



Original Article

The Pivotal Role of the Peripheral Blood Smear in the Initial Diagnosis of Various Leukemia

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ABSTRACT

Background: Peripheral blood smear (PBS) examination remains a cornerstone in the initial evaluation of hematological disorders. Despite advances in immunophenotyping and molecular diagnostics, PBS continues to provide rapid and valuable morphological insights, especially in resource-limited settings.

Aim: To evaluate the role of peripheral blood smear in the early diagnosis and classification of various leukemias.

Materials and Methods: A retrospective observational study was conducted on in P.D.U. Government Hospital, Rajkot. The study period was taken between 1st August 2025 to 31st March 2026. Between this time period we found 55 cases of leukemia. Clinical details, hematological parameters, and peripheral smear findings were analyzed and correlated.

Results: Acute Myeloid Leukemia (30.91%) was the most common subtype followed by Chronic Myeloid Leukemia (20%). Pallor was the most frequent presenting feature. Peripheral smear findings such as blasts, smudge cells, and basophilia were instrumental in initial diagnosis.

Conclusion: Peripheral blood smear remains a rapid, cost-effective, and indispensable diagnostic tool that aids in early detection and classification of leukemias.

Keywords: Leukaemia. Peripheral blood smear, Blast, Acute myeloid leukaemia

INTRODUCTION

Leukemia comprises a diverse group of clonal hematopoietic malignancies characterized by abnormal proliferation of white blood cells in the bone marrow and peripheral circulation. These disorders are broadly classified into acute and chronic leukemias, each with distinct clinical behavior, prognosis, and management strategies.

Early and accurate diagnosis is critical, as many leukemias—particularly acute leukemias—require urgent intervention. While modern diagnostic modalities such as flow cytometry, cytogenetics, and molecular studies have significantly improved classification and prognostication, they may not always be immediately available, particularly in resource-constrained settings.

In such scenarios, peripheral blood smear examination serves as the first and often most informative diagnostic tool. It provides immediate morphological details, including identification of blasts, assessment of cell lineage, and detection of characteristic features such as Auer rods, smudge cells, and basophilia.

Moreover, PBS allows correlation with clinical findings and can guide further investigations. Its role is especially crucial in initial suspicion, triaging patients, and initiating early management.

The present study was undertaken to evaluate the diagnostic utility of peripheral blood smear in various leukemias and to correlate morphological findings with clinical and demographic parameters.

MATERIALS AND METHODS

This retrospective observational study was conducted on **55 cases of leukemia**. Study Design we chose is of retrospective descriptive study. Study Setting conducted in a tertiary care center, P.D.U. Government Hospital, Rajkot. Study Duration was from 1st August 2025 to 31st March 2026.

Data Collection

The following parameters were recorded:

- Age and gender
- Clinical presentation
- Hematological parameters
- Peripheral smear findings

Peripheral Smear Examination

- Blood samples collected in EDTA vials
- Smears prepared using standard technique.
- Stained with Leishman stain and Field Stain.
- Examined under light microscopy.

RESULTS

A total of **55 cases** were analyzed.

Table 1: Distribution of Leukemia Types

Diagnosis	No. Of Cases	Percentage
Acute myeloid Leukemia	17	30.91%
Acute Lymphoid Leukemia	10	18.18%
Chronic myeloid Leukemia	11	20%
Chronic lymphoid Leukemia	10	18.18%
Acute BlasticLeukemia	06	10.91%
Lymphoma leukemia	01	1.82%
Total	55	100%

The most common leukemia observed was AML (30.91%), followed by CML (20%). Acute leukemias constituted a larger proportion compared to chronic leukemias, indicating a higher burden of aggressive disease presentation.

Table 2: Gender Distribution Of various Leukemia

Diagnosis	Male	Female	Total
Acute myeloid Leukemia	09	08	17
Acute Lymphoid Leukemia	07	03	10
Chronic myeloid Leukemia	07	04	11
Chronic lymphoid Leukemia	08	02	10
Acute BlasticLeukemia	02	04	06
Lymphoma leukemia	00	01	01
Total	33	22	55

There was a clear male predominance (60%) compared to females (40%). This trend was consistent across most leukemia subtypes, suggesting possible gender-related susceptibility or healthcare access differences.

