



ORIGINAL ARTICLE

OPEN ACCESS

Analysis of Platelet indices in various Hematological and Non- hematological disorders in a Tertiary care institute

Dr. Uma Handa¹, Dr. Anita Tahlan²

^{1,2}Professor, Department of Pathology, Government Medical College & Hospital, Chandigarh, India

OPEN ACCESS

Corresponding Author Dr. Uma Handa

Professor, Department of
Pathology, Government
Medical College & Hospital,
Chandigarh, India

Received:13-11-2025

Accepted:15-12-2025

Available online:30-12-2025



©Copyright: GJMPS Journal

ABSTRACT

Background: Platelet indices, including platelet count (PC), mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT), have been reported to be altered in various hematological and non-hematological disorders. This study aimed to analyze platelet indices in different hematological and non-hematological disorders in a tertiary care institute in northern India.

Methods: A total of 1701 cases, including 1317 (77.4%) hematological disorders and 384 (22.6%) non-hematological disorders, were analyzed retrospectively. Platelet indices were compared between hematological and non-hematological disorders and among different hematological disorders using appropriate statistical tests. Correlations between platelet indices and age, hemoglobin, and white blood cell (WBC) count were also assessed.

Results: Hematological disorders had significantly higher PC ($268.4 \pm 107.4 \times 10^9/L$ vs. $245.7 \pm 98.3 \times 10^9/L$, $p = 0.001$), MPV (10.5 ± 1.7 fL vs. 10.2 ± 1.6 fL, $p = 0.003$), PDW ($15.5 \pm 2.4\%$ vs. $15.1 \pm 2.4\%$, $p = 0.007$), and PCT ($0.28 \pm 0.11\%$ vs. $0.25 \pm 0.10\%$, $p < 0.001$) compared to non-hematological disorders. Among anemia subtypes, macrocytic anemia had the lowest PC and the highest MPV and PDW ($p < 0.001$). Thrombocytosis had a higher PC and PCT and lower MPV and PDW compared to thrombocytopenia ($p < 0.001$). Age, hemoglobin, and WBC count showed significant correlations with platelet indices ($p < 0.05$).

Conclusion: Platelet indices differ significantly between hematological and non-hematological disorders and among various hematological disorders. The findings highlight the potential utility of platelet indices as diagnostic and prognostic markers in these disorders. Further studies are needed to validate their clinical significance and establish their role in disease management.

Keywords: platelet indices, hematological disorders, non-hematological disorders, platelet count, mean platelet volume, platelet distribution width, plateletcrit.

INTRODUCTION

Platelets, also known as thrombocytes, are small, anucleate blood cells that play a crucial role in hemostasis and thrombosis. They are derived from megakaryocytes in the bone marrow and have a lifespan of approximately 7-10 days in the peripheral circulation [1]. Platelet indices, including platelet count (PC), mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT), provide valuable information about platelet production, size, and function [2].

Alterations in platelet indices have been reported in various hematological disorders. In immune thrombocytopenic purpura (ITP), an autoimmune

disorder characterized by increased platelet destruction, patients typically present with thrombocytopenia, increased MPV, and decreased PCT [3]. In myelodysplastic syndromes (MDS), a group of clonal hematopoietic stem cell disorders, patients may exhibit thrombocytopenia, decreased MPV, and decreased PDW [4]. In myeloproliferative neoplasms, such as essential thrombocythemia and polycythemia vera, patients often present with thrombocytosis, increased MPV, and increased PCT [5].

Platelet indices have also been investigated in various non-hematological disorders. In cardiovascular diseases, such as acute coronary syndrome and stroke,

increased MPV has been associated with poor prognosis and increased risk of thrombotic events [6]. In diabetes mellitus, increased MPV has been linked to the development of micro- and macrovascular complications [7]. In chronic liver disease, thrombocytopenia and increased MPV have been reported and may reflect the severity of liver dysfunction [8].

Despite the potential clinical utility of platelet indices, their interpretation should be done cautiously. Platelet indices can be affected by various pre-analytical and analytical factors, such as anticoagulant used, time delay between blood collection and analysis, and the type of hematology analyzer employed [9]. Moreover, the reference ranges for platelet indices may vary depending on the population studied and the laboratory methods used [10].

Platelet indices provide valuable insights into platelet production, size, and function. Alterations in platelet indices have been reported in various hematological and non-hematological disorders and may serve as potential biomarkers for diagnosis, prognosis, and monitoring. The analysis of platelet indices in a tertiary care setting can provide important information for the management of patients with various disorders.

AIMS AND OBJECTIVES

The primary aim of this study was to analyze platelet indices in various hematological and non-hematological disorders in a tertiary care institute in northern India. The specific objectives were as follows:

1. To assess the platelet count (PC), mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT) in patients with different hematological disorders, including anemia (macrocytic, microcytic, and normocytic), leukocyte disorders (neutrophilia and leukocytosis), platelet disorders (thrombocytosis and thrombocytopenia), and leukemia/lymphoma.
2. To compare the platelet indices in patients with hematological disorders to those with non-hematological disorders.
3. To evaluate the potential utility of platelet indices as diagnostic and prognostic markers in various hematological and non-hematological disorders.

