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ORIGINAL ARTICLE

MORPHOLOGIC & FLOWCYTOMETRIC ANALYSIS OF ACUTE LEUKEMIAS IN A TEACHING HOSPITAL IN CHHATTISGARH

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ABSTRACT: BACKGROUND: Immunophenotyping of leukemia by flowcytometry offers a better classification of the hematopoietic lineage of malignant cells as compared to morphology. **AIM:** To determine the immunophenotypic subtypes of acute leukemia in a tertiary care teaching hospital. **MATERIAL & METHODS:** A one year study of morphologic & flowcytometric data of patients with acute leukemia. **RESULTS:** Total numbers of acute leukemia patients diagnosed morphologically were 45, out of which 20 patients underwent immunophenotyping by flowcytometry. Maximum patients were in the age group of 0-10 yrs followed by 11-20 yrs with males outnumbering female. Immunophenotypically they belonged to ALL-B cell lineage, ALL-T cell lineage, AML, biphenotypic, inconclusive. **CONCLUSION:** Immunophenotyping of acute leukemias by flowcytometry, not only helps to confirm the morphologic diagnosis but also helps in assigning specific lineage to the blasts, particularly in acute lymphoid leukemia.
KEYWORDS: Flowcytometry, immunophenotyping, acute leukemia.

INTRODUCTION: Acute leukemia comprises a heterogeneous group of diseases which are characterized by rapid and uncontrolled expansion of progenitor cells of the hematopoietic system.[1] Till recently the diagnosis of acute leukemia was made by the morphology and cytochemistry. With the advancement in the field of immunology, a new modality of flowcytometry has emerged for diagnosing acute leukemias. Flowcytometry is a technique by which lineage specific antigens can be identified, which helps in rendering specific treatment to the patients as well as predicting the course of the disease.[2] The present study was done to analyse the morphologic & flowcytometric data of patients with acute leukemia in our region about which there is limited published data.

MATERIAL & METHODS: The study was performed in the hematology section of Department of Pathology of a tertiary care teaching hospital in Chhattisgarh for duration of one year. This was a prospective, cross sectional observational study. The samples were received from other departments of the affiliated hospital especially the pediatric and medicine departments. Of all the bone marrow samples received in hematology section, 45 were diagnosed as acute leukemias. Out of these, 20 patients underwent immunophenotyping by flowcytometry.

The demographic data of patients were collected. Their EDTA-anticoagulated blood was used for CBC and peripheral smear examination. CBC was performed on fully automated five part differential cell counter. The peripheral smears were stained by Leishman's stain and examined using oil immersion lens. The bone marrow aspiration samples were also stained by Leishman's

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stain and examined. For flocytometry, heparinised peripheral blood or bone marrow aspirate was used. It was carried out by FACS counter (Fluorescent Antibody Cell Sorter, Becton Dickinson; USA). The flowcytometry was performed in the Department of Biochemistry of our institute.

The panel of monoclonal antibodies that were used included:

B- Lymphoid markers: CD10, CD19.
T- Lymphoid markers: CD5, CD7.
Myeloid markers: CD13, CD33.
Immaturity markers: CD34, CD117, HLADR.

RESULTS: Of all the 45 cases of acute leukemia, the morphologic and flowcytometric data was available for 20 patients. The findings of the study were based on these patients.

The age-wise distribution showed that 70% of the patients belonged to 0-10 years of age group followed by 20% in 11-20 years age group.

