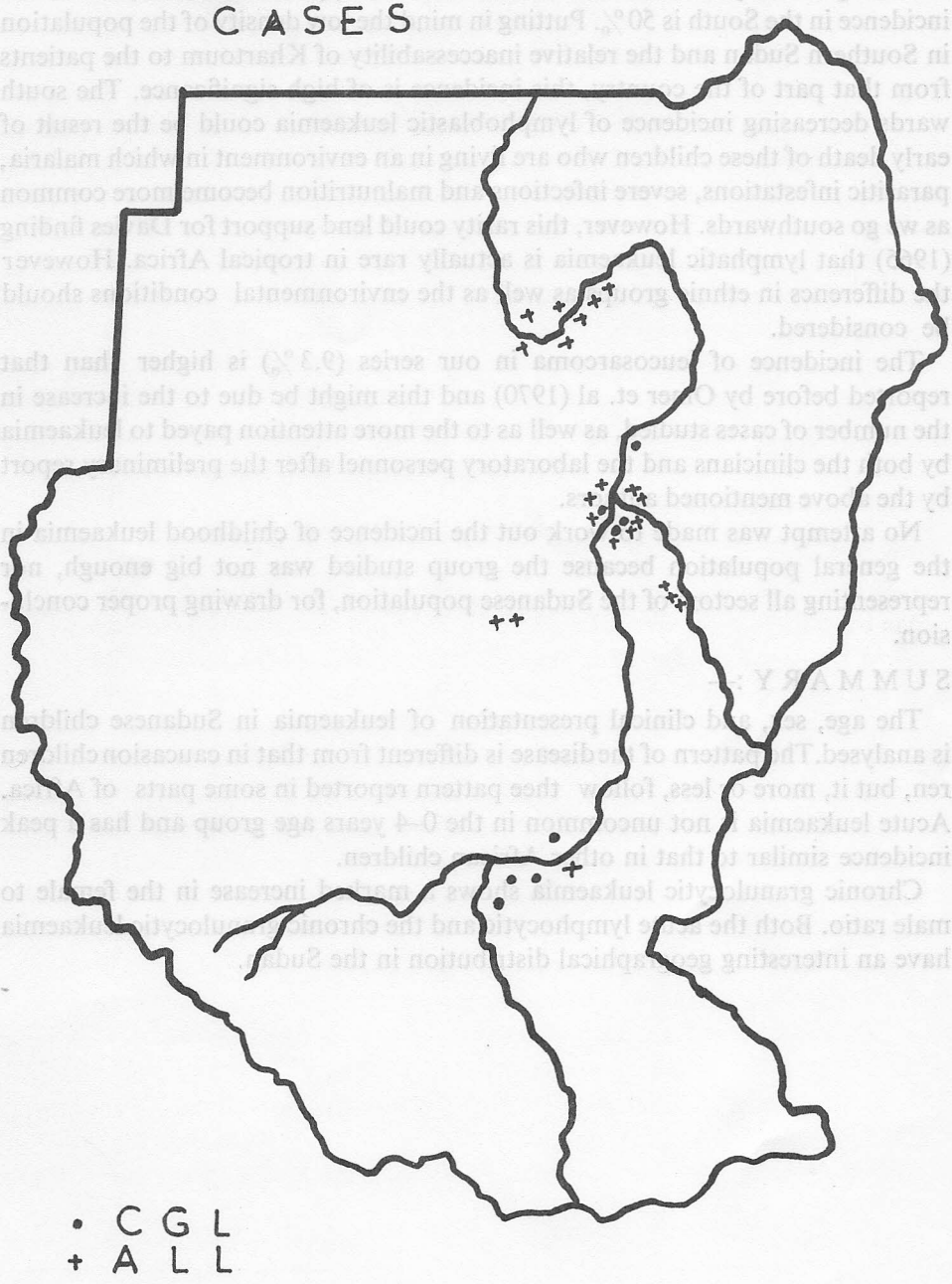
The four cases of leucosarcoma presented with anaemia, fever and weight loss. Two had lymph nodes enlargement only; the third one had lymph nodes enlargement as well as splenomegaly, the fourth patient had enlargementof his cervical lymph nodes, spleen and liver. Three of those patients showed peripheral blood and bone marrow involvement at variable periods of time after their first visit; while in the fourth patient the disease was detected, in addition to the clinical findings, by the morphology of the malignant cells in the marrow and peripheral blood during his first visit.

