



A RETROSPECTIVE STUDY OF LEUKAEMIA CASES IN JAWAHARLAL NEHRU INSTITUTE OF MEDICAL SCIENCES (JNIMS)

Pathology

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ABSTRACT

Background: Leukaemia is a malignant neoplasm of the haematopoietic stem cells characterized by diffuse replacement of the bone marrow and/or peripheral blood by neoplastic cells. It is a retrospective study.

Method: The study was within a period of four years in the teaching hospital of JNIMS, among the leukaemia cases treated during March 2015 and April 2019 with total number of 102 cases.

Result: Morphological subtyping showed that acute lymphoblastic leukaemia L_2 (ALL- L_2) was the highest with 36 cases (35.2%) and acute myeloid leukaemia (AML- M_1) was the lowest with a single case (0.9%). Males were predominant with 66 (64.7%) and females 36 only (35.3%). Highest number of patients belong to children (35.2%). Among the female sufferers 33 (32.4%) were pre-menopausal and 8 (7.8%) were post-menopausal.

Conclusion: In this study children under 10 years are most affected (31.3%) and males (64.7%) are more affected.

KEYWORDS

Hematopoietic, Stem cells, Acute Myeloid Leukemia, Chronic Myeloid Leukemia, Acute Lymphoblastic Leukemia, Chronic Lymphoblastic Leukemia.

INTRODUCTION:

Leukaemia is a type of cancer that mainly occurs in the blood or bone-marrow with the manifestation of an uncontrolled growth of abnormal white blood cells. There are four types of malignant disease of the blood and bone marrow. These are Acute Lymphoblastic Leukaemia, Acute Myeloid Leukaemia, Chronic Lymphocytic Leukaemia and Chronic Myeloid Leukaemia. Acute Myeloid Leukaemia progresses rapidly¹.

The causes of leukaemia are not known however one of the causes is considered to be abnormal in the chromosomes². The predisposing factors for developing leukaemia include exposure to high doses of a) radiation, b) certain types of chemotherapy or chemicals, such as benzene, c) persons having Down Syndrome, d) Epstein-Barr virus infection e) smoking also increases the risk of formation of leukaemia³.

It is treatable and curable if diagnosed in the earliest stages of the disease. Advanced leukaemia results in a proliferation of abnormal white blood cells that spread throughout the blood stream. These abnormal cells crowd out normal white blood cells. The abnormal white cells incapable to fight infection, resulting to increased infection.

The abnormal white blood cells crowd out the red blood cells leading to anemia, reduction in total red blood cells⁴.

Leukaemia also decreases the number of platelets cells leading to impaired clotting the abnormal white blood cells formed in leukaemia also accumulate in the organs of the body e.g. spleen, liver, lymph node, testes and brain and interfere with normal organ functioning⁵.

METHODS:

The study was retrospective observational study conducted in the Department of Pathology, Jawaharlal Nehru Institute of Medical Sciences. A total of 102 confirmed cases of leukaemia during four years between March, 2015 and April, 2019 were included in the study.

Retrospective analysis in respect of leukaemia types, subtypes, age, sex & ethnic groups was carried out. FAB (French, American, British) Classification was used for AML which subdivides into eight types M_0 , M_1 , M_2 , M_3 , M_4 , M_5 , M_6 , M_7 and ALL into three subtypes as $L1$, $L2$, $L3$ ^{6,7,8}. Diagnosis was based on peripheral blood count, peripheral blood smear and Wright stained bone marrow aspiration smears were examined for morphology. Cytochemistry studies with special stain like myeloperoxidase (MPO). Periodic acid-Schiff (PAS) were done whenever required.

RESULTS:

In this study a total of 102 leukemias were included. Maximum no. of leukaemia & the subtypes cases (Table - I) were among children between 1 to 10 total being 32 (31%). Minimum being among the age group of 71 to 80 years, total being 4 only (3.9%). Maximum no. of cases were among the ALL - L_2 , Table - I total being 36 (35%). The highest number of leukaemia was ALL - L_2 with a total no. of 36 (35%) and lowest number was with AML- M_1 , with one case only (0.9%).

Table - I

	Age Distribution of Leukemia and Subtypes											Total	Percentage
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100			
ALL- L_1	3			1							4	3.9 %	
ALL- L_2	25	4	2		2		2	1			36	35.2 %	
AML- M_1		1	2		1	1		1			6	5.8 %	
AML- M_2	2	3	8	3	5	6	4	1			32	31.3 %	
AML- M_3	2	2	5	2	2		1				14	13.7 %	
AML- M_4				1			1				2	1.9 %	
AML- M_7								1			1	0.9 %	
CML					4	3					7	6.8 %	
Age Wise Total	32	10	17	7	14	10	8	4			102		

Table - II shows the breakup of male sufferers with the subtypes of leukaemia among the males and the females. Males predominantly suffer from leukaemia. The highest number (21) suffered from ALL- L_2 subtype and lowest being 1 only with AML- M_1 . Among the females ALL- L_2 happens to be highest killer (15) and the lowest was 1 each with AML- M_3 and CML.

Table - II

Leukemia & Subtypes	Leukemia & Subtypes Sex Distribution								Total	Percentage
	ALL L_1	ALL L_2	AML M_1	AML M_2	AML M_3	AML M_4	AML M_7	CML		
Males	4	21	2	19	13	0	1	6	66	64.7
Females	0	15	4	13	1	2		1	36	35.3
Total	4	36	6	32	14	2	1	7	102	

Table - III males were more affected being total of 66 cases (64.7%) and females being 36 only (35.3%). The oldest in the series was 72 years male and youngest was 2 years old male. Among the female patients the oldest was 70 years and the youngest being 3 years. Of the female sufferers 28 were pre-menopausal and only 8 were post-menopausal (Table - III).

