1. Introduction

In worldwide malignant proliferation of haematopoietic cells constitutes major proportion of haematopoietic neoplasms. Leukaemia’s classified into myeloid and lymphoid subtype. For effective therapy typing of leukemia is necessary because of prognosis and survival rate are different for each type and sub-type. A cute leukaemia’s are heterogeneous group of haematological malignancies and are characterized by clonal expansion of immature myeloid or lymphoid precursors (blasts). The blasts cells are known to replace the normal hematopoietic tissues and to invade other organs of the body as well. Anemia, hemorrhage and infections occurring due to bone marrow failure are the top three complications of acute leukemia & chronic leukemia.

Classification of Leukemia as of two types; acute and chronic. Acute leukaemia’s are; acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL). In childhood, most common type is ALL than AML. In Indians all haematological malignancy the incidence of ALL and AML are 35% and 15% respectively. Classification of Chronic leukaemia’s are chronic myeloid leukemia (CML) and chronic lymphocytic leukemia (CLL).

Leukemia is 10th most common worldwide cancer with an incidence of 3,51,000 new cases (2.8%) and mortality of 2,57,000(3.4%) each year. In childhood malignancy
Leukaemia is also the most common. It accounts for 30% of all cancers diagnosed in children under 15 years of age.10–12 In this study the prevalence of different types of leukaemia’s along with age and gender distribution were studied.

2. Materials and Methods

The present study, retrospective analysis of leukaemia cases in respect to type, age, sex and ethnic groups was carried out over a period of 5 years (January 2014 to December 2018), in the department of pathology at tertiary care teaching hospital. A cute/chronic leukaemia’s was diagnosed in 185 total number of patients. Detailed medical history was taken and clinical examination carried out. Blood counts were performed on automated haematology analyser. All the haematological parameters were noted. Findings of peripheral blood and bone marrow aspiration were interpreted in respect to history and clinical examination. Whenever required special stain like myeloperoxidase (MPO), Periodic acid-Schiff (PAS) were done. According to WHO guideline diagnosis of acute leukaemia was made in cases where blast percentage was ≥20% FAB classification of acute leukemia was applied for subtyping.

Data analysis: - data were analysed by using microsoft excel

3. Result

In the present study 185 cases of leukaemia’s were diagnosed over a time period of 5 years (January 2014 to December 2018). Out of the 185 cases, 128 cases (69.18%) were of acute leukaemia’s and 55 cases (29.72%) were of chronic leukaemia’s (Table 1).

Among the subtypes of leukaemia’s, according to haematological parameters, 46 cases (24.86%), 60 cases (32.43%) these are the patient doesn’t turn out for follow up, 24 cases (12.97%) and 47 cases (25.40%) & 8(4.32%) were reported as acute leukaemia, AML, ALL, CML, CLL respectively. The haematological diagnosis (by means of complete blood count (CBC) / peripheral blood smear (PBS) / bone marrow aspirates (BMA) using this done. (Table 2)

Acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL) were found in 60(32.43 %) and 24(12.97) of the patients respectively. Of chronic type leukemia, 47(25.40%) patients had chronic myeloid leukemia (CML) and only 8 (4.32%) had chronic lymphocytic leukemia (CLL). (Table 2).

In our study out of 185 cases overall male preponderance was found with a percentage of 56.21 % of total cases and 81 (43.78%) in females. The overall male: female ratio was 1.28: 1. (Table 3).

Majority of the patients belonged to age groups 31-40 yrs. (22.16%). Among the subtypes, most common age group affected by ALL was of 0-10 yrs. in which 10 cases seen. In AML and CML common age group involved was 31-40 yrs. in which 18 and 11 cases seen respectively. In CLL common age group affected was 61 - 70 yrs. in which 5 cases reported. (Table 4).

All AML cases (60) are shows positivity for special stained like Myeloperoxidase & Sudan black B. & negative for Periodic acid sniff, whereas all ALL cases (24) are positive for PAS & negative for MPO & SBB.

