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Seasonal trends in Leukemias in East Godavari District

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Abstract:
Aims and Objectives: *To analyse the seasonal trends in leukemias and to know the incidence of various leukemias in different age groups and gender.*
Methodology: *This was an observational study of 168 cases over a period of 72 months in the department of Pathology, Government General Hospital,* a tertiary care teaching hospital, *Rangaraya Medical College, Kakinada. Clinical data including the date of diagnosis was collected . Haemogram and Bone Marrow done with Leishman's stain and May Granwald Giemsa stain.Clinical data included Date of diagnosis i.e. Date when the definite diagnosis is made with peripheral smear or the bonemarrow., Age at diagnosis, Gender, Month wise data collected for 12 month cycle and the time of diagnosis is noted in the 4 seasons i.e. Winter (December, January, February), Summer (March, April, May),Monsoon (June , July, August), Autumn(September, October, November).*
Results*: The total number of leukemias during the study period were 168. Acute leukemias out numbered chronic leukemias .72% acute leukemias occurred in summer and winter.*
Conclusion: *Seasonal trends are seen in acute leukemias world wide though the exact associated etiopathological factors remain uncertain*

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I. Introduction

Leukemia is a hemopoietic malignancy probably arising from interactions between exogenous(infections) or endogenous(inflammation, oxidative stress) exposures, genetic susceptibility and chance. Chance is incidental exposure along with genetic defect leading to in utero initiation and accentuated by post natal exposure ,finally evolving into ALL. Types of leukemias include Acute Myeloid Leukemia(AML),Acute Lymphoblastic Leukemia(ALL),Chronic Myeloid Leukemia(CML) and Chronic Lymphocytic Leukemia(CLL).

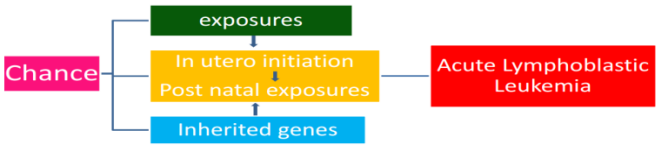

Fig.no 1. Leukemogenesis[(1)]

II. Material and Methods

This prospective observational study was carried out on patients refered to Department of Pathology from varios specialities at Government General Hospital/Rangaraya Medical College, a tertiary care teaching hospital, Kakinada, Andhra Pradesh during 72 months (January 2013 to December 2018). A total 168 cases (both male and females) of aged 7days to 76 years were studied. in this study.
Study Design: Prospective observational study
Study Location: This was a tertiary care teaching hospital based study done in Department of Pathology at Government general hospital, a tertiary care teaching hospital ,Kakinada,Andhra Pradesh.
Study Duration: January 2013 to December 2018.
Sample size: 168 patients.

Subjects & selection method:
Inclusion criteria:
1. Diagnosed cases of Leukemias
2. Either sex
3. Any age group
4. Date of diagnosis

Exclusion criteria:
1. Myelodysplastic syndromes
2. Multiple myeloma cases
3. Malignant deposits in bone marrow.

Procedure methodology

Every case is tested in hematology laboratory with particular reference to the clinical data, hepatosplenomegaly and relevant biochemical investigations.Complete hemogram done and peripheral smears were examined followed by bone marrow study.Bone marrow aspiration smears were stained with May Grunwald Giemsa stain,Leishman stain and Per iodic acid Schiff (PAS).

III. Results

74 % cases belonged to acute leukemias which were diagnosed on cytomorphology into AML and ALL.Some were left as acute /undifferentiated types as they needed special cytochemistry to sub type them.

Table no 1 Shows acute leukemias out number chronic ones

Total number of cases	168
Acute leukemias	125(75%)
Chronic leukemias	43(25%)

Table no 2 : Types of Leukemias . 74% are acute, and AML being the commonest

Type	Number of cases (n=168)	%
Acute Leukemia	125	74.4
AML	48	28.6
ALL	43	25.6
Undifferentiated Leukemia	34	20.2
Chronic Leukemia	43	25.6
CML	41	24.4
CLL	2	1.2
Total	168	100

Fig.no 2 .Types of Leukemias

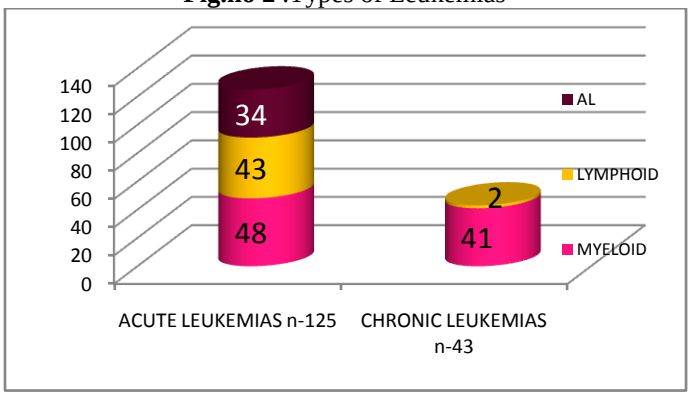

Table no 3 : Month wise distribution of Acute Leukemias . Seasonal variation is observed in 12 month cycle,more cases are seen in winter(december,january,feb) and summer (march,april,may,june)