Table 3: Age Distribution Of various Leukemia

Age (Years)	AML	ALL	CML	CLL	Acute Blastic Leukemia	Lymphoma Leukemia	Total
<10	01	06	00	00	02	00	09
11-20	02	02	00	00	01	00	05
21-30	02	02	05	00	02	00	11
31-40	05	00	02	02	01	00	11
41-50	03	00	02	04	00	00	09
51-60	00	00	01	01	00	00	02

61-70	02	00	00	01	00	00	03
>70	02	00	01	02	00	01	05

ALL was predominantly seen in children (<10 years). AML showed a wider age distribution. CML was more frequent in young to middle-aged adults. CLL was mainly observed in older age groups. This reflects known epidemiological patterns of leukemia distribution.

Table 4: Clinical Presentation

Presenting Feature	AML	ALL	CML	CLL	Acute BlasticLeukemia	Lymphoma Leukemia	Total
Fever	01	01	01	00	00	00	03
Weakness	02	02	01	02	02	00	09
Pallor	11	04	00	00	04	00	19
Bleeding	02	00	00	00	00	00	02
Splenomegaly	01	00	09	00	00	01	10
Lymphadenopathy	00	03	00	08	00	00	11
Total	17	10	11	10	06	01	55

Pallor (34.5%) was the most common presenting feature, reflecting underlying anemia. Lymphadenopathy and splenomegaly were also frequent findings, particularly in CLL and CML respectively. Bleeding manifestations were less common but clinically significant.

Table 5: CML cases distribution according to Phases

CML phase	No. Of Cases	Percentage
Chronic Phase	08	80%
Accelerated Phase	00	00%
Blast crisis Phase	02	20%
Total	10	100%

Majority of CML cases (80%) were diagnosed in the chronic phase, indicating early detection in most patients. However, presence of blast crisis cases highlights delayed presentation in a subset.

Table 6: AML Subclassification

AML subclass	No. Of Cases
Acute PromyelocyticLeukemia	02
Acute MyelomonocyticLeukemia	01
AML M0	06
AML M2	08
Total	17

AML M2 was the most common subtype, followed by AML M0. Presence of APML cases is clinically significant due to its distinct treatment and prognosis.

Table 7: Peripheral Smear Findings

Key Peripheral Smear Finding	No. Of Cases
Blast	23
Auer rods	02
Smudge cells	10
Left shift	00
Basophillia	08
Total	43

Blasts were the most frequent finding (23 cases), confirming their central role in diagnosing acute leukemias. Smudge cells were characteristic of CLL, while basophilia was strongly associated with CML. Auer rods, though less frequent, provided definitive evidence of myeloid lineage.

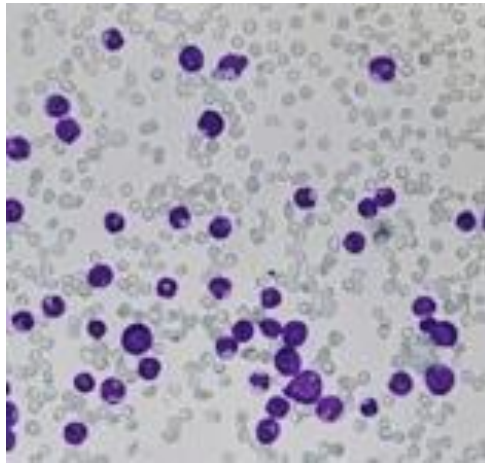


Image:1: Acute lymphoblastic leukemia: Blasts having high N:C ratio. 1-2 inconspicuous nucleoli are seen. (Field stain,40x)

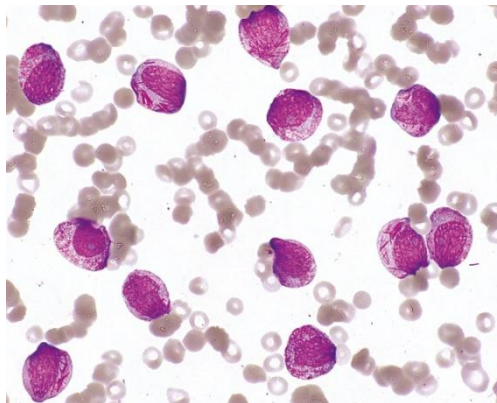


Image:2: Acute promyelocytic leukemia. Many promyelocytes with auer rods are seen. Faggot cells are also seen. (Field stain,100x)

