

Changes in Platelet Parameters in Conditions of LeucocytosisShiwangi Chhanwal¹, Jigyasu Joshi², Vijay Rajak³, Nishu⁴^{1,4}Resident, Department of Pathology, RNT Medical College, Udaipur²Assistant professor, Department of Pathology, RNT Medical College, Udaipur³Associate professor, Department of Pathology, RNT Medical College, Udaipur

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Conflict of interest: Nil

Abstract:

Background: Platelets are primarily concerned with haemostatic function but there are accumulating evidences to suggest their role in the pathophysiology of different clinical conditions that can be correlated with platelet parameters to some extent. This study was aimed to find out the relationship between WBC count in conditions of leucocytosis and platelet count and platelet parameters namely mean platelet volume, platelet distribution width and plateletcrit.

Method: Complete blood count records of total 1000 cases were evaluated dividing them in Group 1 (500 cases with WBC count within normal range) and Group 2 (500 cases with raised WBC count).

Result: There was significant difference between Group 1 & Group 2 in platelet count, PCT value & MPV values; platelet count & PCT values were higher in Group 2 while MPV was higher in Group 1. However, there was no statistically significant difference between these groups in PDW values.

Conclusion: Platelet count and PCT values increase in conditions of leucocytosis so can be considered as markers of infection but the exact mechanism for this association & clinical significance remains to be proved by further large scale studies.

Keywords: Leucocytosis, Platelets, Platelet Parameters.

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Introduction

Platelets (PLTs) play an important role in the primary hemostasis and arterial thrombosis formation. They provide rapid protection against bleeding and catalyze the formation of stable blood clots [B1,2]. Apart from control bleeding and to induce thrombosis, they have different roles in inflammation, atherosclerosis, angiogenesis, antimicrobial host defense, and contribution to wound healing [B1-4].

Platelet parameters, including MPV and PDW, derived from the impedance size distribution curve, serve as markers for platelet reactivity and function. Changes in these parameters, indicative of altered platelet function, are associated with systemic inflammation in various studies.[B5,6] Mean platelet volume (MPV) is calculated by dividing the plateletcrit (PCT) by the number of platelets. MPV is a potential marker of the platelet reactivity [C8]

PDW is an indicator of volume variability in platelets size and is increased in the presence of platelet anisocytosis [C11]. The platelet distribution width (PDW) is the width of the size distribution curve in femtoliter (fL) at the 20% level of the peak on the impedance platelet size distribution curve [C,6].

PCT is the volume occupied by platelets in the blood as a percentage and calculated according to the formula $PCT = \text{platelet count} \times MPV / 10,000$. Under physiological conditions, the amount of platelets in the blood is maintained in an equilibrium state by regeneration and elimination [C13].

While a high platelet count is not typically viewed as an infection marker, some studies propose that infections might induce thrombocytosis [B9,10].

Aims and Objective

1. To investigate the relationship between leukocyte count (white blood cell count, WBC) in conditions resulting in leukocytosis and PLT count and its parameters, including MPV, PDW, and PCT.
2. Investigate the potential role of platelet parameters as early indicators or markers in conditions characterized by leukocytosis.

Material and Methods

This prospective investigation was scheduled to span for 6 months, running from June 2023 to Nov 2023.

A total 500 subject with normal WBC counts and the PLT parameters were included in the study as a control group (Group 1), and 500 subjects with elevated WBC count were evaluated for comparison with PLT counts and its parameters, which was called as Group 2.

Inclusion Criteria: All the patients admitted in RNT Medical College having total leucocyte count more than 11000/mm³ (leukocytosis) and less than 50,000/mm³ were included in the study

Exclusion Criteria:

1. Patients with complicated infections or with very high-WBC count infections.

2. Patients with infections secondary to solid organ or hematological malignancies.
3. Patients with infections associated with solid organs or bone marrow transplantations.
4. Patients with chronic infections.

