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Pathology

A CLINICOPATHOLOGICAL STUDY OF ACUTE AND CHRONIC LEUKEMIA IN A TERTIARY CARE HOSPITAL

Dr. Sarat Das	Associate Professor of Pathology, JMCH, Jorhat.
Dr. Prasanta Kr. Baruah	Professor of Pathology, JMCH, Jorhat.
Dr. Sandeep Khakhlari	Assistant Professor of Pathology, AMCH, Dibrugarh.
Dr. Gautam Boro*	Assistant Professor of Pathology, JMCH, Jorhat. *Corresponding Author

ABSTRACT **Introduction:** Leukemias are neoplastic proliferations of haematopoietic stem cells and form a major proportion of haematopoietic neoplasms that are diagnosed worldwide. Typing of leukemia is essential for effective therapy because prognosis and survival rate are different for each type and sub-type **Aims:** this study was carried out to determine the frequency of acute and chronic leukemias and to evaluate their clinicopathological features. **Methods:** It was a hospital based cross sectional study of 60 patients carried out in the department of Pathology, JMCH, Assam over a period of one year between February 2018 and January 2019. Diagnosis was based on peripheral blood count, peripheral blood smear and bone marrow examination (as on when available marrow sample) for morphology along with cytochemical study whenever possible. **Results:** In the present study, commonest leukemia was Acute myeloid leukemia (AML, 50%) followed by Acute lymphoblastic leukemia (ALL 26.6%), chronic myeloid leukemia (CML, 16.7%) and chronic lymphocytic leukemia (CLL, 6.7%). Out of total 60 cases, 36 were male and 24 were female with Male:Female ratio of 1.5:1. Acute lymphoblastic leukemia was the most common type of leukemia in the children and adolescents. Acute Myeloid leukemia was more prevalent in adults. **Conclusion:** Peripheral blood smear and bone marrow aspiration study still remains the important tool along with cytochemistry, immunophenotyping and cytogenetic study in the diagnosis and management of leukemia.

KEYWORDS : Acute leukemia, Chronic leukemia, peripheral blood smear, cytochemistry.

INTRODUCTION:

Leukaemia is a disease resulting from the neoplastic proliferation of haemopoietic or lymphoid cells.It results from mutation of a single stem cell, the progeny of which form a clone of leukaemic cells.[1] It is a group of hematological malignancies in which there is unregulated and rapid proliferation of leukemic progenitor cells. This results in replacement of normal hematopoietic precursor cells of erythroid, megakaryocytic, myeloid or lymphoid lineage by proliferating leukemic cells in bone marrow manifesting in the form of anemia and/or thrombocytopenia with leukocytosis or in form of pancytopenia with presence of immature leukocytes in peripheral blood. Leukemia is the eleventh most common cancer worldwide with about 257,000 new cases each year.

Leukemia forms a significant percentage of haematological disorders and affects individuals of all age groups throughout the world, but the incidence of disease and the frequency of various morphological types and sub-types have been found to be differing in different countries. Clinically leukemias are of two types; acute and chronic. Acute leukemias are acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML). Chronic leukemias are classified into chronic myeloid leukemia (CML) and chronic lypmphocytic leukemia (CLL). In childhood, ALL is more common than AML. In India, the incidence of ALL and AML are 35% and 15% of all hematological malignancies respectively.

MATERIALS AND METHODS:

The present study was a hospital based cross sectional study for a period of one year (February 2018 to January 2019) at Jorhat Medical College & Hospital, Jorhat, Assam. During the study period, detailed history and particulars of the patients were recorded. A history of short duration of clinical features like pallor, fatigue, bleeding in the form of bruising, petechiae or ecchymotic spots, persistent fever, bone or joint pains with or without organomegaly and/or lymphadenopathy and who were later diagnosed as leukaemia were taken up for the study. A detailed clinical history regarding nature and duration of illness, loss of weight, significant family history and drug history, if any, was taken. This was followed by detailed general physical and systemic examination.

