

A study of leukemias Profile in central India

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Abstract

Introduction: Leukemia was considered as a rare disease few years back. However, it is increasing in incidence and prevalence slowly and steadily. Leukemias are euplastic proliferations of haematopoietic cells and form a major proportion of haematopoietic neoplasms that are diagnosed worldwide. **Objective:** To find out the incidence of four major types of leukemias in central India. **Methods:** Total 73 cases were selected from in and out patient departments of Gandhi Medical College and associated Hamidia Hospital Bhopal over a period from Oct 2013 to Nov 2014. Diagnosis was based on peripheral blood count, peripheral blood smear and bone marrow examination for morphology along with cytochemistry study whenever required. **Results:** Out of 73 cases on final diagnosis, 23 cases (31.51%) were of Acute Lymphoblastic Leukemias, 11 cases (15.07%) were of Acute Myeloblastic Leukemias, 35 cases (47.97%) were of Chronic Myeloid Leukemias, 1 case (1.37%) is of Chronic Lymphocytic Leukemia and 3 cases (4.11%) were Undiagnosed which were referred to higher centers. **Conclusion:** The present study revealed that Chronic leukemia was more common than acute leukemia with Chronic Myeloid Leukemias being the most common type, followed by Acute Lymphoblastic Leukemias, Acute Myeloblastic Leukemias and Chronic Lymphocytic Leukemia.

Keywords: Acute Lymphoblastic Leukemias, Incidence, Leukaemia.

Introduction

Leukemia was considered as a rare disease few years back. However, it is increasing in incidence and prevalence slowly and steadily. Leukemias are the 10th most common cancer in men and 12th most common in women and constitute 3% of the global cancer burden [1].

Developing countries bear more than half of global cancer burden, because 75% of the world population lives in these countries [2]. The incidence of Leukemia is highest in North America and Australia/New-Zealand and lowest in sub-Saharan Africa [3].

In India, lympho-haematopoietic malignancies constitute 9.5% of all cancers in men and 5.5% in women [4].

Manuscript received: 4th April 2018
Reviewed: 14th April 2018
Author Corrected: 20th April 2018
Accepted for Publication: 25th April 2018

As per available information from population-based surveys, the incidence of leukemia in India varies from 0.8/1, 00,000 in Barshi (Rural area of Maharashtra) to 5/1,00,000 in Delhi.

These figures are comparably lower than rest of the world but under diagnosis and under-reporting cannot be ruled out [4]. The cell type distribution of leukemias observed in India is different from that observed in developed world.

Myeloid leukemias predominate in India while lymphoid leukemias dominate in western world mainly because of higher incidence of chronic lymphatic leukemia [5].

Despite being relative uncommon, leukemias have been studied more extensively because of easy accessibility of involved tissue [1].

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The incidence of CML was noted highest (45.3%) and that was lowest of CLL (5.7%) in Capital of India i.e. Delhi during a period of 1970-1979.19 Similar observations were noted in Chandigarh and other metro cities like Mumbai and Calcutta [6,7,8].

There was exception for incidence of ALL (39.2%) which was highest observed in Kerala state during a period of 1980-1983 [9]. The leukemias are defined as diseases in which abnormal proliferation of haematopoietic cells cause progressively increasing infiltration of bone marrow, although in certain forms the lymphatic tissues are particularly affected [10].

Malignant proliferation of haematopoietic cells (leukemia) constitutes major proportion of haematopoietic neoplasm's worldwide. Leukemias are classified into myeloid and lymphoid subtype [11].

Typing of leukemia is essential for effective therapy because prognosis and survival rate are different for each type and sub-type [12]. Leukemia are of two types; acute and chronic.

Acute leukemias are; acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML). In childhood, ALL is most common type than AML. In India, the incidence of ALL and AML are 35% and 15% of all hematological malignancies respectively.