COMMENT:—

The present series show that the incidence of acute leukaemia (66.7%) is similar to that quoted before (Omer et.al 1970) and moderately lower than that reported by Kasili et.al. (1970), from Kenya, in whose series 84% were of the acute type. Acute leukaemia is not uncommon in the 0–4 years ago groups and this does not follow the trend shown in Rodesian Africans (Jeffrey et. al. 1972) and that reported by Davies for African Children (1965). The peak incidence in our series is 6 years which is higher than that reported by Meigham (1964) and Browining et. al. (1968) in white American children. It is interesting, however, that our finding is similar to the peak incidence reported by Browning et. al. (1968) for the American Negro Children and by Kasili et. al. (1970) for African Childen in Kenya.

There is a definite high incidence of chronic granulocytic leukaemia in childhood in our series, these Patients constituted 23.3%of cases, which is higher than that reported in European and some African series (Shinkin et. al. 1951, Kasili et. al. 1970). In fact the lower incidence of acute myeloblastic leukaemia (9.3%) and the preponderance of chronic granulocytic leukaemia is in keeping with the preliminary report of Omer et. al. (1970) .An interesting finding in our series is the marked preponderance of the female sex in this type of leukaemia with a ratio of 9:1.

A significant finding is the geographical distribution of the disease in the Sudan mentioned before. There is a rising incidence of acute leukaemia as wə


GEOGRAPHICAL DISTRIBUTION OF CASES
• CGL
+ ALL

go northwards with only 4.6% of the case in south Sudan. The incidence of chronic granulocytic leukaemia increases in the opposite direction, where the incidence in the South is 50%. Putting in mind the low density of the population in Southern Sudan and the relative inaccessability of Khartoum to the patients from that part of the country, this incidence is of high significance. The south wards decreasing incidence of lymphoblastic leukaemia could be the result of early death of these children who are living in an environment in which malaria, parasitic infestations, severe infections and malnutrition become more common as we go southwards. However, this rarity could lend support for Davies finding (1965) that lymphatic leukaemia is actually rare in tropical Africa. However the differencs in ethnic groups as well as the environmental conditions should be considered.

The incidence of leucosarcoma in our series (9.3%) is higher than that reported before by Omer et. al (1970) and this might be due to the increase in the number of cases studied, as well as to the more attention payed to leukaemia by both the clinicians and the laboratory personnel after the preliminary report by the above mentioned authors.

No attempt was made to work out the incidence of childhood leukaemia in the general population because the group studied was not big enough, nor representing all sectors of the Sudanese population, for drawing proper conclusion.

SUMMARY :—

The age, sex, and clinical presentation of leukaemia in Sudanese children is analysed.The pattern of the disease is different from that in caucasion children ren, but it, more or less, follow thee pattern reported in some parts of Africa. Acute leukaemia is not uncommon in the 0–4 years age group and has a peak incidence similar to that in other African children.

Chronic granulocytic leukaemia shows a marked increase in the female to male ratio. Both the acute lymphocytic and the chronic granulocytic leukaemia have an interesting geographical distribution in the Sudan.

REFERENCES

(1) Ager, E.A., Schuman, L.M., Wallace, H.M. et. al. (1965) An epidemiological study of of childhood leukaemia. J. Chronic Dis. 18:113.

(2) Shmkin, M.B., Mitter, S.R. & Bigrman, U.R. Myelocytic leukaemia: An analysis of incidence distribution, & Fatality, 1910–1948. Ann. Jntern. Med. 35:194 (1951).

(3) Daeie, J.V. & Lewis, S.M. Practical Haematology, London, Churchill Ltd., (1968)

(4) Omer, A; Hidayatalla, A; Satti, A. Preliminary studies of leukaemia in the Sudan. S.M.J. (1970).

(5) Kasili, E.G. & (5) Kasili, E.G. & Taylor, J.R. Leukaemia in Kenya E.Afr. Med. J. 47:461 (1970).

(6) Jeffrey, C; & Gelfand, M Leukaemia in the Rhodesian African. Trop. & Geogr. Med. 75:176. (1972).

(7) Davies, J.N.P. Leukaemia in children in Tropical Africa Lancet 2:65 (1965).

(8) Meighan, S.S. Leukaemia in Children J.A.M.A. 190:578 (1964).

(9) Browning, D & Gross, S. Epidemiological studies of Acute Childhood Leukaemia Amer. J. Dis. Child. 116:576. (1968).