Total of 60 patients with acute and chronic leukemia reported during the study period were included in the study. These patients were evaluated especially regarding age, gender and chief complaints. Diagnosis was made on findings of Complete blood count (i.e. Haemoglobin, Total leucocyte count and Platelet count) which was done by automated cell counter; peripheral blood smear stained by Leishman stain and bone marrow aspiration smear (in selected cases) stained by Giemsa stain. Cytochemistry studies like myeloperoxidase (MPO), Periodic acid Schiff stain (PAS) and Sudan black B (SBB) were done to differentiate myeloid and lymphoid leukemia. These stains were prepared and used as per the guidelines endorsed in Practical Haematology Dacie and Lewis 11th edition[2]. Then all cases were diagnosed and classified, as acute myeloid leukemia, acute lymphoblastic leukemia, chronic myeloid leukemia and chronic lymphocytic leukemia.

RESULTS:

In our study, 66.6% of patients had acute leukemia while 33.4 % had chronic leukemia (Table 1).

Table 1: Frequency of Leukemia

Types of Leukemia	Total no of cases	Percentage
Acute Leukemia	46	66.6
Chronic Leukemia	14	33.4
Total	60	100

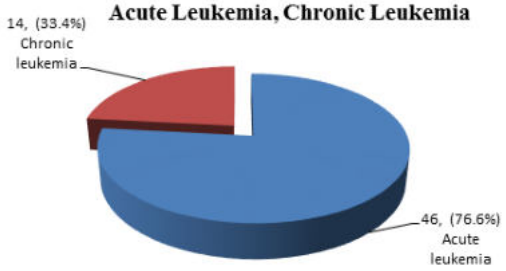

Table 2: Frequency of different subtypes of Leukemia

Subtypes of Leukemia	Total no of cases	Percentage
AML	30	50.0
ALL	16	26.6
CML	10	16.7
CLL	4	6.7
Total	60	100

Acute myeloid leukemia (AML) and Acute lymphoblastic leukemia (ALL) were found in 50% and 26.6% of all total patients respectively. Of chronic leukemia, 16.7% patients had chronic myeloid leukemia (CML) and only 6.7 % had chronic lymphocytic leukemia (CLL) (Table 2).

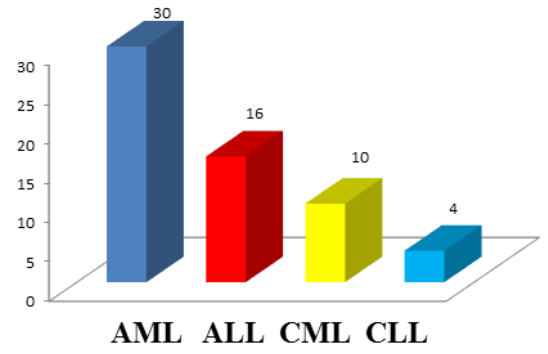

Table 3: Gender wise distribution of different types of leukemia

Types of Leukemia	Male	%	Female	%
AML	18	50	12	50
ALL	10	27.8	6	25
CML	6	16.6	4	16.7
CLL	2	5.6	2	8.3
Total	36		24	

Overall male (36) preponderance was found in our study with a percentage of 60% of total cases and 40% in females (24). Male to female ratio was 1.5: 1. Male preponderance was observed in AML (50%) and ALL (27.8%) whereas female preponderance was observed in AML (50%) and CML (16.7%)

Table 4: Age wise distribution of different types of leukemia

Age	AML	ALL	CML	CLL	Total	%
0-9 yrs	03	09	0	0	12	20
10-19 yrs	05	04	0	0	09	15
20-29 yrs	06	02	2	2	08	13.3
30-39 yrs	08	01	01	0	10	16.6
40-49 yrs	04	0	02	0	06	10
50-59 yrs	03	0	05	1	09	15
60-69 yrs	01	0	02	03	06	10
Total	30	16	10	4	60	100

It was observed from table 4 that, age group found to be most vulnerable for the various leukemias is 0-9 years followed by 30-39 years. AML was commonest in age group of 30-39 years, ALL between 0-9 years of age group.

Table 5: Frequency of clinical Features of leukemias.