Month	2013	2014	2015	2016	2017	2018	Total
January	1	4	3	5	2	4	19
February	0	0	2	4	1	0	7
March	0	3	2	3	1	3	12
April	0	1	1	4	1	2	9
May	0	0	2	6	7	1	16
June	0	2	0	3	1	2	8
July	3	2	0	3	3	2	13
August	2	0	0	4	0	0	6
September	0	3	0	2	1	1	7
October	1	1	1	0	3	2	8
November	1	2	2	5	0	2	12
December	2	1	1	1	0	3	8
Total	10	19	14	40	20	22	125

Fig.no 3 Month wise distribution of Acute Leukemias

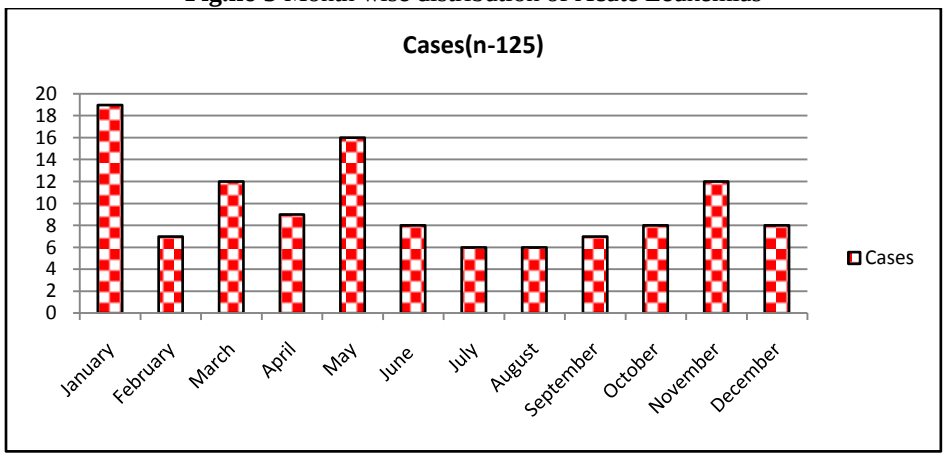

Table no 4 Leukemias - gender (n-168) Males out number females in overall cases.

Male	91(54%)
female	77(46%)
Total	128

Table no 5 Shows age groups .Most common age group is 15-40 years

Years	Cases
0-14	48
15-40	63
>40	57
Total	168

IV. Discussion

Leukemias are identified in 1889.Their pathogenesis is complex involving mainly cytogenetic abnormalities.Ex : Multistep natural history of ALL starts from initiation(in utero) through evolution to overt disease.Genetic Pathogenesis(ALL) includes Initiation(MLL rearrangement) and predisposition (inherited genes) lead to lesion generation. Usually 20 candidate exposures are required in leukemogenesis.Ex:Influenza viruses, persistent in utero generated pre-leukemic clone and genetic susceptibility.Infants born with trisomy 21 are Down's syndrome are at increased risk of ALL and AML. Exogenous and endogenous factors along with inherited genetic defect lead to leukemias .These factors may be responsible for the seasonal variation in leukemias globally.

In our study ,91 (72%) acute leukemias identified are seen mostly in winter and summer.Common age group:15-40 yrs ,AML most common. Male preponderance is seen and this may be due to specific mutations that

target X-chromosome genes. Climate in India is different in different regions which have their own microclimates. Common seasons in india are Winter (December, January, February) ,Summer (March, April, May, June), Monsoon(July, August,september), and Autumn(October, November) . Comparison to other studies done with Nepal study,Turkey study,Harris et al(USA),Badrinadh and colleagues(UK),Victorian cancer cytogenetics service centre(Australia and Manchester Children Tumor Registry(UK) .

Table no 8 Nepal study

Month	1997	1998	1999	2000	2001	2002	Total
January	2	2	1	2	5	4	16
February	3	2	1	2	4	2	14
March	3	1	5	0	5	5	19
April	7	3	3	6	2	4	25
May	5	3	2	1	5	9	25
June	2	2	2	3	3	8	20
July	1	2	1	1	4	8	17
August	2	1	2	1	5	3	14
September	0	3	0	1	2	3	9
October	1	2	5	0	2	1	11
November	1	7	2	1	6	0	17
December	0	3	2	2	0	2	9
Total	27	31	26	20	43	49	196

Nepal study was done in Koilara institute for a period of six years.Total number of cases were 196,out of which 121 were acute leukemias and 75 chronic.Maximum number of cases occurred in spring(March,April,May) and summer(June,July,August) with Male preponderance.

Turkey study : ALL was common in spring and summer. Rose et al study indicated summer excess.Harris et al,USA reported trimodel pattern with peaks in April,August and December.they reported environmental allergens ,infectious agents promoting leukemogenesis via indirect mechanisms.These peaks may coincide with seasonal elevation of allergic factors during spring and infections caused by viruses like influenza during winter.

Manchester Children's Tumour Registry (MCTR). Westerbeek et al studied 1669 cases. 1070 cases were Acute lymphoblastic leukemia(ALL) with peak in July .Badrinath and colleagues (1997), UK show 40% summer excess.

V. Conclusion

Leukemias are seen globally with different patterns and and are following seasonal trends especially Acute leukemias. They are more common in Summer(June,July,August) and Winter(December,January,February) correlated well with other studies including Harris et al an International study,Badrinadh and colleagues etc..

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