



Original Article

Clinicopathological Correlation of Platelet Counts in Leukemia: A Tertiary Care Center Study

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ABSTRACT

Background: Platelet parameters, including platelet count, mean platelet volume (MPV), and platelet distribution width (PDW), are routinely available hematological indices that may provide insights into disease processes in leukemia. Their role in distinguishing between acute and chronic leukemias, however, remains to be clearly defined. This study aimed to evaluate the clinicopathological correlation of platelet parameters in leukemia.

Methods: A retrospective observational study was carried out in the Department of Pathology at PDU Medical College and Hospital over a period of 15 months (January 2025 to March 2026). A total of 45 patients diagnosed with leukemia were included, comprising 34 cases of acute leukemia and 11 cases of chronic leukemia, including chronic lymphocytic leukemia and chronic myeloid leukemia. Platelet count, MPV, and PDW values were retrieved from laboratory records and analyzed.

Results: Patients with acute leukemia showed marked thrombocytopenia, with a mean platelet count of 36,705/ μ L. The mean MPV and PDW in this group were 9.24 fL and 17.09%, respectively. In contrast, chronic leukemia cases showed relatively preserved platelet counts. The chronic lymphocytic leukemia subgroup had a mean platelet count of 302,500/ μ L, MPV of 10.15 fL, and PDW of 16.65%. The chronic myeloid leukemia subgroup demonstrated variable platelet counts (mean: 329,556/ μ L), along with higher MPV (10.71 fL) and mildly increased PDW (16.54%). Overall, distinct differences in platelet parameters were observed between acute and chronic leukemia groups.

Conclusion: Platelet parameters show differing patterns in acute and chronic leukemias. Acute leukemia is associated with significant thrombocytopenia and higher PDW, whereas chronic leukemias tend to show preserved or elevated platelet counts with relatively stable indices. These findings suggest that platelet parameters may serve as useful adjuncts in the evaluation of leukemia.

Keywords: Leukemia; Platelet count; Mean platelet volume; Platelet distribution width; Acute leukemia; Chronic leukemia.

INTRODUCTION

Leukemia comprises a heterogeneous group of hematological malignancies characterized by clonal proliferation of abnormal leukocytes in the bone marrow and peripheral blood. It is broadly classified into acute and chronic forms based on the clinical course and degree of cellular differentiation. Acute leukemias are typically aggressive and present with rapid onset of symptoms, whereas chronic leukemias often follow an indolent course with variable clinical manifestations [1].

Platelets play a critical role in hemostasis, and abnormalities in platelet count and function are frequently observed in leukemia. Thrombocytopenia is a common finding in acute leukemia, primarily due to marrow infiltration and

suppression of normal hematopoiesis, as well as increased peripheral destruction [2]. In contrast, chronic leukemias, particularly Chronic Myeloid Leukemia, may demonstrate normal or elevated platelet counts due to underlying myeloproliferative activity, while Chronic Lymphocytic Leukemia typically shows relatively preserved platelet levels unless advanced disease or marrow failure ensues [3].

In addition to platelet count, platelet indices such as mean platelet volume (MPV) and platelet distribution width (PDW) have gained attention as potential markers of platelet production and activation. MPV reflects the average size of platelets and serves as an indirect indicator of platelet production and turnover, with larger platelets generally representing younger and more reactive forms [4]. PDW, on the other hand, measures the variability in platelet size and is considered a marker of heterogeneity in platelet population, which may increase in conditions associated with active platelet destruction or dysregulated production [5].

Recent studies have suggested that platelet indices may provide additional diagnostic and prognostic information in hematological disorders, including leukemias. Elevated MPV and PDW have been associated with increased platelet turnover and peripheral destruction, whereas relatively stable values may indicate steady-state production [6]. These indices are routinely available as part of automated hematology analyzers, making them cost-effective and easily accessible parameters in routine clinical practice [7].

Despite their potential utility, the role of platelet indices in differentiating between acute and chronic leukemias remains inadequately explored, particularly in resource-limited settings. Most available studies have focused on individual parameters or specific leukemia subtypes, with limited data on comprehensive clinicopathological correlation across different leukemia categories [8].

Therefore, the present study was undertaken to evaluate platelet count and platelet indices, including MPV and PDW, in patients with acute and chronic leukemia, and to assess their clinicopathological correlation in a tertiary care center. Such analysis may help in better understanding disease mechanisms and may provide supportive evidence for the use of platelet parameters as adjunctive diagnostic tools [9,10].

MATERIALS AND METHODS

Study Design and Setting

This retrospective observational study was conducted in the Department of Pathology at PDU Medical College and Hospital over a period of 15 months, from January 2025 to March 2026.

Study Population

A total of 45 patients diagnosed with leukemia were included in the study. The cases comprised 34 patients with acute leukemia and 11 patients with chronic leukemia, including chronic lymphocytic leukemia and chronic myeloid leukemia. Diagnosis was established based on clinical findings, peripheral smear examination, and relevant hematological investigations.