Statistical Analysis: Statistics was done using SPSS 10.5 version software system. Results were given as mean±standard deviation (SD) and minimum and maximum (min-max) values. The correlation between WBC and PLT parameters were assessed using Spearman correlation analyses.

Result:

Table 1: Age and sex-wise distribution (N=150)

Parameter	Group 1 (n=500)		Group 2 (n=500)		P-value
	Mean+SD	Min-Max	Mean+SD	Min-Max	
WBC	8.57+8.65	4.9-12.5	15.19+2.91	12.8-49.1	<0.001
Platelets	227.35+60.73	151-455	263+90.43	155-2107	<0.001
MPV	8.86+1.98	5.1-11.3	9.07+3.02	6.1-11.4	0.19
PCT	0.20+0.19	0.21-0.5	0.21+0.08	0.15-1.64	0.27
PDW	17.56+0.61	5.8-28.8	17.54+0.58	8-28.8	0.59

The parameters include white blood cell count (WBC), platelets, mean platelet volume (MPV), plateletocrit (PCT), and platelet distribution width (PDW). WBC, Platelets exhibits a significant difference (p < 0.001) between the two groups, while other parameters such as MPV, PCT, and PDW show non-significant differences.

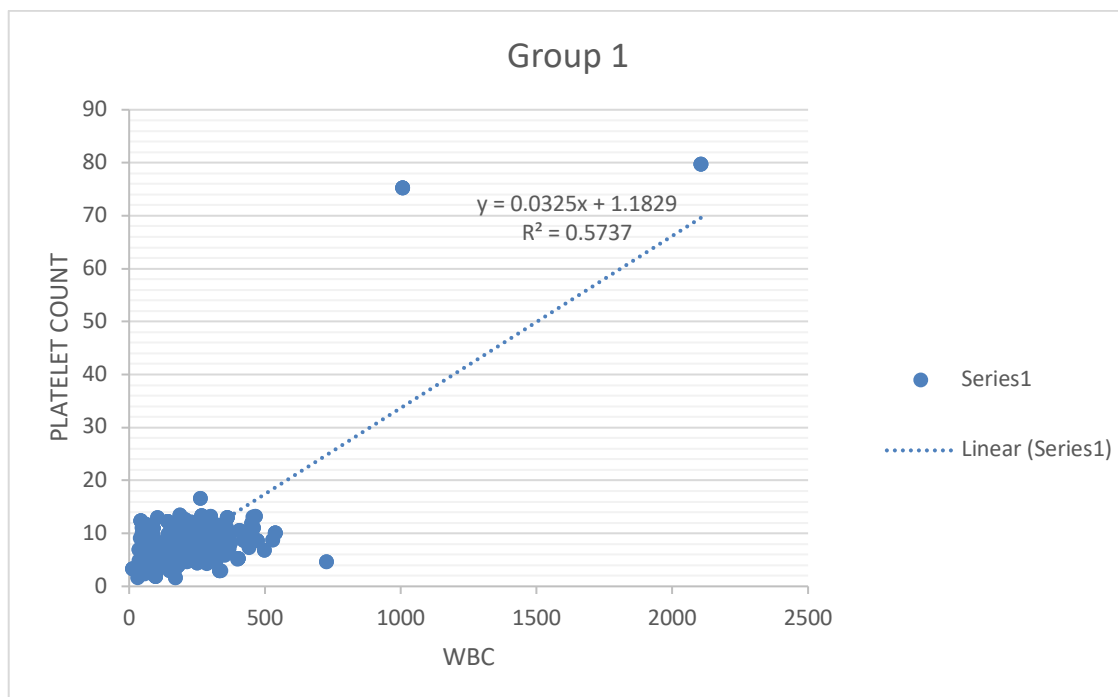


Figure 2: The scatter plot of PLT counts and WBC counts in group 1

The table indicates a strong positive correlation (r-value = 0.75) between white blood cell count (WBC) and platelet count, and this correlation is statistically significant (p < 0.0001).

