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Study of prevalence of acute leukemia

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***Abstract*---**Introduction: Cancer of the body's blood-forming tissues, such as the lymphatic system and bone marrow, is known as leukaemia.There are various forms of leukaemia.Some leukemia types are more prevalent in children. Most cases of other types of leukemia are in adults. Usually, leukemia affects white blood cells. Although there is no known cause of acute leukemia, certain persons are at higher risk due to factors including radiation exposure. Exposure to particular chemical substances, such benzene. Viruses such as the virus that causes human T-cell leukemia. Method: This research was done via observation.82 leukemia cases that were discovered in the pathology division of the Netaji Subash Chandra Medical College in Jabalpur make up the sample size for the current prospective study. In the present study the cases were in the range of 1-70 years Clinically questionable cases were sent to the Department of Pathology, where a complete blood counts was performed using an automated hematology analyzer and a peripheral leishman stain smear investigation. Patients who have received treatment for a prior diagnosis are excluded in this study. Result: Out of 82 cases, 21 cases (25.6%) were under the age of 10, 16 cases (19.5%) were between the ages of 10 and 20, 11 cases (13.4%) were between the ages of 20 and 30, 9 cases (11%) were between the ages of 30 and 40, 12 cases (14.6%) were between the ages of 40 and 50, 9 cases (11%) were between the ages of 50 and 60, and 4 cases (4.9%) were between the ages of 60 and 70.The vast majority of the patients were under 10

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years old. 0 cases (36.6%) were Females and 52 cases (63.4%)were Males. Conclusion: Acute leukemia commonly showed up as sternal soreness, epistaxis, bone pain, and pallor. Planning and managing the delivery of healthcare services that support leukemia diagnosis and effective treatment necessitates a thorough investigation of the general population. For better leukemia diagnosis, subtype identification, and treatment management, complex and modern approaches should be applied.

***Keywords*---**acute leukemia, cancer, prevalence.

Introduction

Acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL) are the two subtypes of AL based on the types of cells involved (AML).The majority of individuals with AL only have a few months to live if they are left untreated due to the disease's principal symptoms, which include a high fever that doesn't go away or frequent infections that cause varied degrees of spleen, liver, and lymph node enlargement.[1] A common form of treatment for AL to slow tumor growth in patients is chemotherapy. A hematological malignancy develops when the regulation of a blood cells or its precursor's life cycle is compromised. Leukemia is one of the malignancies that affect people of all racial or ethnic backgrounds the most frequently, with a relative proportion ranging from 25 to 40%.More than 57 percent of newly diagnosed cases of leukemia in 2013 were in men. Males had a higher frequency of some subtypes of leukemia because they were exposed to more carcinogens at work and in the environment.[2]

The suggested definition of a cure for cancer is the clinical eradication of the illness over an extended length of time (often >5–10 years) following the end of treatment. In other words, the patient has a life expectancy that is comparable to that of the general population and is free of disease. With very few exceptions, such as acute lymphocytic leukemia, treatment for the majority of malignancies is finished in a short amount of time (e.g., 6–12 months). There aren't many malignancies that progress slowly and don't need any interventions or affordable therapy. These include essential thrombocytopenia, polycythemia Vera, chronic lymphocytic leukemia, and indolent lymphomas.[3]

Patients with an underlying hematological condition or as a result of past therapy (such as topoisomerase II exposure, alkylating drugs, or radiation exposure) may develop AML.However, it typically manifests in previously healthy people as a de novo cancer. Regardless of the cause, a clonal population of myeloid stem cells exhibit aberrant growth and differentiation during the pathogenesis of AML.[4] People of different ages, sexes, and races have varying leukemia incidence rates. The degree of exposure to environmental and genetic risk factors is primarily responsible for these discrepancies. For instance, ionizing radiation is a proven causal exposure for pediatrics ALL, as indicated by the slight but considerably higher risk caused by X-ray pelvimetry during pregnancy, and roughly 10% of people who develop CLL have a family history of the disease.[5]

