A Morphological Pattern of 234 Cases of Leukemias

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Abstract

Morphological pattern of 234 consecutive cases of various types of leukemias is presented. Acute leukemias (62.8%) were commoner than chronic (37.2%). Amongst acute leukemias, myoloid leukemias (AMI) were more frequent as compared to lymphoblastic (ALL). AML:ALL ratio was 2.57:1 in adults and 1:3 in children. Amongst AML cases, M4 was the commonest, followed by M2, Mi, M3 and M4 and M6 and M7 respectively. In ALL patients, Li was the commonest, followed by L2 and L3 respectively. Amongst chronic leukemias, myelocytic leukemia (CML) was more common than lymphocytic leukemia (CLL) with a CML:CLL ratio of 3.1 :1. In a total of 60 CML cases, two had juvenile CML, four were between 10 and 15 years of age and the remaining 54 were adults. Hairy cell leukemia (2 cases) and lymphoma/leukemia syndrome (5 cases) were uncommon (JPMA 44:145, 1994).

Introduction

Leukemias comprise of a heterogenous group of malignancies arising from the marrow cells. In a study on 2,220 malignant tumours in Faisalabad, haematological malignancies were the second commonest in males (11.62%) and seventh (4.0%) in females[1]. In another study at AFIP, Rawalpindi, leukemias were the second commonest malignancy (9.09%) in males and fourth (4.53%) amongst females. According to the third national survey in USA, leukemias constituted 30.1% of malignancies during childhood[3]. In Pakistan also, leukemias are the commonest malignancies in childhood, constituting 35% to 38.5% of malignancies occurring below 15 years of age[2,4]. Leukemias are broadly classified into acute and chronic types, depending on the mode of onset, clinical course of the disease, cytological features of the leukemic cells, response to therapy and prognosis. For acute leukemias, French-American-British (FAB) classification is now widely accepted[5,6]. Acute leukemias are thus classified as acute lymphoblastic leukemias (ALL- Li, L2 and L3) and acute myeloid leukemias (AML - Mi, M2, M3, M4, M5, M6 and M7). Whereas acute lymphoblastic leukemias are more common in children[7], acute myeloid leukemias are commoner in adults[8]. Chronic myeloid leukemia (CML) is characterized by malignant proliferation of myeloid series cells[9] and is a clonal disorder of pleuripotent haemopoietic stem cells[10]. CML comprises about 20% of all cases of leukemia in the west[11]. Chronic lymphocytic leukemias (CLL), which are the commonest types of leukemias in the Western world[12], are relatively less frequent in Pakistan. Prolymphocytic leukemia and hairy cell leukemia are now recognised as distinct entities. Furthermore, various types of non-Hodgkin's lymphomas after bone marrow infiltration may present in a leukemic phase, i.e., lymphoma/leukemia syndrome[13]. This taper - a continuation of our previous studies[14-17] describes the morphological pattern of cases of acute and chronic leukemias.

Patients and Methods

Patients

This study includes 234 consecutive cases of all types of leukemias, which were diagnosed at Pathology Department of Rawalpindi Medical College, Rawalpindi, during nine years (from January, 1985 till December, 1993).

Methods

A detailed clinical data was recorded in every patient with particular reference to age, sex, pallor, fever, bleeding manifestations, hepatomegaly, splenomegaly, lymphadenopathy, bone tenderness and jaundice.

Laboratory Investigations

About 5.0 ml of blood was drawn in a disposable syringe. It was transferred into an EDTA vial and was mixed gently and thoroughly. The following investigations were carried out in every patient: haemoglobin estimation by cyanmet-haemoglobin method; white cell count, red cell count and platelet count by visual methods, using improved Neubauer chamber and differential leucotyte count after staining with May-Grunwald-Giemsa stain. Bone marrow aspiration was performed in all the patients, using Saleh's bone marrow aspiration needle. In every case, atleast six smears were made and two of them were stained by May-Grunwald- Giemsa stain.

Special Stains

In cases of acute leukemia, bone marrow smears were also stained by PAS, Sudan Black stain and Nephthyl Acetate Esterase stains. In CML, whenever required, peripheral smears were stained for leucocyte alkaline phosphatase. For all the special stains, commercially available kits (Sigma) were used. For acute leukemia, we used French-American-British (FAB) classification. One of the cases of acute myeloid leukemia who showed negative PAS, Sudan Black and Naphthyl Acetate Esterase stains was diagnosed as AML-MO which is not a FAB type of AML.