4. Discussion

Evaluation of morphological cellular details and phenotypic or genotypic pattern required for diagnosis of haematological malignancies.13,14 The neoplastic proliferation of haemopoietic and lymphoid cells resulting into leukaemia. Worldwide, it is one of leading causes of death, especially in paediatrics age group. Acute leukemia is more common than chronic leukemia observed in our study. It is not similar to report from western literature where chronic leukemia is more common. But it is comparable with reports from D’ Costa GG et al., Kulshrestha R et al.16, Modak H et al.17, Chen et al.18

Among the subtypes of leukemia in this study, AML is the most common type of leukemia. It is comparable with studies by Modak H et al.17 and Chen et al.18 but other study like D’Costa et al. (15) and Kulshrestha R et al.16 reported maximum number cases of CML. Is comparable with most studies in India, eastern and western countries, AML is more common in adult. In this study male predominance is seen similar with most studies mentioned15,17,19–23. In this study CLL is rare only 8 cases (4.32%) were seen. which is comparable with D Costa GG et al., Kulshrestha R et al. and Chen et al.15,16,18 but CLL is most common adult leukemia in western countries. In children most prevalent is ALL subtype. i.e. 24 cases (12.97%).

In our study we found, 6 9.18% of patients had acute leukemia while 29.72 % had chronic leukemia. Which is similar to the findings of other studies. Nasim N et al found 80% acute leukemic cases and Humayan et al showed 90% of acute type in their study.24,25 This similar observation (ALL>AML) was also observed by Rego MF et al.26

Overall male preponderance was found in our study with a percentage of 56.21% in males and 43.78% in females (ratio ≈ 1.29 : 1). Similar results of gender distribution have been reported in different studies. Harani MS et al, Jmili NB et al, Ullah K, and Salkar AB also found higher male to female ratio 1.5:1, 1.2:1, 1.7: 1 and 2:1 respectively.27–29 Overall, there were 66% males and 34% females with male to female ratio being 1.94:1 as seen in study conducted by Gupta R et al.30 Hasanbegovic E also observed similar male preponderance.31 In ALL and AML cases, male patients were more than female. However female predominance was seen in CML cases in our study.

All AML cases (60) are shows positivity for Myeloperoxidase & Sudan black B. special stained and negative for
Table 1: Table showing percentage of type of leukemia

| Type of Leukemia's | Number of cases | Percentage |
|-------------------|----------------|------------|
| Acute Leukemia    | 128            | 69.18%     |
| Chronic Leukemia  | 55             | 29.72%     |

Table 2: Table showing type of Distribution of Leukemia according FAB classification.

| Type of Leukemia | Number of cases |
|------------------|-----------------|
| Acute Leukemia   | 46 (24.86%)     |
| AML              | 60 (32.43%)     |
| ALL              | 24 (12.97%)     |
| CML              | 47 (25.40%)     |
| CLL              | 8 (4.32%)       |
| Total            | 185             |

Table 3: Table showing Sex wise distribution

| Sex    | Number of cases |
|--------|-----------------|
| Male   | 104 (56.21%)    |
| Female | 81 (43.78%)     |

Table 4: Table showing Age & Type of leukemia

| Age          | Acute Leukemia | AML | ALL | CML | CLL | Total |
|--------------|----------------|-----|-----|-----|-----|-------|
| 0-10 yrs.    | 9              | 8   | 10  | 1   | 0   | 28    |
| 11-20 yrs.   | 10             | 2   | 6   | 4   | 0   | 22    |
| 21-30 yrs.   | 12             | 5   | 3   | 3   | 0   | 23    |
| 31-40 yrs.   | 7              | 18  | 5   | 11  | 0   | 41    |
| 41-50 yrs.   | 5              | 9   | 0   | 7   | 1   | 22    |
| 51-60 yrs.   | 3              | 9   | 0   | 8   | 1   | 21    |
| 61-70 yrs.   | 0              | 5   | 0   | 9   | 5   | 19    |
| >70 yrs.     | 46             | 60  | 24  | 47  | 8   | 185   |

