ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 04, 2024

Peripheral Blood Smear Findings of Leukaemia's in a Tertiary Care Centre: A Comprehensive Analysis

Dr. Vidyavathi Hasabi[1], Dr. Prem Kalagi[2], Dr. Nayana L[3], Dr.Sunita vernaker[4]

[1]Senior resident, Department of pathology, Kims, Hubli

[2]Fellow in tumor pathology Hcg hospital, Bangalore

[3]Senior resident , Department of Pathology, Siddaganga medical college and research institute, Tumkur

[4]Professor and HOD department of pathology kims, Hubli

Corresponding author: Dr. Prem Kalagi

Abstract: This study aimed to conduct a thorough analysis of peripheral blood smear findings in acute and chronic leukaemia's at a tertiary care centre, utilizing the 5th edition of the WHO classification (2022) for diagnosis and employing cytochemical staining to differentiate between Acute Myeloid Leukaemia (AML) and Acute Lymphoblastic Leukaemia (ALL).
Methods: A retrospective analysis was performed on peripheral blood smear findings of 300 cases, including 30 cases of acute leukaemia, at a tertiary care centre. Diagnosis was based on standardized diagnostic criteria, and cytochemical staining was utilized for subtype differentiation. Data on patient demographics, leukaemia subtype, and peripheral blood smear characteristics were collected and analysed.
Results: Among the 30 acute leukaemia cases, CML constituted 16 cases, while 12 cases were identified as AML and 2 cases as ALL. Peripheral blood smear analysis revealed distinct morphological features corresponding to each leukaemia subtype. Cytochemical staining aided in confirming the lineage differentiation between AML and ALL.
Conclusion: Peripheral blood smear analysis, guided by standardized diagnostic criteria and complemented by ancillary tests such as cytochemical staining, plays a crucial role in leukaemia diagnosis and classification. Continued research and collaboration are essential for advancing diagnostic algorithms and improving patient care in the management of leukaemia's.

Keywords: Leukaemia, cytochemistry, peripheral smear

Introduction: Leukaemia, a group of haematological malignancies, poses a diagnostic challenge due to its diverse manifestations[1]. Peripheral blood smear analysis remains a fundamental diagnostic tool, offering valuable insights into cellular morphology and lineage differentiation[2-3]. In this study, we aimed to conduct a comprehensive analysis of peripheral blood smear findings in acute and chronic leukaemia's at a tertiary care centre, utilizing standardized diagnostic criteria and ancillary tests[4].

Study Objectives:

- Comprehensive analysis of peripheral blood smear in acute and chronic leukaemia's.

Materials and Methods: A prospective study of patients, was performed on peripheral blood smear findings of 300 cases at OPD, Department of Pathology, Karnataka Institute of Medical Sciences, Hubballi, Karnataka, India. Diagnosis was based on the 5th edition of the WHO classification (2022), which provides a standardized framework for leukaemia classification. Cytochemical staining was employed to differentiate between Acute Myeloid Leukaemia (AML) and Acute Lymphoblastic Leukaemia (ALL). Data on patient demographics, leukaemia subtype, and peripheral blood smear characteristics were collected and analysed. The study was

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 04, 2024

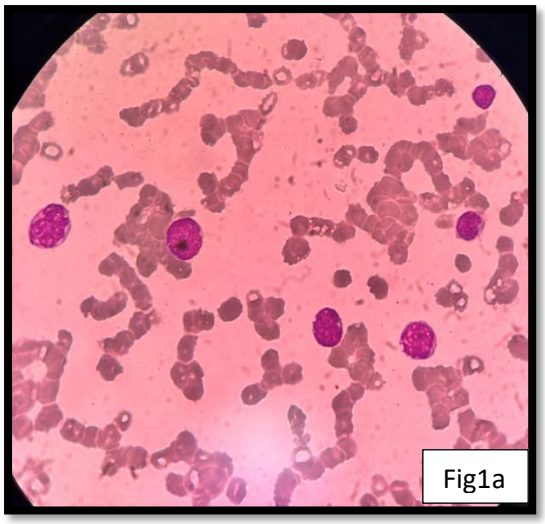
done from January 2023 to December 2023. All procedures performed in the current study were approved by Institutional Ethical Committee in accordance with the 1964 Helsinki declaration and later amendments.