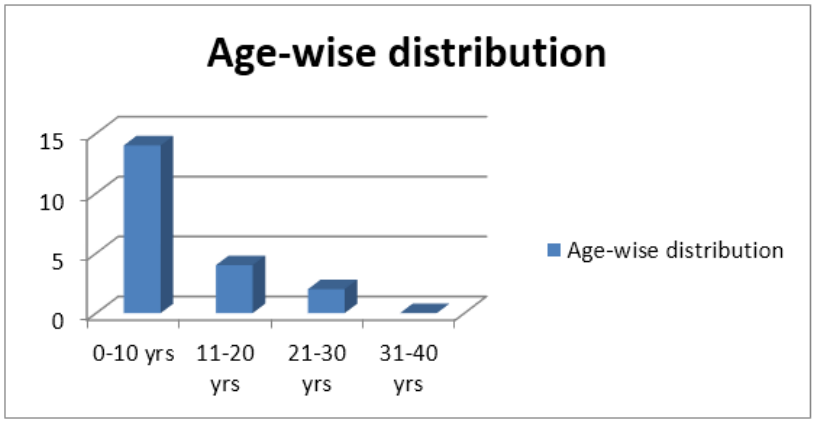

Figure 1: Age wise distribution of acute leukemias

The gender-wise distribution showed that 65% were males whereas rest was females.

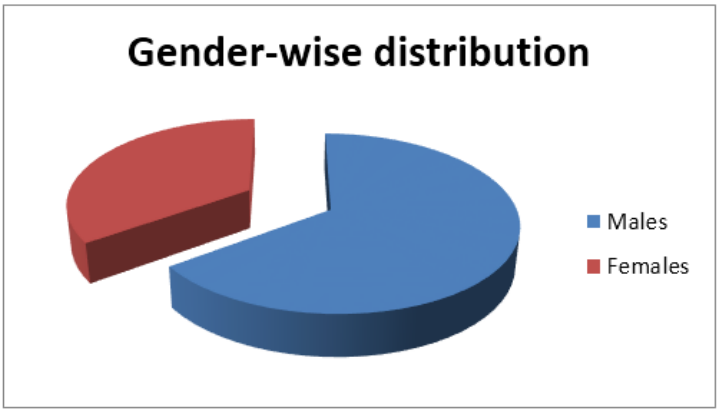

Figure 2: Gender wise distribution of acute leukemias

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Based on the morphology and immunophenotyping by flowcytometry, the acute leukemias were classified as ALL-B cell lineage, ALL-T cell lineage, AML, biphenotypic and inconclusive.

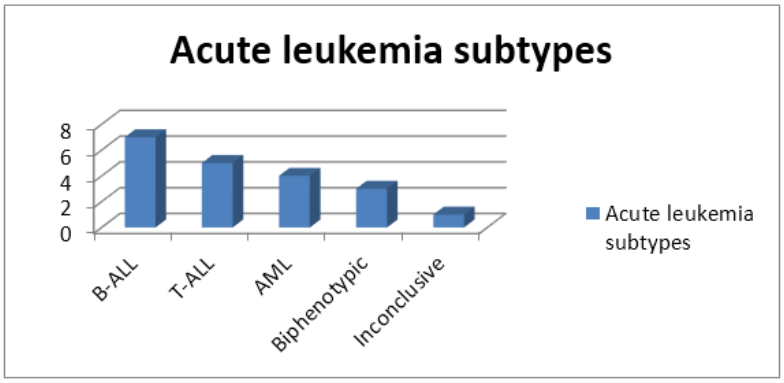

Figure 3: Subtypes of acute leukemias

Of all the cases of acute leukemias, 60% were acute lymphoblastic leukemia, 20% were acute myeloid leukemia, 15% were biphenotypic and 5% were inconclusive. Among the acute lymphoblastic leukemias, 58% belonged to B-cell lineage whereas rest was T-cell lineage. One case was inconclusive because of improper sample collection.

DISCUSSION: Hematopoietic neoplasms consist of a diversity of disorders which are derived from hematopoietic stem cells of the bone marrow or lymphoid organs. In the 19th century, the term leukemia referred to the white or pale colour of blood, due to increased leukocytes. The term 'acute' referred to diseases with aggressive clinical courses, whereas 'chronic' to those with slower progression.[3] Till recently the diagnosis of acute leukemia was made by the morphology and cytochemistry of blast cells. Flow cytometry is a powerful technique for the identification and monitoring of hematopoietic neoplasms as it can assign the lineage as well as maturational stage of the leukemic cells.