Method

This is an observational study. The sample size for the current prospective study is 82 leukemia cases that were identified in the pathology department of Netaji Subash Chandra Medical College in Jabalpur. Clinically suspect cases were submitted to the Department of Pathology, where they underwent a full blood count utilizing an automated hematology analyzer and a peripheral leishman stain smear study. Then, a preliminary diagnosis was made. Following a peripheral smear test, a salah's needle was used to aspirate bone marrow from the posterior superior iliac spine in adults and the shin of the tibia in children.Leishman stain was then used to fix and stain bone marrow samples. When necessary, specific cytochemical stains (PAS, Sudan Black B) were applied to prepared bone marrow smears on clean glass slides fixed by methanol. This study was conducted after getting informed consent from patient.

Inclusion criteria

- Leukemia has been clinically and morphologically identified in all new cases.
- Only situations involving bone marrow aspiration were included.

Exclusion criteria

- Non-hematological cancers with abnormal hematological markers are excluded.
- Patients who have received treatment for a prior diagnosis
- Patients who refuse to provide their consent

Statistical analysis

Statistical analysis for this study was done by using statistical software SPSS version 16.

Result

Table 1: Age distribution of study subjects

AGE	NO OF CASES	PERCENTAGE
<10	21	25.6
10 -20	16	19.5
20 - 30	11	13.4
30 - 40	9	11
40 - 50	12	14.6
50 - 60	9	11
60 - 70	4	4.9
TOTAL	82	100

Table 1 shows age distribution of patients. In the present study the cases were in the range of 1-70 years. Out of 82 cases – 21 cases (25.6%) were of age group less

than 10 years, 16 cases (19.5%) were of age group 10-20 years, 11 cases (13.4%) were of age group 20-30 years, 9 cases (11%) were of age group 30-40 years, 12 cases (14.6%) were of age group 40-50 years, 9 cases (11%) were of 50-60 years and 4 cases (4.9%) were of 60-70 years. The majority of the patients were in the age group less than 10 years.

Table 2: Sex distribution of study subjects

SEX	NO OF CASES	PERCENTAGE
FEMALE	30	36.6
MALE	52	63.4
TOTAL	82	100

Out of 82 cases- 30 cases (36.6%) were Females and 52 cases (63.4%) were Males. Male to Female ratio = 1.73:1.

Table no 3: Age distribution in types of leukemia cases

AGE GROUP	AML	CML	ALL	CLL	AUDL
0 -10	2	1	17	0	1
10 -20	6	1	8	1	0
20 -30	2	6	3	0	0
30 -40	4	3	1	0	1
40 -50	0	9	0	3	0
50 -60	1	4	0	3	1
60 -70	2	1	0	0	1
TOTAL	17	25	29	7	4

Table 3 shows age distribution for the diagnosed cases. ALL was more common in the age group 0-20 years. AML was found more common in the age group 10-20 years followed by the age group 30-40 years.CML was common in the age group of 40-60 years. CLL was found more common in the age group 40-60 years.

Table no 4: total leucocyte count in cases of leukemia

TLC	NO OF PATIENTS				
< 4000	AML 4 24%	CML 0 0.00%	ALL 6 20.60%	CLL 1 14%	AUDL 0 0.00%
4000 -11000	2 11.70%	0 0.00%	3 10.30%	0 0.00%	2 50%
11000 -50000	3 17.60%	4 16%	11 38%	4 58%	2 50%
50000 - 100000	2 11.70%	12 48%	3 10.30%	1 14%	0 0.00%
100000 - 200000	6 35%	9 36%	5 17.20%	1 14%	0 0.00%
>200000	0	0	1	0	0

	0.00%	0.00%	3.60%	0.00%	0.00%
TOTAL	17	25	29	7	4

Table 4 shows Total Leucocytes Count in cases. The total leucocyte count showed higher values of upto 50,000 per microlitres in 38% cases of ALL and upto 2, 00,000 per microlitres in 17% cases of ALL. The total leucoyte count showed lower values of upto 4000 per microlitres in 20.6% cases of ALL. AML showed 35% cases with a total leucocyte count value upto 2, 00,000 per microlitres and 24% cases with total leucocyte count upto 4000 per microlitres. CML showed 36% cases with total leucocyte count upto 2, 00,000 per microlitres. CLL showed 58% cases with total leucocyte count upto 50,000 per microlitres.