Sl. No	Clinical Features	AML	%	ALL	%	CML	%	CLL	%	Total	%
1	Fever	28	60.8	10	21.7	07	15.2	1	2.2	46	76.7
2	Generalized weakness	22	53.7	09	21.9	08	19.5	2	4.8	41	68.3
3	Pallor	19	52.7	08	21.6	09	24.3	1	2.7	37	61.7
4	Loss of appetite	15	45.4	10	30.3	07	21.2	1	3.0	33	55.0
5	Bleeding manifestation	16	53.3	11	36.8	2	6.6	1	3.3	30	50
6	Lymphadenopathy	12	44.4	08	29.6	05	18.5	2	7.4	27	45
7	Splenomegaly	08	32.0	09	36.0	07	28.0	1	4	25	41.7
8	Bony tenderness	12	50	08	33.3	4	16.6	0	0	24	40

Table 5 depicts the prominent clinical presentations of all the 60 patients of leukaemia. The symptom of patients suffering from leukaemia is variable but by analyzing the cases a common spectrum of presentation was noted. Fever and Generalized weakness were the most common presenting symptoms followed by loss of appetite, bleeding manifestations and bone pain respectively. Pallor was the most frequently observed sign along with bony tenderness, lymphadenopathy and splenomegaly.

In AML, the most common presenting clinical feature was fever followed by generalized weakness, bleeding manifestations, pallor, lymphadenopathy, splenomegaly and bone tenderness. Similarly, bleeding manifestation, splenomegaly, fever, pallor were the common presenting clinical features of patients with ALL. CML patients mostly presented with generalized weakness, splenomegaly, loss of appetite and pallor, whereas most of the patients of CLL were incidentally diagnosed and complained of mostly generalized weakness and loss of appetite and pallor was a common presenting sign followed by lymphadenopathy, splenomegaly and bleeding manifestations in these patients.

Table 6: Frequency of major Laboratory indices of leukemia.

Parameters	Range	No.of cases	%
Total count (cells/cubic mm)	<4000	1	1.6
	4000-11,000	0	0
	11,001-25,000	2	3.3
	25,001-50,000	10	16.7
	50,001-1,00,000	29	48.3
	>1,00,000	18	30
Hb (gm%)	≤ 6	29	48.3
	6.1-9	20	33.3
	9.1-12	11	18.3
Platelet (per cubic micro litre)	<20,000	25	41.7
	20,000-<50,000	13	21.7
	50,000-1 lakh	08	13.3
	>1 lakh	14	23.3
% Blast	<20%	14	23.3
	20-50%	17	28.3
	51-80%	13	21.7
	>80%	16	26.7

Table 6: shows the laboratory indices in different leukemias. Out of the total 60 cases, 1 case (1.6%) showed leucopenia (total count< 4000/ cumm),02 cases (3.3%) had leucocyte count between 11, 000-25, 000/cumm. 10 cases (16.7 %) between 25, 000- 50, 000 /cumm, 29 (48.3%) cases had total leucocyte count between 50, 000-1,00,000 /cumm whereas 18 cases (30%) had total count > 1, 00, 000/cumm.

Anaemia was detected in almost 100% of the leukaemic patients. There was severe degree of anemia in 48.3% (n=29) of cases (Hb ≤ 6 g/dl), and 33.3 % (n = 20) had moderate degree of anaemia (Hb: 6.1-9 g/dl) while 18.3 % (n=11) cases had mild anaemia.

Amongst the leukaemia cases, 14 cases (23.3%) showed platelet count above 1,00,000/cumm and another 08 cases (13.3%) showed platelet count between 50,000-100,000/cumm, whereas 13 cases (21.7%) showed platelet count between 25,000-50,000/cumm and 25 cases (41.7%) showed severe thrombocytopenia with platelet count < 20,000/ cumm.

Amongst the leukaemia cases, 14 cases (23.3%) showed blast percentage <20%, 17 cases (28.3%) showed blast percentage between 20-50%, 13 cases (21.7%) showed blast percentage between 50 -80% and 16 cases (26.7 %) had blast percentage of >80%.