Data Collection

Data were retrieved retrospectively from laboratory records and case files. The following parameters were recorded:

- Platelet count (/ μ L)
- Mean platelet volume (MPV) (fL)
- Platelet distribution width (PDW) (%)

All hematological parameters were obtained using an automated hematology analyzer as part of routine diagnostic workup.

Inclusion Criteria

- Patients of all age groups diagnosed with leukemia (acute or chronic)
- Cases with complete hematological data, including platelet count, MPV, and PDW
- Newly diagnosed as well as previously diagnosed cases during the study period

Exclusion Criteria

- Patients with incomplete laboratory data
- Cases with known platelet disorders unrelated to leukemia (e.g., idiopathic thrombocytopenic purpura)
- Patients receiving platelet transfusion prior to sample collection
- Cases with concurrent conditions known to significantly affect platelet parameters (e.g., severe sepsis, chronic liver disease)

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using appropriate statistical methods. Continuous variables were expressed as mean values. Platelet parameters were compared between acute and chronic leukemia groups to assess clinicopathological correlation.

RESULTS

A total of 45 cases of leukemia were analyzed, including acute and chronic leukemias. Platelet count and platelet indices were evaluated and compared across different groups.

Table 1: Distribution of Leukemia Cases

Category	Number of Cases (n)	Percentage (%)
Acute Leukemia	34	75.6
Chronic Leukemia	11	24.4
Total	45	100

The majority of cases were acute leukemia, accounting for 75.6% of the study population, while chronic leukemias constituted 24.4%. These findings indicate that acute leukemia was more commonly encountered than chronic leukemia in the studied cohort.

Table 2: Gender Distribution of the Study Population

Gender	Number of Cases (n)	Percentage (%)
Female	26	57.8%
Male	19	42.2%
Total	45	100%

Gender Distribution in Leukemia Cases (n=45)

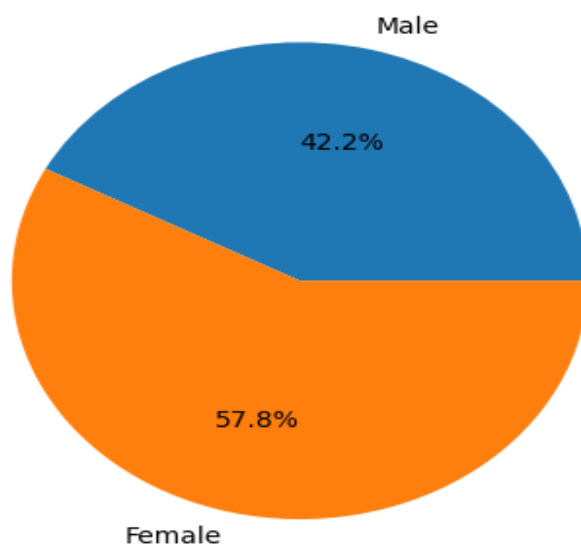


Figure 1: Gender Distribution of the Study Population

The study population showed a female predominance, with 26 (57.8%) females and 19 (42.2%) males.

Table 3: Age-wise Distribution of Acute Leukemia Cases

Age Group (years)	Number of Cases (n)	Percentage (%)
0-20	13	38.2%
21-40	7	20.6%
41-60	11	32.4%
61-80	3	8.8%
>80	0	0%
Total	34	100%

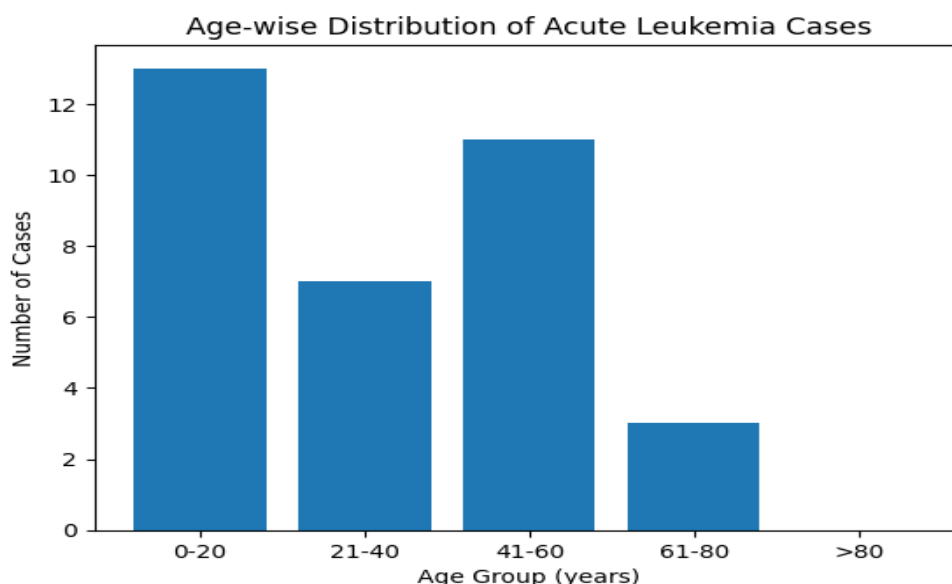


Figure 2: Age-wise Distribution of Acute Leukemia Cases

The highest number of cases was observed in the 0–20 years age group (n=13, 38.2%), followed by the 41–60 years group (n=11, 32.4%). The 21–40 years group accounted for 7 cases (20.6%), while the 61–80 years group had the lowest number among recorded cases (n=3, 8.8%). No cases were observed in individuals older than 80 years. Overall, the data indicate a higher occurrence of acute leukemia in younger age groups.