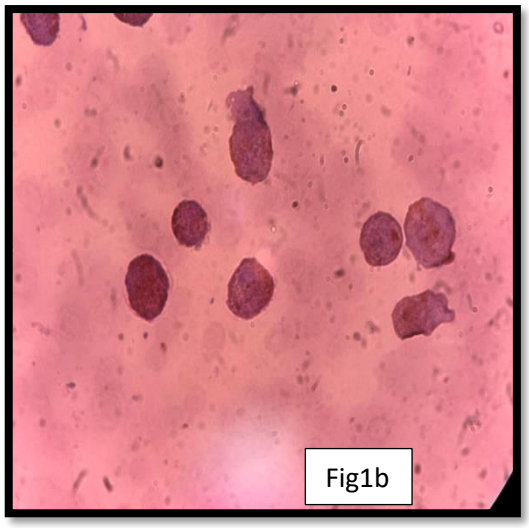
Study Procedure: A blood smear was prepared by spreading a drop of blood across a glass slide immediately followed by staining with leishman or wright . The sample was collected in EDTA tube and was run using aspen analyser. Cytochemical staining was employed were ever necessary.

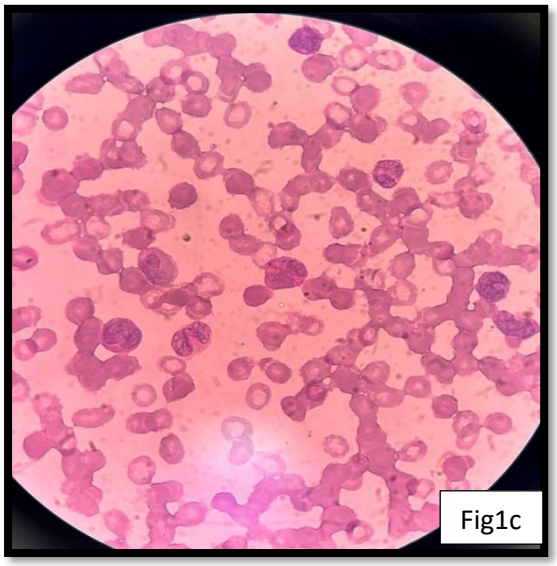
Statistical Analysis: Data was entered into Microsoft excel data sheet and was analysed using Statistical Package for the Social Sciences (SPSS) software, version 22.0 (IBM SPSS Statistics, Somers NY, USA). Normality of the continuous data, was tested by Kolmogorov-Smirnov test and the Shapiro-Wilk test. Continuous data was represented as mean and standard deviation. Categorical data was represented in the form of frequencies and proportions. Independent t-test was used as test of significance to identify the mean difference between two quantitative variables. Chi-square test was used as test of significance for qualitative data.

Results: Total 300 peripheral smears studied. Among which there were 30 acute leukaemia cases, constituted of 18 female and 12 males. Chronic Myeloid Leukaemia (CML) constituted 16 cases, while 12 cases were identified as Acute Myeloid Leukaemia (AML) and 2 cases as Acute Lymphoblastic Leukaemia (ALL). Peripheral blood smear analysis revealed distinct morphological features corresponding to each leukaemia subtype. In AML, myeloblasts with varying degrees of differentiation were observed, with some cases showing the presence of Auer rods. ALL cases exhibited lymphoblasts with high nuclear/cytoplasmic ratio and scant cytoplasm. Cytochemical staining aided in confirming the lineage differentiation between AML and ALL. (Fig1).

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 04, 2024







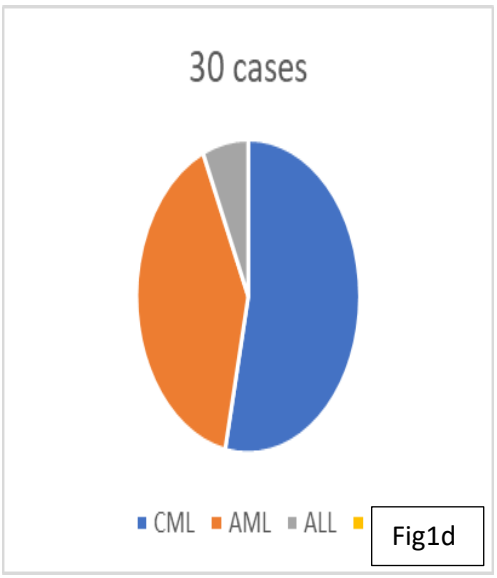


Fig 1a: Peripheral smear showing myeloid blasts.