We studied the morphologic and flowcytometric data of 20 patients which we encountered over a period of one year. In our study the majority i.e. 70% of the patients belonged to the age group of 0-10 years followed by 20% in 11-20 years age group. A six year study by Kulshrestha R et al[4] showed higher incidence in adults. The difference might be due to the short duration of our study.

The study by Kulshrestha R et al[4] also showed that there was a male preponderance. Our study also gave similar results with male patients making up 65% of the total. Similar results were seen in few other studies as well.[5,6]

Based on the morphologic and flowcytometric features we divided the acute leukemias as B-cell ALL, T-cell ALL, AML, biphenotypic and inconclusive. We found that 60% were acute lymphoblastic leukemia, 20% were acute myeloid leukemia, 15% were biphenotypic and 5% were inconclusive. Among the acute lymphoblastic leukemias, we got a slightly higher preponderance of B-cell lineage as compared to T-cell lineage. A similar study by Patel K et al[7] done in Kenya showed that the predominant type of leukemia was ALL. However unlike our study

they got B-cell & T-cell ALL in almost equal number. This may be because of variation in geographical factors.

Thus the differentiation of acute leukemias became possible mainly by the use of flowcytometry.

CONCLUSION: This study concluded that the most common type of acute leukemia encountered in our region was ALL. Among the ALL, B-cell lineage was more common than those of T-cell lineage. This study thus highlighted the importance of doing immunophenotyping by flowcytometry. However, it was a study of short duration with limited number of patients. Large scale studies of similar kind need to be undertaken to get a better idea of the trends of acute leukemia in the region. Nevertheless, this study was able to give a brief idea about pattern of leukemias in this region having scarcity of similar data.

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REFERENCES:

1. McCulloch EA. Stem cells in normal and leukemic hemopoiesis (Henry Stratton Lecture, 1982). Blood 1983; 62: 1-13.
2. Belurkar S, Mantravadi H, Manohar C, Kurien A. Correlation of morphologic and cytochemical diagnosis with flowcytometric analysis in acute leukemia. J Can Res Ther 2013; 9: 71-9.
3. McPherson RA, Pincus MR. Henry's Clinical diagnosis and management by Laboratory methods. 22nd ed. Philadelphia: Elsevier Saunders; 2011. Chapter 34, the flow cytometric evaluation of Hematopoietic neoplasia. p. 656-673.
4. Kulshrestha R, Sah SP. Pattern of Occurrence of Leukemia at a Teaching Hospital in Eastern Region of Nepal - A Six Year Study. J Nepal Med Assoc 2009; 48(173): 35-40.
5. Chavoshi SH, Ziaei JE, Akbari AAM, Chavoshi SMR, Hamedfar H, Mazouchian H, Dolatkhah R. A 10 Years Survey of Acute Lymphoblastic Leukemia in Northwest of Iran: Immunophenotyping Assessment and its Relation to Induction Therapy. Int J Curr Res Aca Rev 2015; 3(1): 115-123.
6. Laishram RS, Singh NB, Laishram S, Kipgen P, Student, Sharma LDC. Pattern of Leukaemias in a Tertiary Care Hospital-A 5 Years Retrospective Study of 103 Cases. Indian Medical Gazette-May 2013: 175-180.
7. Patel K, Lotodo T, Njuguna F, Emonyi W, Mining S, Buziba N, Czader M, Chite A, Vik T, Kaspers G, Westers M, Haas VD, Abbink F, Skiles J, Kigen N. Use of Flow Cytometry Immunophenotyping for Diagnosis of Acute Leukemia at Moi Teaching and Referral Hospital, Eldoret, Kenya. American Scientific Research Journal for Engineering, Technology, and Sciences. 2015; 13(1): 72-80.

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