Table-III

Sex Distribution of Leukemia cases with Pre and Post Menopausal Status					
Total Male			Total Female		
66 (64.7%)			36 (35.3%)		
Oldest	Youngest		Oldest	Youngest	
					Pre Menopausal
72 yrs	2 yrs	70 yrs	3 yrs	28 (27.5%)	8 (7.8%)

Of the leukaemia cases, chronic leukaemia were 7 (6.8%) only and the rest 95 cases (93.13%) were acute leukaemias. Sex distribution of the leukaemia & subtype (Table – II) shows sex distribution of each subtypes of acute leukaemias and also chronic leukaemia. Table – III shows total number of males and females suffering from acute leukaemia with the subtypes and the chronic leukaemias. Table-III also shows females who are in pre-menopausal and post-menopausal period.

Table - IV shows sex distribution of the acute and chronic leukaemias and the subtypes of the acute leukaemias indicating preponderance of males over the females.

Table-IV

Male Female Ratio of Types of Leukaemia

Types & Subtypes of Leukemia	Male	Female
ALL-L ₁	04	Nil
ALL-L ₂	21	15
AML-M ₁	02	04
AML-M ₂	19	13
AML-M ₃	13	01
AML-M ₄	Nil	02
AML-M ₅	01	Nil
CML	06	01
Total	66	36

In this study geographical distribution of leukaemia and subtypes are shown. Imphal East and Imphal West districts are most affected. Over all people in the valley are affected than those in the Hills.

In this study males suffer predominantly from all leukemias including subtypes. The total male sufferers are 65 (63.7%), total female sufferers were 36 (35.29%).

Table – V Ethno Cultural Cum Geographical Distribution

District	Valley/Hill	Urban	Rural	Ethnicity & Religion			Total no. of cases	Percentage
				Meitei Hindu	Muslim	Tribal Christian		
Imphal East	Valley	6	20	23	2	1	26	25%
Imphal West	Valley	17	9	22	2	2	26	25%
Bishnupur	Valley	0	10	9	1	0	10	9.8%
Thoubal	Valley	0	12	11	1	0	12	11.75%
Churachandpur	Hill/Valley	3	5	0	0	8	8	7.84%
Ukhul	Hill	0	6	0	0	6	6	5.88%
Senapati	Hill	0	3	0	0	3	3	2.94 %
Chandel	Hill	0	2	0	0	2	2	1.96%
Kangpokpi	Hill	0	3	0	0	3	3	2.94%
Noney	Hill	0	2	0	0	2	2	1.96%
Tamenglong	Hill	0	1	0	0	1	1	0.98%
Kakching	Valley	0	3	3	0	0	3	2.94%

CONCLUSION:

Acute leukaemias are more common than the chronic leukaemia. Males are more predominant than the females. Maximum number of cases are among the pediatric age group. Chronic leukaemia is least in the study. Among the acute leukaemia M₁ is the lowest in the study. Geographical pattern of leukaemia varies widely but warrants in-dept study on the matter.

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In this study only 4 males (3.9%) suffer from ALL-L₁, 21 males (20.5%) and 15 females (14.7%) suffer from ALL-L₂. Only 2 males (1.9%) and 4 females (3.9%) suffer from AML-M₁, 19 males (18.6%) and 13 (12%) females suffer from AML-M₂, 13 males (12.7%) and 01 (0.9) females suffer from AML-M₃, 2 (1.9%) females suffer from AML-M₄. Only one male suffer from AML-L₇, (0.9%), 6 males (5.8%) and 01 female (0.9%) suffer from CML.

DISCUSSION:

Leukaemia is a disease resulting from abnormal proliferation of haemopoietic and lymphoid cells. It is one of the leading causes of death worldwide especially pediatric age group. In the study acute leukaemia is more common than chronic leukaemia. It is comparable with reports from D'Costa GG et al⁹, Kulshrestha. R et al¹⁰, Modak H et al¹¹, Chen et al¹². Among the subtypes of leukaemia in this study, ALL-L₂ is the most common and next common is AML-M₂. However in western literatures¹³ and reports of Chen et al¹², Ghost et al¹⁴, Makase K et al¹⁵, Eivazi-Ziaet¹⁶ indicate that AML-M2 is the most common subtype. AML is more common among the adults and is compatible with most of the studies in India and those from abroad.

In this study male predominance is quite evident. This finding is similar with most studies^{6,17,8,9,11,14,16}. In ALL-L₂ is most common subtype of leukaemia and maximum cases are seen in 1st and 2nd decades of life. In this study, ALL subtype is showing more male predominance which is compatible with that of Parkin DM et al¹⁸, D'costa GG et al⁹, Meighan et al²³, Alrudainy et al¹⁹. AML-M₁ is having only 2 cases (1.9%). Male predominance of AML-M₂ and AML-M₃ at the ratio of 19:13 and 13:1 over the female sufferers.

The geographical pattern of leukaemia is known to vary widely (Table - V) however this observed geographic variation remains unexplained. Different leukaemia subtypes have shown important differences in geographic racial/ethnic, age patterns in previous studies, thus suggesting that different subtypes may have different etiologic factors^{21,22}. In this study maximum number were from the valley population, 77 no. out of total of 102. The finding may be because of easy accessibility to the teaching hospital (JNIMS) or may be something to do with genetic difference, food habits, environment differences etc among the people in the valley and those in the Hills. Therefore a comprehensive in-dept study on the role of geographical variation among the leukemias and its subtypes is warranted.

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