

Incidence of acute and chronic leukemias in rural area at tertiary care teaching hospital: a five years of study

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Abstract

Introduction: Leukemias are neoplastic proliferations of haematopoietic cells and form a major proportion of haematopoietic neoplasms that are diagnosed worldwide.

Aims: To chart out the incidence of four major types of leukemias presenting for the first time to Hospital located in rural region.

Methods: It was a prospective and retrospective study of 156 patients carried out in the department of Pathology located in rural area over a five years period between May 2006 and May 2011. Diagnosis was based on peripheral blood count, peripheral blood smear and bone marrow examination for morphology along with cytochemistry study whenever required.

Results: In this study, commonest leukemia was chronic myeloid leukemia (CML) followed by Acute lymphoid leukemia (ALL), Acute myeloid leukemia(AML) and then chronic lymphoid leukemia (CLL). Out of total 156 cases, 90 were male and 66 were females with Male: Female ratio is 1.36:1. Acute lymphoid leukemia was the most common type of leukaemia in the children and adolescents. Myeloid neoplasms were most common in adults.

Conclusion: CML was commonest type of leukemia followed by acute lymphoid leukemia. Male predominance was seen in all types of leukemia and age has significant effect on type of leukemia.

Keywords: Incidence, Leukemia, Rural India, Tertiary care teaching hospital

Introduction

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.¹ They form 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.² Leukemias demonstrate extra-ordinary biological, morphological and clinical heterogeneity.³ Leukemias are usually divided into myeloid and lymphoid, acute and chronic. This simple classification based on lineage and on rate of disease progression when untreated. The purpose of classification of leukemias is to organise knowledge into manageable forms so that biological entities can be recognised. Correct classification permits optimal patient management.⁴

Leukemias are the 10th most common cancer in men and 12th most common in women and constitute 3% of the global cancer burden.⁵ Developing countries bear more than half of global cancer burden, because 75% of the world population lives in these countries.⁶ The incidence of Leukemia is highest in North America and Australia/ New-zealand and lowest in sub-saharan Africa.⁷ In India, lympho-haematopoietic malignancies constitute 9.5% of all cancers in men and 5.5% in women.⁸ 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.⁸ 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.² Despite being relative uncommon, leukemias have been studied more extensively because of easy accessibility of involved tissue.⁵ 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 1970-1979.⁹ Similar observations were noted in Chandigarh and other metrocities like Mumbai and Calcutta.^{10,11,12} There was exception for incidence of ALL(39.2%) which was highest observed in Kerala state during a period of 1980-1983.¹³

Hence this study was carried out in rural population to know that rural population differs markedly from rest of urban Indian population or not.

Materials and Methods

Present study was carried out in the department of pathology, during the period of May 2006- May 2011. A total of 156 patients with acute and chronic leukemia reported during the study period were included in the study. F.A.B. (French, American, British) classification was used for AML which subdivides into eight types M0, M1, M2, M3, M4, M5, M6, M7 and ALL into three subtypes as L1, L2, L3.^{14,15,16} These patients were evaluated especially regarding age, gender, risk factors, occupation and chief complaints.

The study from May 2006 to April 2009 was retrospective and data collected from records maintained in department of Pathology, Haematology

and Medical record section of same Hospital. All cases reporting to Hospital for the first time from May 2009 to May 2011 were prospective cases and their clinico-laboratory characteristics were recorded.

Diagnosis was made on findings of peripheral blood count (i.e. Haemoglobin, Total leucocyte count and Platelet count) which was done by automated cell counter; peripheral blood smear and bone marrow aspiration smear 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.¹⁷ Cytochemistry studies (like myeloperoxidase (MPO), Periodic acid schiff stain (PAS), Sudan black B (SBB)

and Non-specific esterase) were done in all prospective cases to differentiate myeloid and lymphoid leukemia.¹⁷

These stains were prepared and used as per the guidelines endorsed in Practical Haematology Dacie and Lewis 10th edition, year 2006.¹⁷ Then all cases diagnosed and classified, as acute myeloid leukemia, acute lymphoid leukemia, chronic myeloid leukemia and chronic lymphoid leukemias.

Results

Total 156 patients diagnosed as leukaemia were further subjected to analysis according to their different morphology and other relevant parameters.

Table 1: Gender wise distribution of different types of Leukaemia amongst study population

Gender	AML	ALL	CML	CLL	CMML	JMML	Total
Male	15 (9.61%)	23 (14.74%)	35 (22.43%)	15 (9.61%)	01 (0.64%)	01 (0.64%)	90 (57.70%)
Female	21 (13.46%)	18 (11.54%)	18 (11.54%)	09 (5.76%)	00	00	66 (42.30%)
Total	36 (23.07%)	41 (26.28%)	53 (33.97%)	24 (15.38%)	01 (0.64%)	01 (0.64%)	156 (100%)

(AML- Acute myeloid leukemia, ALL- Acute lymphoid leukemia, CML- Chronic myeloid leukemia, CLL- Chronic lymphoid leukemia, CMML- Chronic myelomonocytic leukemia, JMML- Juvenile myelomonocytic leukemia)

Table 1 shows that the commonest type of leukemia encountered was chronic myeloid leukemia (CML) which is accounted for 33.97% cases followed by acute lymphoid leukemia (ALL) (26.28%), acute myeloid leukemia (AML) (23.07%) and then chronic lymphoid leukemia (15.38%). It was also observed that, out of 156 cases, 90 were male and 66 were females and Male: Female ratio was 1.36:1 which indicates male predominance in all types of leukemia.