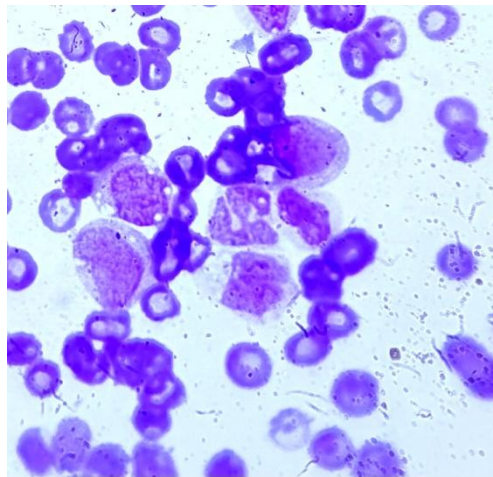


Image:3: Acute myelomonocytic leukemia. Many monoblasts having reniform nuclei and cytoplasmic vacuolation are seen. Myeloblasts are also present. (Field stain,100x)

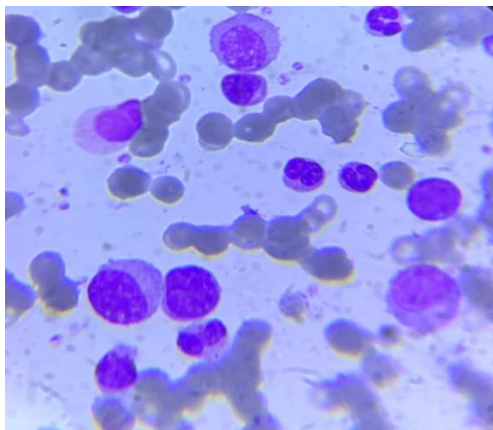


Image:4: Chronic myeloid leukemia. Myelomonocytic buldge is seen. (Field stain,100x)

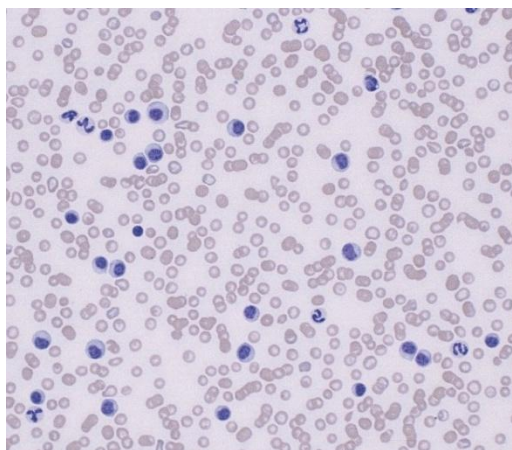


Image:5: Chronic lymphocytic leukemia. Many mature lymphocytes are seen. (Field stain,40x)

DISCUSSION

The present study reinforces the critical role of peripheral blood smear in the initial diagnosis of leukemias.

The predominance of AML observed in this study aligns with multiple regional studies, where AML is frequently reported as the most common adult leukemia. The relatively high proportion of acute leukemias emphasizes the need for rapid diagnostic methods, as delays can significantly impact patient outcomes.

Male predominance noted in this study has been consistently reported in hematological malignancies. While the exact reason remains unclear, genetic, environmental, and occupational factors may contribute.

The age distribution findings were also in agreement with established patterns. ALL showed a clear predilection for pediatric age groups, whereas CLL was predominantly seen in elderly individuals. CML affected a relatively younger population in this study compared to Western data, which is a known trend in developing countries.

Clinical presentation in leukemia is often nonspecific. Pallor being the most common symptom reflects anemia due to marrow infiltration. Lymphadenopathy and splenomegaly are important clinical clues that help narrow the differential diagnosis.

Peripheral smear findings played a decisive role in diagnosis. Blasts enabled identification of acute leukemias. Auer rods confirmed myeloid origin. Smudge cells were highly suggestive of CLL. Basophilia strongly pointed toward CML. These morphological features not only aid in diagnosis but also help prioritize further confirmatory tests such as bone marrow examination and immunophenotyping.

In resource-limited settings, where advanced diagnostics may be delayed, PBS serves as an invaluable frontline tool. It enables early clinical decision-making and initiation of supportive therapy.

CONCLUSION

Peripheral blood smear examination continues to be an indispensable diagnostic modality in hematology. It is rapid, cost-effective, and widely accessible. Provides crucial morphological insights. It enables early diagnosis and classification of leukemias. Guides further diagnostic and therapeutic interventions

Even in the era of advanced technologies, PBS remains a cornerstone in the initial evaluation of leukemia.

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