Chronic leukemias are classified into chronic myeloid leukemia (CML) and chronic lymphocytic leukemia (CLL) [13,14]. Due to the lack of any nationwide leukemia screening program, most of the population of India is still unaware of this blood disorder.

Lack of awareness also plays a role in underlying late presentation and noncompliance with screening guidelines [15].

Hence it is important to determine the current incidence of leukemia's in India as well as to understand how the occurrence and outcome of the disease differs across the whole country.

Materials and Methods**Results**

The present study comprises 73 cases of Leukemia. The observations made in this study are as follows.

Place of study- Department of Pathology, Gandhi Medical College, Bhopal

Type of study- prospective

Sampling methods- Selected from in and out patient departments of Gandhi Medical College and associated Hamidia

Sample collection- Blood, bone marrow smear

Inclusion criteria- having provisional diagnosis of acute leukemia and leucoproliferative disorder.

The study was conducted after approval from institutional ethical committee in the Department of Pathology, Gandhi Medical College, Bhopal from Oct 2013 to Nov 2014.

Total 73 cases were selected from in and out patient departments of Gandhi Medical College and associated Hamidia Hospital Bhopal having provisional diagnosis of acute leukemia and leucoproliferative disorder so on basis of leishman stained smears-Peripheral/bone marrow along with cytochemistry study whenever required.

Thorough case history and clinical examination as per predefined Performa with Hemoglobin estimation, WBC count, Platelet count and various hematological indices were evaluated using automated analyzer.

Peripheral blood/bone marrow smear was made on clean glass slides with fresh blood samples; smears were fixed and stained by leishman stain.

Leishman stain was poured on air dried unfixed smears for a period of 5-7 minutes, then added twice quantity of buffered distilled water for next 10 minutes. Smears prepared on clean glass slides, fixed by methanol and stained for various cytochemical stains (MPO, PAS, NES, and NAP).

For all the special stains, commercially available kits (Leucognost) were used. FAB classification of acute leukemia was applied for sub-typing.

Table No-1: Type of Leukemia's, including Age, sex distribution.

Age (yrs) & Sex	No of Patient									
	ALL (23)		AML (11)		CML (35)		CLL (1)		Undiagnosed (3)	
0-15	13	56.52%	2	18.18%	3	8.57%	0	0	0	0
16-30	5	21.74%	4	36.36%	9	25.71%	0	0	2	67.00%
31-45	3	13.04%	4	36.36%	13	37.14%	0	0	1	33.00%
>45	2	8.70%	1	9.09%	10	28.57%	1	100%	0	0
Male	15	65.22%	4	36.36%	10	28.57%	0	0	2	67.00%
Female	8	34.78%	7	63.64%	25	71.43%	1	100%	1	33.00%

Out of 73 cases on final diagnosis, 23 cases (31.51%) were of Acute Lymphoblastic Leukemias, 11 cases (15.07%) were of Acute Myeloblastic Leukemias, 35 cases (47.97%) were of Chronic Myeloid Leukemias, 1 case (1.37%) is of Chronic Lymphocytic Leukemia and 3 cases (4.11%) were Undiagnosed.

In Our study Out of 73 cases - 31cases (42.47%) were Male and 42cases (57%) were Female. which shows female predominance it may be due to sample size. Out of 73 cases – 18 cases (24.66%) were of age group 0 to 15 years, 21 cases (28.77%) were of age group 16 to 30 years, 19 cases (26.03%) were of age group 31 to 45 years and 15 cases (20.55%) were of above 45 years.

Hemoglobin Distribution: In Acute Lymphoblastic Leukemia and Acute Myeloblastic Leukemia most of the cases (56.52% and 72.73%) had less than 6 gm% Hb. In Chronic Myeloid Leukemia only 5.71% cases had severe anemia, while 34.29% and 51.43% had moderate and mild anemia. In Chronic Lymphocytic Leukemia patient had mild anemia.