Table 4: Subclassification of Chronic Leukemia

Type	Number of Cases (n)	Percentage (%)
Chronic Lymphocytic Leukemia (CLL)	2	18.2
Chronic Myeloid Leukemia (CML)	9	81.8
Total	11	100

Among chronic leukemias, CML was the predominant subtype (81.8%), while CLL accounted for a smaller proportion (18.2%). This reflects the relative frequency of myeloproliferative disorders in the study.

Table 5: Platelet Parameters in Acute Leukemia

Parameter	Mean Value
Platelet Count (/ μ L)	36,705.88
MPV (fL)	9.24
PDW (%)	17.09

Acute leukemia cases showed marked thrombocytopenia with a low mean platelet count. PDW was relatively elevated, indicating increased variability in platelet size, suggestive of active platelet turnover.

Table 6: Comparison of Platelet Parameters Across Groups

Parameter	Acute Leukemia	CLL	CML
Platelet Count (/ μ L)	36,705	302,500	329,556
MPV (fL)	9.24	10.15	10.71
PDW (%)	17.09	16.65	16.54

A clear difference in platelet patterns was observed across groups. Acute leukemia was associated with significantly reduced platelet counts and higher PDW, whereas chronic leukemias showed preserved or elevated platelet counts with relatively stable indices.

DISCUSSION

Platelet parameters are routinely available hematological indices and can provide useful insights into the underlying disease process in leukemia. In the present study, clear differences were observed in platelet count and platelet indices between acute and chronic leukemias, reflecting differences in their pathophysiology.

The acute leukemia group showed marked thrombocytopenia, with a mean platelet count of 36,705/ μ L. This is in line with previously reported findings, where thrombocytopenia in acute leukemia is primarily attributed to marrow infiltration and suppression of normal hematopoiesis, along with increased peripheral destruction. Similar observations have been described by Kuter et al. [11] and Shaikh et al. [12], both of whom reported significantly reduced platelet counts in acute leukemia patients.

The mean platelet volume (MPV) in acute leukemia cases was within the normal range in the present study. MPV is considered a marker of platelet production and turnover, with higher values generally indicating the release of younger platelets. Korniluk et al. [13] noted that MPV may increase in conditions with enhanced platelet production. The relatively stable MPV observed in our acute cases may suggest a variable or limited marrow response in the setting of disease-related suppression.

Platelet distribution width (PDW) was found to be higher in acute leukemia cases, indicating increased variation in platelet size. This likely reflects a mixed population of platelets due to increased destruction and compensatory release. Vagdatli et al. [14] have similarly emphasized that PDW increases in conditions associated with platelet consumption and anisocytosis.

In contrast, chronic leukemias showed relatively preserved platelet counts. The CLL subgroup demonstrated near-normal platelet counts and stable MPV and PDW values, suggesting relatively maintained platelet production. Comparable findings have been reported by Hallek et al. [15], who observed that platelet counts in CLL are usually preserved unless there is advanced disease or significant marrow involvement.

The CML subgroup demonstrated variability in platelet counts, ranging from low to markedly elevated values, with an overall higher mean platelet count. This variability reflects the myeloproliferative nature of Chronic Myeloid Leukemia. The increased MPV in these cases indicates active platelet production and release of larger platelets. Similar patterns of altered platelet indices in myeloproliferative disorders have been described by Briggs et al. [16].

When acute and chronic leukemias are compared, distinct patterns become evident. Acute leukemias are characterized by significant thrombocytopenia and increased PDW, suggesting peripheral destruction and ineffective hematopoiesis. In contrast, chronic leukemias, including Chronic Lymphocytic Leukemia and Chronic Myeloid Leukemia, tend to show preserved or elevated platelet counts with relatively stable indices, reflecting ongoing or dysregulated marrow activity. Similar comparative observations have been reported by Budak et al. [17] and Noris et al. [18].

The findings of the present study suggest that platelet parameters may serve as simple and cost-effective adjuncts in the initial evaluation of leukemia. However, certain limitations should be acknowledged. The sample size was relatively small, particularly in the CLL subgroup, and detailed statistical analysis was not performed. Larger studies with comprehensive statistical evaluation are required to further validate these observations and to explore the potential prognostic significance of platelet indices in leukemia.

CONCLUSION

Platelet count and platelet indices demonstrate distinct patterns in acute and chronic leukemias and reflect their underlying pathophysiological differences. Acute leukemias are commonly associated with marked thrombocytopenia and increased PDW, whereas chronic leukemias tend to show preserved or elevated platelet counts with relatively stable indices.

These observations suggest that platelet parameters, which are routinely available and cost-effective, can serve as useful supportive tools in the initial evaluation of leukemia.

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Nil.

Conflicts of Interest

There are no conflicts of interest.

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