Results

In a total of 2,310 patients who underwent a marrow aspiration at Pathology Department of Rawalpindi Medical College, from January, 1985 till December, 1993, 234 were diagnosed as having various types of leukemias.

Table I. Morphological pattern of 234 cases of leukemia.

Types of leukemia (total number)	Number	Percentage
Acute (148)		
AML (81)		
AML-MO*	1	1.2
AML-M1	15	18.5
AML-M2	21	25.9
AML-M3	9	11.1
AML-M4	24	29.6
AML-M5	9	11.1
AML-M6	1	1.2
AML-M7	1	1.2
ALL (67)		
ALL-L1	41	61.2
ALL-L2	23	34.3
ALL-L3	3	4.4
Chronic (87)		
CML (60)		
in adults	54	90
Juvenile (<1 year age)	2	3.3
10-15 years age	4	6.6
CLL	20	23.1
Hairy cell leukemia	2	2.3
Lymphoma/leukemia syndrome	5	5.7

*MO is not a FAB type of AML.

Table I shows the morphological breakup of these patients. Acute leukemias (62.8%) were more common as compared to chronic (37.2%), with an acute leukemia: chronic leukemia ratio of 1.7:1. Amongst 148 cases of various histological types of acute leukemias, 81 (54.7%) showed AML, whereas ALL was seen in 67 cases (45.3%). All cases of AML and ALL were classified according to FAB (French-American-British) criteria (Table I). In 81 cases of AML, M4 was the commonest (29.6%), followed byM2 (25.9%), Ml (18.5%), M3 and MS (11.1% each) and M6 and M7 (1.2% each) respectively. Amongst 67 cases of ALL, Li was the commonest FAB type (61.2%) followed by L2 (34.3%) and L3 (4.4%) respectively. Various types of chronic leukemias were diagnosed in87 cases; 60

(68.9%) of them had CML, 20(23%) CLL, 2 (2.3%) hairy cell leukemia and 5 (5.7%) leukemic transformation of non-Hodgkin's lymphoma (lymphoma/leukemia syndrome). In a total of 60 cases of CML, 2 (3.3%) had Juvenile CML (age below one year), four (6.6%) manifested CML between 10 and 15 years and the remaining 54 (90%) were above 15 years of age. The AML:ALL ratio (the ratio between the number of AML and ALL patients) was 1.21:1. This ratio was higher in aduhs (2.57:1), as compared to children i.e., <15 years age (1:3). Likewise CM1:CLL ratio was 3.1:1 (Table II).

Table II. Ratios between different types of leukemias.

Type of leukemia	Ratio
Acute:chronic	1.70:1
AML:ALL (all age groups)	1.21:1
AML:ALL (in adults)	2.57:1
AML:ALL (in children)	1:3
CML:CLL	3.1:1

Amongst AML patients, 79% were adults and 21% children (<15 years). On the contrary, in ALL, 28% were adults and 72% children (<15 years).

Table III. Age ranges in various types of leukemias.

Types of leukemia	Range (years)	Mean±SD (years)
AML	6 m - 88	31.68±21.73
ALL	10 m - 63	14±14.26
CML	2 m - 65	38.6±15.5
CLL	40 - 80	61.1±11.3

Table III shows the ranges and mean± SD values of age representation of patients having AML, ALL, CML and CLL. The peak incidences of various types of leukemias were as follows: ALL-- 1-5 and 11-15 years; AML-- 11-30 years; CML--31-40 years and CLL-- 61-70 years. ALL, AML and CLL were more common in males, whereas in CML, males and females were equally affected (Table IV).

Table IV. Sex distribution in 234 cases of leukemias.

Type of leukemia	Male:female ratio
AML	1.32:1
ALL	1.5:1
CML	1:1
CLL	4:1
Hairy cell leukemia	2:0
Lymphoma/leukemia syndrome	3:2

Discussion

Leukemias are broadly classified as acute and chronic types. For acute leukemias, FAB classification is now widely accepted. In the present study, 234 cases of various types of acute as well as chronic leukemias were classified on the basis of cell morphology. In case of acute leukemias, the diagnosis was supported by cytochemical staining procedures. Acute leukemias were more common (62.8%) ,as compared to chronic leukemias (37.2%).