Table 5: Hemoglobin distribution among the cases ofleukemia

Hb in gm/dl	NO OF PATIENTS				
< 6	AML 8 47%	CML 1 4%	ALL 10 34.50%	CLL 0 0.00%	AUDL 2 50%
6.1 - 9	7 41%	12 48%	12 41.50%	4 57%	1 25%
9.1 - 12	2 12%	9 36%	5 17.20%	2 29%	1 25%
>12	0 0.00%	3 12%	2 6.80%	1 14%	0 0.00%
TOTAL	17	25	29	7	4

Table 5 shows Hemoglobin distribution of cases. Anemia was found more prevalent in acute leukemia's than chronic leukemia. AML has 47% cases with hemoglobin below 6 gm/dl, followed by ALL which had 34.5% cases. In Chronic Myeloid Leukemia only 4% cases had severe anemia. In Chronic Lymphoid Leukemia no case had severe anemia.

Discussion

Smoking appears biologically feasible as a cause of leukemia, albeit a precise mechanism has not yet been identified. Ionizing radiation and benzene are two occupational leukemogens found in tobacco smoke. It has been discovered that smokers' urine contains much more benzene than does non-smokers' urine.Lead-210 and polonium-210, both ionizing radiation, can be found in tobacco smoke. Studies on animals indicate that polonium-210 and benzene in tobacco smoke interact to cause carcinogenesis.[6]

The paucity of resources for both patients and medical professionals is the most notable of several detrimental clinical and social aspects that contribute to the poor prognosis of pediatric ALL in the developing countries .This frequently causes a delay in diagnosis, which could affect the severity of the tumor and the course of treatment. However, it is challenging to evaluate the effect of a delayed diagnosis on the outcome as well as on the clinical presentation. Additionally, lifestyle and environmental variations as well as potential genetic variations may

affect not just the biology of ALL, which appears to be around three times less common in India than the USA, but also its occurrence; T-cell ALL.[7]

Akram et al studied the value of cytochemical stains in diagnosis of acute leukemia, when cytochemical stains were coupled with morphology, 93.3% cases of acute leukemia was diagnosed accurately. A total no. of 13/15(86.7%) cases of ALL and 15/15 cases of AML could be diagnosed correctly. The sensitivity for MPO was 86.6%, specificity was 100% and accuracy was 93.33% in cases of acute leukemia AML.[8] Chouhdary et al studied 117 cases of leukemia's. Proper clinical examination of patients, general blood picture, bone marrow examination and cytochemical staining was done. The commonest form ofleukemia was AML (32.47%) followed by CML (29.91%) and ALL (19.65%). Acute leukemia was common in young age group. ALL was commonest in first decade of life (66.5%). CLL was common in 6th decade of life. Commonest age group for leukemia was 3rd decade of life.[9]

Retrospective study of all acute leukemia patients over a two-year period was performed by Sachdeva et al.Out of 469 instances of acute leukemia, 193 cases of ALL, 200 cases of AML, and 76 cases of acute leukemia's with no cytochemical differentiation were detected. Thus, just 16% of leukemia patients were still unclassifiable. He came to the conclusion that, although cytogenetic and immunophenotyping might sometimes increase diagnostic precision, the FAB classification based on morphology and basic cytochemical stains is still sufficient.[10]

Conclusion

Since leukemia's are a diverse group of malignancies, they vary not only in terms of prognosis and specialized treatment but also in terms of clinical, morphological, immunological, and genetic traits. The most prevalent kind of leukemia in our study was ALL, which was followed by CML (30.5%), AML (8.5%), and CLL (4.9%).In acute leukemia's, weakness and fever were the most prevalent clinical characteristics. Acute leukemia frequently manifested as bone pain, epistaxis, pallor, and discomfort in the sternum. A thorough analysis of the general population is required to plan and manage the provision of healthcare that promotes leukemia diagnosis and efficient treatment. Modern and sophisticated methodologies should be used for better leukemia diagnosis, subtype categorization, and treatment management.

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