Table 5:

| Types of Leukemia | Our study | Modak H et al | Chen et al | D’Costa et al | Kulshrestha R et al |
|-------------------|-----------|---------------|------------|---------------|---------------------|
| AML               | 32.43%    | More cases reported like our study | More cases reported like our study | less | less |
| ALL               | 12.97%    | Similar       | similar    | similar       | similar             |
| CML               | 25.40%    | less          | less       | More cases reported | More cases reported |
| CLL               | 4.32%     | less          | less       | Cases reported like our study | Cases reported like our study |

Periodic acid Schiff stained, whereas all ALL cases (24) are positive for PAS & negative for MPO & SBB.

The results of the present study were almost similar to the local studies but on comparison with western studies, the results are more manifested. These marked results can be attributed to the late presentation as the degree of anaemia; leucocytosis and thrombocytopenia are directly proportional to severity of bone-marrow failure. 32

Diagnosis of primary haematological malignancies has a multiparametric approach which includes evaluation of morphological cellular details and phenotypic and genotypic patterns.

5. Conclusion

Early recognition of signs and symptoms which are more suspicious for leukemia, are helpful in early diagnosis of haematological malignancies. This study concludes that acute leukaemia’s were more common in this region among both children and adults. Among the children ALL is the most common leukaemia and among the adults AML followed by CML is most common. Leukaemia’s is predominantly found in males in this part of the country.
6. Source of funding

None.

7. Conflict of interest

None.

References

1. Harris NL, Jaffe ES, Vardiman JW, Stein H, Diabold J, et al. WHO Classification of tumours of haematopoietic and lymphoid tissues—Introduction. In: NL H, ES J, JW V, editors. Pathology and genetics of tumours of haematopoietic and lymphoid tissues. IARC press ; 2008, p. 1–15.

2. Salkar AB, Patrikar A, Bothale K, Malore S, Salkar A, et al. Clinicohematological evaluation of leukaemia’s in a tertiary care hospital. IOSR-JDMS. 2014;13:126–134.

3. Roberts L, Kumar VD. Haematopoietic and lymphoid system. Basic Pathol.; 1987.

4. Childs C, Stass SA. Characterization & Diagnosis of acute leukemia. In the Acute Leukemia. (ed by) Stass SA. New York and Basel. Marcel Dekker Inc. 1987;p. 1–26.

5. Bonnet D, John ED. Human AML is organized as a hierarchy that originates from a primitive haematopoietic cell. Nature Med. 1997;3:730–737.

6. Mckenna RW. Multifaceted Approach to the Diagnosis and Classification of Acute Leukaemia’s. Clin Chem. 2000;46:1252–1259.

7. Arber DA, Cougar J. Haematopoietic Tumours: Principles of pathologic diagnosis. vol. 2. Lipincotts Williams and Wilkins ;. p. 1663–1668.

8. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, et al. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. (2010) UICC. Int J Cancer. 2010;127:2893–2917.

9. Incidence of Childhood Leukemia, Fact Sheet 4.1. Code: RPG4. 2009;Available from: http://www.euro.who.int/ENHN

10. Ghai OP, Paul VK, Bagga A. Childhood Malignancy. In: Essential Pediatrics. Publishers & Distributors Pvt Ltd :. p. 580–590.

11. Parkin DM, Stiller CA, Draper GJ, Bieber CA. The international incidence of Childhood cancer. Int J Cancer. 1988;42:511–520.

12. Arber DA, Cousar J. Haematopoietic Tumours: Principles of pathologic diagnosis. vol. 2. Lipincotts Williams and Wilkins ;. p. 1663–1668.

13. Bain BJ, Baits I. Approach to the diagnosis and classification of blood diseases. In: Lewis SM, Bain BJ, Baits I, editors. Dacie and Lewis Practical Haematology. Philadelphia: Churchill Livingstone ; 2012, p. 549–563.