Table V. Comparison of distribution (%) of various types of AML cases in the present study with some previous reports.

FAB type	Sultan et al. (250) 1981	Miguel et al. (102) 1986	Chessells et al.* (112) 1986	Alvi et al. (26) 1990	Chaudhry et al. (54) 1993	Present study (81)
M1	21	13	10	15.3	13	18.5
M2	32	14	26	35	44.4	23.9
M3	16	14	6	15.3	11.1	11.1
M4	16	22	22	19.2	24	29.6
M5	12	21	24	11.5	3.7	11.1
M6	3	7	9	3.7	3.7	1.2
M7	-	-	-	-	-	1.2

*study conducted on childhood AML.
The number of cases is shown in parenthesis.

Table V compares the distribution of FAB types of AML in the present study with some previous

reports from within Pakistan and abroad. M2 is the commonest FAB type of AML[8,18-20]; however, in the present series, M4was the commonest. This findingisin conformitywith the report by Miguel et al21. In our cases, M2 was the second commonest AML FAB type, followed by M1 and M3 as well as M5 respectively.

Table VI. Comparison of the distribution (%) of ALL cases in the present study with some previous reports.

Type of ALL	Coccia et al. 1979 (324)	Hann et al. 1979 (209)	Viana et al. 1980 (223)	Miller et al. 1981 (883)	Zafar 1985 (80)	Eys et al. 1986 (617)	Barnette et al.* 1986 (112)	Alvi et al. 1990 <15 yrs. (36)	Alvi et al. 1990 >15 Yrs. (29)	Present study (67)
L1	78	73	71	85	55	88	63	92	58	61.2
L2	22	24	25	14	40	8	30	8	38	34.3
L3	-	3	4	1	-	1	7	-	-	4.4

* In all adults.

Number of cases is given in parenthesis.

In Table VI, the distribution of ALL cases according to FAB classification was compared with some previous reports. In the present series, Li was the commonest FAB type, followed by L2 and L3, respectively. Similar pattern has also been reported in other series[19,22-28]. AML occurs twice as often as ALL, the vast majority of cases occurring in adults[29]. In children, ALL is much more common, accounting for approximately 80% of leukemias, followed by AML (17%) and chronic myelogenous leükemias (about 3%), respectively[7]. In the present series, AML was observed more commonly in adults (79%) as compared to children (2i%), whereas ALL was commoner in children (72%) as compared to in 28% amongst adults. Amongst the chronic leukemias, in the present study, CML was the commonest (68.9%), followed by CLL (23%). CML:CLL ratio was 3.1:1. In a total of 60 cases of CML, 54 (60%) had adult type of CML; four cases (6.6%) were between 10 and 15 years of age and two (3.3%) had juvenile CML presenting below the age of one year. CLL was diagnosed in 20 cases, thus constituting 23% of chronic leukemias.

References

1. Abmad, 3., Hashmi, MA., Naveed, IA., et al. Spectrum of malignancies in Faiaalabad: 1986-90. Palc.J.Pathol., 1992;3:103- 10.
2. Ahmed, M., Khan, A.H. and Mansoor, A. The pattern of malignant tumoura in Northern Pakiatan. J.Pak.Med.Assoc., 1991;41:270-73.
3. Young, J.L. and Miller, R.W. Incidence of malignant tomours in US children. Pediatr., 1973;86:254-56.
4. Qureahi, S. Malignancies in childhood. J.Pak.Med.Assoc., 1990;40:68-69.
5. Rennet, 3M., Catovairy, D., Daniel, MT., et al. Proposals for classification of acute leukemias. French-American-British (FAR) Cooperative Group. Br.J. Haematol., 1986;33:452-58.
6. Bennett, J.M., Daniel, M.T., catovaky, D. et al.The morphological classification of acute