Total Leukocyte Count Distribution: In Acute Lymphoblastic Leukemia and Acute Myeloblastic Leukemia 39.13% and 63.64% of cases showed count less than 4000/cu mm. While in Chronic Myeloid Leukemia most of cases (91.43%) showed leukocytosis and 100.00% cases of Chronic lymphocytic leukemia showed leukocytosis.

Platelet Count Distribution: Most of the cases (82.61% and 100%) of acute lymphoblastic leukemia (ALL) acute myeloid leukemia (AML) had moderate to severe thrombocytopenia. Whereas in chronic myeloid leukemia (CML) and chronic lymphocytic leukemia (CLL) most of cases had platelet above 1lakh/cu mm.

Sub-classification Acute Myeloblastic Leukemia: On by morphological and cytochemical method. sub classification of Acute Myeloblastic Leukemia is done. Most common subtype of Acute Myeloblastic Leukemia was M3 subtype which comprised of 36.36% cases.

Whereas M1, M2, M5, M6, M7 comprised of 18.18%, 9.09%, 9.09%, 9.09%, 18.18% respectively. In present study there were no cases belonging to M0 and M4 subtype.

Table-2: Frequency (in percentage) of various Leukemias in India.

Reference	Region (Period of Study)	No of cases	ALL	AML	CML	CLL
Chatterjee et al	Calcutta (1949–1961)	544	22.5	32.5	35.9	5.9
Advani et al	Mumbai (1960–1975)	1126	30	13	40	9
Prakash et al	Pondicherry (1970–1979)	278	35	29.5	30.8	3.2
Rani et al	Delhi (1970–1979)	490	15.5	30.8	45.3	5.7
Verghese et al	Kerala (1980–1983)	1016	39.2	19.6	16.4	1.9
Kushawaha et al	Lucknow (1971–1984)	970	9.3	38.7	48	2.6
Shome et al	Chandigarh (1975–1983)	820	24	29.3	36.7	8.8
Dicosta et al	Mumbai (1975–1984)	242	36	22	38	2
Rathee et al	Haryana (2008-2012)	650	17.2	33.8	39	10
Jaya Bhaskar	Loni, Maharashtra (2006 and 2011)	156	26.28	23.07	33.97	15.38
Our study	Bhopal (2013-2014)	73	31.51	15.07	47.97	1.37

Discussion

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.

This incidence varies in different geographical regions according to varying life styles, economic conditions, and poverty rate [16].

In India the incidence of various hematological cancers is different as compared to western countries. This can be attributable to less health awareness and poor availability of health care delivery system in India [17, 18]. In present study 73 cases of leukemias were studied 34 cases (46.58%) and 36 cases (49.32%) were of acute and chronic leukemias respectively and 3 cases (4.11%) were undiagnosed.

Out of 73 cases – 18 cases (24.66%) were of age group 0 to 15 years, 21 cases (28.77%) were of age group 16 to 30 years, 19 cases (26.03%) were of age group 31 to 45 years and 15 cases (20.55%) were of above 45 years. In Acute Lymphoblastic Leukemia and Acute Myeloblastic Leukemia most of the cases (56.52% and (72.73%) had less than 6 gm% Hb. In Chronic Myeloid Leukemia only 5.71% cases had severe anemia, while 34.29% and 51.43% had moderate and mild anemia.

In Chronic Lymphocytic Leukemia patient had mild anemia In Acute Lymphoblastic Leukemia and Acute Myelo-blastic Leukemia 39.13% and 63.64% of cases showed count less than 4000 /cu mm. While in Chronic Myeloid Leukemia most of cases (91.43%) showed leukocytosis and 100.00% cases of chronic lymphocytic leukemia showed leukocytosis.

Most of the cases (82.61% and 100%) of acute lymphoblastic leukemia (ALL) acute myeloid leukemia (AML) had moderate to severe thrombocytopenia. Whereas in chronic myeloid leukemia (CML) and chronic lymphocytic leukemia (CLL) most of cases had platelet above 1lakh/cu mm.