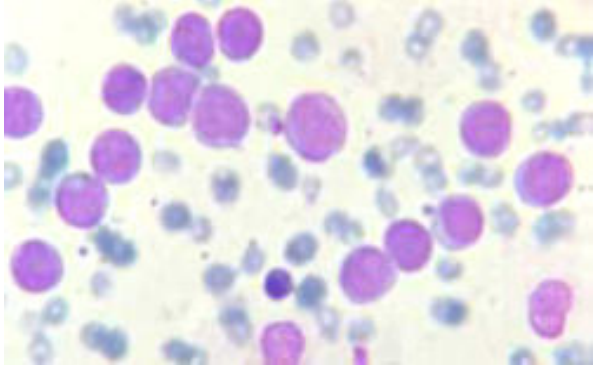

Figure 1: Photomicrograph of peripheral blood smear showing myeloblasts in a Acute myeloid leukemia (M2) case; Leishman stain: 100x10 view.

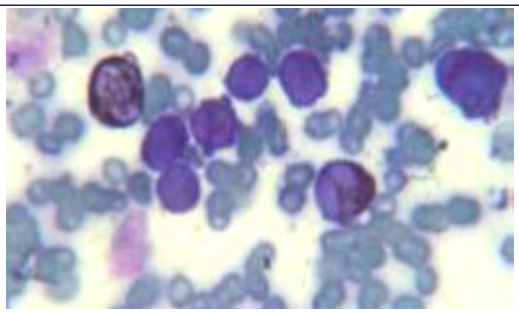

Figure 2: Photomicrograph of a case of Acute Promyelocytic Leukemia showing abnormal promyelocytes with strong positivity for Sudan Black B: 100x10 view.

DISCUSSION:

In the year of 1857, Virchow probably was the first to classify leukemia. On the pathologic distribution of tumor, he distinguished splenic and lymphatic forms of leukemia. The incidence of leukemia has increased considerably and this rise is noticeable because of improved statistics, better case findings with novel technologies which lead to better diagnosis and treatment methods. Diagnosis of primary hematological malignancies has multiparametric approach which includes evaluation of morphological cellular details and phenotypic or genotypic pattern.[2] Acute leukemia is more common than chronic leukemia all over the world.

In the present study, majority of the leukemia cases were acute leukemias(66.6%) and (33.4 %) cases were chronic leukemias. Similar findings were observed in the study of Singh G et al[3] showing 66.8% of acute leukemia and 33.2% of chronic leukemia while Humayun et al in his study was observed 90% cases of acute leukemia.[4] In our study, Acute myeloid leukemia(50%) was commonest subtype of leukemia which is comparable with the study conducted by Tesfaye G. et al.[5] Chronic lymphocytic leukemia (6.7%) was least common amongst the leukemias in this current study which is similar with the study of Jain A et al.[6] However, Baviskar JB[7] in her study observed that the commonest leukemia was Chronic myeloid leukemia (33.97%) followed by Acute lymphoblastic leukemia (26.28%), Acute myeloid leukemia (23.07%) and Chronic lymphocytic leukemia (15.38%). This difference in our study may be due to geographic and genetic variation of different types of leukemias and there is need of further evaluation.

In our study, leukemia was seen predominantly in male (60%) in comparison to female (40%). The male:female ratio was 1.5:1 which is in concordance with Singh G et al[3], Harani M.S et al[8] and Kulshrestha R et al[9].

In the present study, the predominant age group for AML was 30-39 yrs, ALL in 0-9 yrs, CML in 50-59 yrs and CLL in 60-69 yrs. ALL was the most common leukemia in paediatric age group where in adult, AML was the most prevalent leukemia which is similar to the study of Singh G et al.[3] Most common clinical features in AML was generalized weakness, bleeding manifestations and pallor; in ALL bleeding manifestation and splenomegaly, in CML splenomegaly and in CLL lymphadenopathy which is in concordance with the study of Hamid GA et al.[10]

CONCLUSION:

The present study concludes that acute leukemia is more prevalent than chronic leukemia among which AML is most common and CLL is least common. AML is more common in adult as compared to ALL which is more prevalent in paediatric age group. Fever and generalized weakness are the most common symptoms whereas pallor and lymphadenopathy are the most frequent clinical signs. Peripheral blood smear and bone marrow aspiration study still remains the important tool along with cytochemistry, immunophenotyping and cytogenetic study in the diagnosis and management of leukemia.

Conflict of interest: None

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