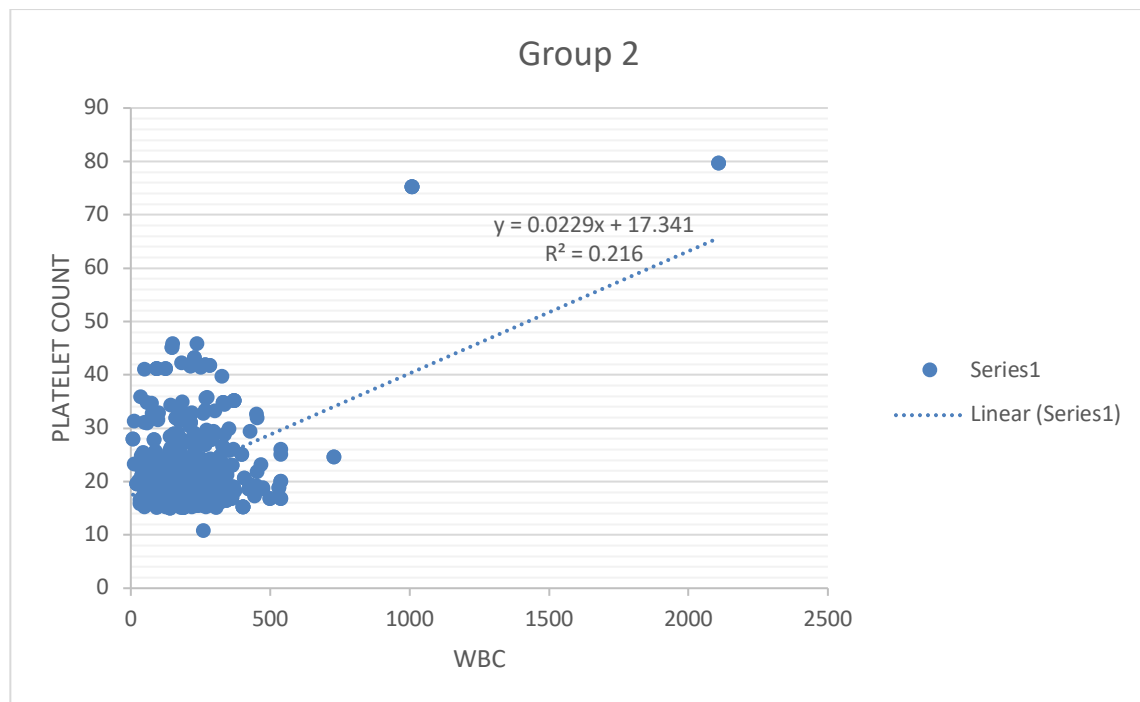


Figure 3: The scatter plot of PLT counts and WBC counts in group 2

The table shows a moderate positive correlation (r -value = 0.46) between white blood cell count (WBC) and platelet count, with statistical significance ($p < 0.001$).

Discussion

In the present study, we found that the PLT counts significantly increased in Group 2 when compared with normal WBC count Group 1. We have found that MPV and PDW values were not significantly different in both groups. There are some recently published studies evaluating the relationship between these parameters and various conditions, including coronary artery disease [B6], endometriosis [B13], cerebral infarction [B14] diabetes mellitus [B15,16], pulmonary tuberculosis [B17,18], and inflammation [B8,12].

Our results showed that PLT counts were increased in infectious circumstances while MPV did not change. Zareifar et al. [B12] reported in their study that PLT counts also increased in infectious and inflammatory diseases, as in our study, but MPV decreased, proposing that platelet parameters can be considered as reliable markers for assessment of disease activity. A similar study by Huang et al [B4] found that there is a well-known close relationship between leukocytes and platelets especially in inflamed endothelium.

Conclusion

PLT count and PCT value increase in infectious conditions. This study and previous studies show that PLTs are employed in infectious conditions but the exact mechanism and the exact clinical

importance of this response remains to be cleared by further studies. There is no correlation with MPV and PDW values seen in both groups.

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