Table 2: Age and Sex distribution of leukemia amongst study population

Sex/Age	AML			ALL			CML			CLL		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
1-15	02	01	03	21	17	38	00	01	01	00	00	00
16-30	06	02	08	02	01	03	05	04	09	01	00	01
31-45	03	03	06	00	00	00	11	10	21	02	00	02
46-60	09	06	15	00	00	00	13	03	16	07	03	10
61-75	01	02	03	00	00	00	05	00	05	05	05	10
>75	00	01	01	00	00	00	01	00	01	00	01	01
Total	21	15	36	23	18	41	35	18	53	15	09	24
M:F Ratio	1.4:1			1.28:1			1.94:1			1.66:1		

It was observed from table 2 that age groups found to be most vulnerable for the various leukemias, which was as follows; AML was commonest in age group of 46-50 years, ALL were between 1-15 years of age group, and peak incidence found in the age group of 1-5 years followed by 6-10 years. CML were evenly distributed from the age group of 21-65 years; and peak incidence was found in between 31-45 years followed by 46-60 years, while CLL were more common in the age group of 61-75 year.

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.¹⁸ 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. The incidence of leukemia found to be varying from different geographical areas according to their life styles, economic conditions, and poverty rate.¹⁹

The incidence and clinical presentation of many haematological cancers in India is relatively lower and differs from that seen in western world due to health awareness and availability of health care delivery system.^{20,21}

In present study, chronic myeloid leukemia (CML) was more common which was in concordance with the studies carried out by Vasavada *et al.*²², Kushawaha *et al.*²³, Chatterji *et al.*¹², Rani S *et al.*⁹, Shome *et al.*¹⁰ and Rathee *et al.*²⁴. It was also observed that studies reported by Menzes and Malik²⁵ and Verghese *et al.*¹³ vary from present study, which is might due to geographical variation and literate public. Chronic myeloid leukemia is unique in combining the need for an expensive long-term therapy (daily TKIs) that results in clinical elimination of the disease only with continued therapy in most instances making it more of chronic disease. Due to chronicity of CML incidence and prevalence remains higher amongst all leukemias. It is likely that patients with CML are now being diagnosed earlier for several reasons including greater awareness of the disease among clinicians and the wide availability of cheap, accurate leucocyte and platelet measurements not performed in the past.

In our study, male predominance was seen, which is similar with most studies conducted in India and other countries.^{24,26}

Present study found that acute lymphoid leukemia (ALL) was the second most common leukemia subtype which was in accordance with the studies reported by Modak H *et al.*²⁷, Chen *et al.*²⁸ and Shome *et al.*¹⁰. However our observations varies from the studies conducted by Vasavada *et al.*²² and Kushawaha *et al.*²³ which might be due to under diagnosis or under reporting. It is also observed that, maximum cases are seen in first and second decade of life which comparable with D'Costa GG *et al.*¹¹, Parkin DM *et al.*²⁹, Meighan *et al.*³⁰, Alrudainy *et al.*³¹ Male predominance for ALL was found in North India (Delhi), rural area of Maharashtra like Barshi, and South India (Chennai and Bangalore), which is in accordance with present study.³²

Acute myeloid leukemia (AML) was the third most common leukemia in the present study which was in accordance with study carried out by D'Costa GG *et al.*¹¹. Incidence of lower percentage was reported by Vasavada *et al.*²² and Menzes and Malik²⁵ which was vary from the present study. Large percentage of cases found in adults was comparable with most of studies in India, eastern and western countries. In this study male predominance was seen, which was similar with most studies mentioned.^{27,33-36}

Though, CLL is the most common form of leukemia affecting adults in western countries. Incidence of CLL is lower in India (1.95-8.8%)^{9-13,23,37}. In present study, chronic lymphoid leukemia (CLL) has lowest percentage of total leukemia cases. As the overall incidence of CLL is lower in India, bit higher

incidence was observed in present study. It was also observed that most of the cases of CLL (70.83%) were seen in patients more than 55 years of age and it is comparable with the study performed in AIIMS Hospital (68.42%).³⁸

In present study, Juvenile Myelomonocytic leukemia (JMML) & Chronic myelomonocytic leukemia (CMML) types of leukaemia found to be only a single case respectively as the overall incidence is very rare for these leukaemias, which might be related to our geographical area.

Conclusion

Present study concluded that chronic leukemia was more common than acute leukemia. The most common type of leukemia was CML followed by ALL, AML and CLL. Male predominance was seen in all types of leukemia. Age was important factor, as specific age groups were observed more common in some types of leukemias. In children, ALL was more common, while AML was more commonly seen in adults. CML and CLL were observed only in adults. CLL was more commonly observed in elderly patients. Present study concluded that the incidence of different types of leukaemia from rural populations doesn't differ markedly from rest of the urban Indian populations.

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