Fig 1b: MPO positive in blasts

Fig 1c: PAS negative in blasts

Fig1d: Pie chart distribution of cases

Discussion: The findings of this study underscore the pivotal role of peripheral blood smear analysis in leukaemia diagnosis and classification. Peripheral blood smears provide a readily accessible sample for morphological evaluation, allowing for rapid assessment of disease burden and identification of abnormal cell populations. In our study the commonest leukaemia was CML followed by AML and ALL similar to other study done[1]. The observed gender distribution and subtype prevalence in our study are consistent with existing literature which has female preponderance [1-2], further validating the utility of standardized diagnostic criteria such as the WHO classification. Cytochemical staining emerged as a valuable adjunctive tool in our analysis, facilitating the differentiation between AML and ALL[2]. By targeting specific cellular markers, cytochemical stains enable precise identification of leukaemia subtypes,

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 04, 2024

guiding treatment decisions and prognostication[3]. Moreover, the incorporation of ancillary tests such as flow cytometry and genetic analysis enhances the diagnostic accuracy and aids in risk stratification[4]. One of the notable challenges encountered in our study was the subtyping of acute leukaemia's based solely on peripheral blood smear analysis. While morphological evaluation provides valuable initial insights, definitive classification often requires additional diagnostic modalities[6]. Integration of cytochemical staining with other ancillary tests is essential for achieving a comprehensive diagnostic workup and optimizing patient care[8]. The multidisciplinary approach advocated in our study underscores the importance of collaboration between haematologists, pathologists, and laboratory scientists[7]. By combining expertise from diverse fields, clinicians can leverage the full spectrum of diagnostic tools and formulate individualized treatment plans tailored to the patient's specific disease subtype and risk profile[9]. To summarise, peripheral blood smear analysis remains a cornerstone in the diagnostic workup of leukaemia's. The findings of this study contribute to our understanding of peripheral blood smear findings in leukaemia, highlighting the diagnostic utility of morphological evaluation and ancillary testing. Continued research and refinement of diagnostic algorithms are essential for improving diagnostic accuracy, enhancing patient outcomes, and advancing the field of haematological oncology.

Limitation(s): Major limitations of the present study were, follow-up of the patients was not available to compare the difference in overall survival and disease-free survival between cases. Further analysis of a larger number of patients with ancillary studies like flow cytometry, cytogenetics and molecular genetics is required.

Conclusion: Peripheral blood smear analysis, guided by standardized diagnostic criteria and complemented by ancillary tests such as cytochemical staining, plays a crucial role in leukaemia diagnosis and classification. The integration of morphological evaluation with ancillary testing enables precise subtype identification and informs personalized treatment strategies. Continued research and collaboration are essential for advancing diagnostic algorithms and improving patient care in the management of leukaemia's.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

References:

1) Rathee R, Vashisht M, Kumar A, Singh S. Incidence of acute and chronic forms of leukaemia in Haryana. International Journal of Pharmacy and Pharmaceutical Sciences. 2014;6(2):323-325.
2) Li W. The 5th Edition of the World Health Organization Classification of Hematolymphoid Tumors. In: Li W, editor. Leukemia [Internet]. Brisbane (AU): Exon Publications; 2022 Oct 16.
3) Adewoyin AS, Nwogoh B. Peripheral blood film - a review. Ann Ib Postgrad Med. 2014 Dec;12(2):71-9. PMID: 25960697; PMCID: PMC4415389.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 04, 2024

4) Garg P, Deshpande AH, Dey B et al. A study of the peripheral smears in a tertiary care teaching hospital of Andaman & Nicobar Islands. Int J Health Sci Res. 2017; 7(9):22-27.
5) Chaudhari S, Desai JS, Adam A, Mishra P. Jak/stat as a novel target for treatment of leukaemia. Int J Pharm Pharm Sci, 2014; 6(1): 1-7.
6) Cancer Facts & Figures. Atlanta, GA: American Cancer Society; 2013.
7) Kumar A, Rathee R, Vashist M, Kamal N, Singh S, Gupta S. Acute Lymphocytic Leukemia: An epidemiological and hematological study from Haryana. Biosci Biotech Res Asia, 2012; 9(2): 813-7
8) Bain BJ. Blood Cell Morphology in Health and Disease. *In Dacie and Lewis Practical Haematology.* (11 ed) 2012; Chapter 5:69–100.
9) Bainton DF. Morphology of Neutrophils, Eosinophils, and Basophils. *Williams Hematology.* 7th Edition 2006.
10) Tkachuk DC, Hirschmann JV. Approach to the microscopic evaluation of blood and bone marrow. In: Tkachuk DC, Hirschmann JV , editors. *Wintrobe Atlas of Clinical Haematology.* Lippincott: Williams & Wilkins; 2007.