lymphoblaatic leukemia: concordance among observera and clinical correlationa. Br.J., Haematolk., 1981;47:553-61.
7. Neglia, J.P. and Robinson, LU Epidemiology of the childhood acute leukemia. Pediatr.Clin.North Am., 1988;35:675-92.
8. Cheasella, 3.85., O\'Callaghan, U. and Hardiaty, R.M. Acute myeloid leukemia in childhood: clinical featorca and prognosia. Br.J. Haematol., 1986;63:555-64.
9. Goldman, J.M. and Lel, D.P. Newapproaches in chronic granolocytic leukemia - origin, prognoela and treatment. Semin Haematol., 1982;19:241-56.
10. Champlin, R.B. and Golde,W. Chronic inyelogenoua leukemia: recentadvancea. Blood, 1985;65:1039-47.
11. Goldman, 3M. Management of chronic mycloid leukemia. Scand 3. Haematol., 1986;37:269-79.
12. William, W.3., Beutler, E., Eralev, A.J. and Lichtman, M.A. Hematology. New York, McGraw Hill nook Company, 1991, pp.981.88.
13.Hoffbrand, A.V. and Lewis, S.M. Postgraduatehematology. 3rd ed. Odord, Heinemann Professional Publishing, 1989, pp.431-33.
14. Hassan, K., Qureahi, M., Shafi, S., etat Acute myeloid leukemia -FAB classification and its correlation with clinico- haematological featurea. iPak. Med. Assoc., 1993;43:200-203.
17. Haaaan, K, Bukhari, KY., Zafar, A., et at Acute leukemia in children - French-American-British (FAB) clasaification and ita relation to clinical featurea. J.Pak.Med.Assoc., 1992;42:29-31.
16. Haaaan, K, Iqbal, W., lkram, N. et al. Chronic myelocytic leukemia - forty patienta with high incidence of blaatic criaia. Rawal Med.J., 1989;17:122.-25.
17. Haasan, K, Iqbal, W., Mirza, M.L, etat Chroniclymphocytic leukemia - correlationwith Rai\'s and Binet'a clinical staging syatema. Rawal MedJ., 1992;20:27-32.
18. Sultan, C., Deregnaucourt, J., Ko, Y.W., etat Diatribution of 250 caaea ofacutemyeloid leukemia (AML) accot-ding to the FAD classification and reapunae tu therapy. Br.J, Haematol., 1981;47:545-51.
19. Alvi,ILA., Saleem, M.,Ahmad, P., etal. Aatudy of hundred caaea of acute leukemia in Northern Pakiatan with reference to French-American-Britiah (FAD) cooperative group clasaitication. Fl,'., 1990; 87-92.
20. Chaudhry, M.T., Tavyab, M. and Farooqui, I.A. Acute non- lymphoblaatic leukemia in adults. J.Pak,Med.Aaaoc., 1993;43:259- 61.
21. Miguel, J.F.S., Gonzalez, M., Canizo, M.C., et at Surface marker analyaia in acute mycloid leukemia and correlation with FAD claaaification. Br.J.Haematol., 1986;64:547-60.
22. Coccia, P.M., Miller, DR., Kersey,J.H. etal. Relationahip ofblaaticaurface markeraand morphology (FAD classification) in childhood acute lymphocytic leukemia (ALL). Blood, 1979;54 (suppi 1):182-85.
23. Hanns, I.M., Evana, D.I.K, Palmer, M.K The prognostic significance of morphological features in cbildhoodacutelymphoblaaticleukemia. Clin.Lsb. Haematol., 1979;1:215-18.
24. Vianna, M.D., Maurer, H.S. and Ferenc, C. Sub-classification of acute lymphoblastic leukemia in children: analysis of the reproducibility of morphological criteria and prognostic implications. BrJ.Haematol, 1980;44:383-88.
25. Miller, DR., Leukin, S., Albo, V., et at Prognostic importance of morphology (FAD classification) in childhood acute lymphoblastic leukemia (ALL). Br.J.Haematol., 1981;48:199-206.
26. Zafar, MN. FABclasaification of acute lymphoglasticleukemia (ALL) and its relevence to ALL in Karachi children. J.Pak.Med. Assoc., 1985;35:233-36.
27. Bys, J.V: Puller, J., Head, 0. et si The French-American- British (FAD) classification of leukemia: the pediatric oncology group experience with lymphucytic leukemia. Cancer, 1986;57:1046-51.
28. Bsrnett, M.J., Oreaves, M.F., Amesa, J.A.L., et al. Treatment of acute lymphoblastic leukemia in adults. Br.J.Haematol., 1986;64:455-68.
29. Boros, L. and Bennett, J.M. Acute myeloid leukemiss in: Haematology I - Leukemias. J.M.

Goldman and HO. Preisler (eda). Isted. London, Butterworth and Company Ltd., 1984, pp. 104-35.