In present study four special staining procedures were done after making a provisional diagnosis of leukemias by leishman stain (Stain used Myeloperoxidase, Periodic acid Schiff, Non-specific Esterase and alkaline phosphates). On special staining we found Myeloblasts of AML and CML showed positive (coarse brown black granules) staining with MPO in more than 3% of blasts in all cases except one in which NSE stain was positive.

Whereas ALL and CLL were negative for MPO stain. The lymphoblasts of ALL and CLL showed positive (block positive) PAS staining.

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Whereas myeloblasts of AML and CML were negative. The NAP scoring was done in all (35) cases of CML and the range of NAP score was 0 to 10. Undiagnosed 3 cases were negative for all (MPO, PAS, NSE) stain. They were advised for flow cytometry, immunophenotyping for which they referred to higher center.

Among all leukemias the incidence and prevalence of chronic myeloid leukemia (CML) remains higher due to chronicity, earlier diagnosis because of accurate and cheaper diagnostic tool and greater physician awareness.

The studies done by various authors also observed [6,8,19-23] higher incidence of chronic myeloid leukemia (CML) than ours while the findings of Menzes and Malik [24] and Verghese et al [9] vary from the above studies (Table 2).

Our study revealed chronic myeloid leukemia (CML) (47.95%) as the most common type of leukemia (Table 1). The varying findings of Menzes and Malik [24] and Verghese et al [9] can be attributable to geographical variation and population bias.

The incidence of acute lymphoblastic leukemia was higher in studies by Prakash et al [25] and Verghese et al [9]. In our study the cases of acute lymphoblastic leukemia were the second predominant (31.51%) which correlates with study of Advani et al [26], Dicosta et al [7], Modak H et al [27], Chen et al [28] and Shome et al [6] (Table 1).

The incidence of Acute myeloid leukemia (AML) in our study was the third most common. Similar findings are reported by Advani et al [26] and D'Costa GG et al [7]. Incidence of higher percentage than ours was reported by Chatterjee et al [8], Prakash et al [25], Rani et al [21], Kushwaha et al [20], Shome et al [6], and Rathee et al [23] (Table 8).

Our study shows the incidence of chronic lymphocytic leukemia (CLL) to be lowest (1.37%) among all the four major types of leukemia which correlates well with the findings of Kushwaha et al [20], Verghese et al [9] and D'Costa GG et al [7] (Table 2).

It has been seen that the spectrum of cancer epidemiology seen in India is different than that seen in

any developed country. It should be stressed that there are not many cancer registry data's in India despite a large population, so better development of regional and national registries is the need of the hour.

Conclusion

Present study concluded that the incidence of different types of leukaemia in central India doesn't differ markedly from rest of the Indian populations. Chronic leukemia was more common than acute leukemia with chronic myeloid leukemia being the most common type, followed by Acute Lymphoblastic Leukemias, Acute Myeloblastic Leukemias and Chronic Lymphocytic Leukemia.

Chronic myeloid leukemia which came out to be more common in our study, is mainly a leukemia of adults affecting the myeloid series while AML occurring in younger age group is characterized by presence of >20% blasts in marrow, as per the WHO criteria.

This incidence varies in different geographical regions according to varying life styles, economic conditions, and poverty rate. It should be stressed that there are not many cancer registry data's in India despite a large population, so better development of regional and national registries is the need of the time.

Addition to existing knowledge: Though numerous studies of leukemia have been done in various regions of India but this study is exclusively the first one which details the leukemia profile in central part of India.

Funding: Nil, **Conflict of interest:** None initiated

Permission from IRB: Yes

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How to cite this article?

Ahirwar R, Nigam R.K, Parmar D. A study of leukemias Profile in central India. Trop J Path Micro 2018;4(2):181-187. doi: 10.17511/jopm.2018.i2.12

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