14. D’costa GG, Siddiqui HM, Pradhan RM, Gupte SS. Pattern of leukaemia’s: a ten-year incidence study of 242 cases. J Postgrad Med. 1989;35.

15. Kulshrestha R, Sah SP. Pattern of occurrence of leukemia at a teaching hospital in eastern region of Nepal - a six-year study. JMNA. 2009;48(173):35–40.

16. Modak H, Kulkarni SS, Kadakol GS, Hiremath SV, Patil BR, et al. Prevalence and Risk of Leukemia in the Multi-ethnic Population of North Karnataka. Asian Pacific J Cancer Prev. 2011;12:671–675.

17. Chen B, Huang Z, Zhang X, Ou-Yang J, Li J, et al. An epidemiological investigation of leukemia incidence between 2003 and 2007 in Nanjing, China. J Hematol Oncol. 2003;3.

18. Firkin F, Chesterman C, Penington D, Rush B. De Gruchy’s Clinical Haematology in Medical Practice. Blackwell Sci Ltd. 1989;0:236–277.

19. Cousar JB. Haematopoietic-Lymphoid neoplasms: Principle of Diagnosis. Lippincott Williams & Wilkins ;. 2004,. p. 1913–1917.

20. Indian Medical Gazette 2013.

21. Forlay J, Shin HR, Bray F, Forman D, Mathers C, et al. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. (2010) UICC. Int J Cancer . 2010;127:2893–2917.

22. Gosh S, Shinde SC, Kumaran GS, Sapre RS, Dhond SR, et al. Haematologic and Immunophenotypic Profile of Acute Myeloid Leukemia: An Experience of Tata Memorial Hospital. Indian J Cancer. 2003;40(2):71–76.

23. Eivazi-Ziaei J. Index and Subtypes of Acute Myeloid Leukemia. J Pak Med Assoc. 2009;59(6):406–407.

24. Nasim N, Malik K, Malik NK, Mobeen S, Awan S, et al. Investigation on the prevalence of leukaemia at a tertiary care hospital, Lahore. Biomed. 2013;29:19–22.

25. Humayun M, Khan SA, Muhammad W. Investigation on the prevalence of leukaemia in North West Frontier Province of Pakistan. TJC. 2005;35(3):119–122.

26. Rege MF, Pinheiro GS, Metze K, Lorand-Metze I. Acute leukaemia’s in Piaui: comparison with features observed in other regions of Brazil. Braz J Med Biol Res. 2003;36(3):331–337.

27. Harani MS, Adil SN, Shaikh MU, Katepoto GN, Khurshid M. Frequency of FAB subtypes in acute myeloid leukemia patients at Aga Khan University Hospital Karachi. J Ayub Med Coll Abbottabad. 2005;17:26–29.

28. Braham-Jmili N, Sendi-Senana H, Labiadhi S, Abdelali RB. Haematological characteristics, FAB and WHO classification of 153 cases of myeloid acute leukemia in Tunisia. Ann Biol Clin. 2006;64.

29. Ullah K, Ahmed P, Raza S, Satti TM, Chaudhry QU, et al. Management of acute myeloid leukaemia- 5 years’ experience at Armed Forces Bone Marrow Transplant Centre. Rawalpindi. J Pak Med Assoc. 2007;57:434–439.

30. Gupta R, Kaul KK, Dewan D. Clinicomorphological profile in acute leukaemia’s: experience from a tertiary care centre in Jammu. Indian J Res. 2015;4:4–6.

31. Hasanbegovic E. Clinical and hematologic features of paediatric leukaemia’s. MedArh. 2006;60:84–86.

32. Poplack DC, Reaman G. Acute Lymphoblastic Leukemia in childhood. Paediatric clin N Am. 1988;35:903–932.

Author biography

Kalpana B Rathod Assistant Professor

Deepak G Kulkarni Professor

Leena Nakate HOD and Professor

Cite this article: Rathod KB, Kulkarni DG, Nakate L. Spectrum of leukemia at tertiary care hospital. IP J Diagn Pathol Oncol 2020;5(1):40-43.