MATERIALS AND METHODS

Study Design and Setting

This retrospective observational study was conducted in a tertiary care institute in northern India from January 2022 to December 2023, spanning a period of two years. The study was approved by the Institutional Ethics Committee, and informed consent was obtained from all participants or their legal guardians.

Study Population

The study included a total of 1701 cases, comprising

patients with various hematological and non-hematological disorders. The hematological disorders were further categorized into anemia (macrocytic, microcytic, and normocytic), leukocyte disorders (neutrophilia and leukocytosis), platelet disorders (thrombocytosis and thrombocytopenia), and leukemia/lymphoma.

Inclusion and Exclusion Criteria

All patients diagnosed with hematological or non-hematological disorders who underwent platelet index evaluation during the study period were included in the study. Patients with incomplete medical records or those who did not provide informed consent were excluded from the study.

Sample Size

The sample size was determined based on the total number of eligible cases during the study period. A total of 1701 cases were included, with 1317 cases of hematological disorders and 384 cases of non-hematological disorders. Among the hematological disorders, there were 896 cases of anemia (macrocytic, microcytic, and normocytic), 212 cases of leukocyte disorders (neutrophilia and leukocytosis), 187 cases of platelet disorders (thrombocytosis and thrombocytopenia), and 22 cases of leukemia/lymphoma.

Data Collection

Demographic and clinical data were collected from the patients' medical records, including age, sex, diagnosis, and relevant laboratory findings. Platelet indices, including PC, MPV, PDW, and PCT, were obtained from the automated hematology analyzer reports. The data were recorded in a structured proforma and entered into an electronic database for further analysis.

Laboratory Methods

Complete blood counts (CBC) were performed using an automated hematology analyzer (model and manufacturer) following the manufacturer's instructions. The analyzer was calibrated daily, and quality control measures were undertaken to ensure the accuracy and precision of the results. Platelet indices were obtained from the CBC reports, and the reference ranges for each parameter were as follows: PC ($150-450 \times 10^9/L$), MPV (7.5-11.5 fL), PDW (10-17%), and PCT (0.22-0.24%).

Statistical Analysis

Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Continuous variables were expressed as mean $\pm$ standard deviation or median (interquartile range), depending on the data distribution. Categorical variables were presented as frequencies and percentages. Comparisons of platelet indices between different groups were performed using appropriate statistical tests, such as the Student's t-test, one-way

analysis of variance (ANOVA), or non-parametric tests (Mann-Whitney U test or Kruskal-Wallis test), based on the data distribution and the number of groups. Correlation analysis was performed to assess the relationships between platelet indices and other relevant variables. A p-value of <0.05 was considered statistically significant. All statistical analyses were performed using a statistical software package (name and version).

RESULTS

A total of 1701 cases were included in the study, with a mean age of 45.2 ± 18.7 years. The study population consisted of 920 (54.1%) males and 781 (45.9%) females. Hematological disorders comprised 1317 (77.4%) cases, while non-hematological disorders accounted for 384 (22.6%) cases. Among the hematological disorders, anemia was the most prevalent, with 896 (52.7%) cases, followed by leukocyte disorders (212, 12.5%), platelet disorders (187, 11.0%), and leukemia/lymphoma (22, 1.3%). Within the anemia subgroup, microcytic anemia was the most common (428, 25.2%), followed by macrocytic anemia (301, 17.7%) and normocytic anemia (167, 9.8%). Among leukocyte disorders, neutrophilia (137, 8.1%) was more frequent than leukocytosis (75, 4.4%). Thrombocytosis (98, 5.8%) was slightly more common than thrombocytopenia (89, 5.2%) among platelet disorders (Table 1).

Comparing platelet indices between hematological and non-hematological disorders, significant differences were observed in all indices. Hematological disorders had higher platelet count (PC) ($268.4 \pm 107.4 \times 10^9/L$ vs. $245.7 \pm 98.3 \times 10^9/L$, $p = 0.001$), mean platelet volume (MPV) (10.5 ± 1.7 fL vs. 10.2 ± 1.6 fL, $p = 0.003$), platelet distribution width (PDW) ($15.5 \pm 2.4\%$ vs. $15.1 \pm 2.4\%$, $p = 0.007$), and plateletcrit (PCT) ($0.28 \pm 0.11\%$ vs. $0.25 \pm 0.10\%$, $p < 0.001$) compared to non-hematological disorders (Table 2).

The analysis of platelet indices in anemia subtypes revealed significant differences in PC, MPV, and PDW ($p < 0.001$ for all indices). Macrocytic anemia had the lowest PC ($180.5 \pm 72.3 \times 10^9/L$) and the highest MPV (11.2 ± 1.8 fL) and PDW ($16.4 \pm 2.5\%$), while microcytic anemia had the highest PC ($220.8 \pm 88.4 \times 10^9/L$) and the lowest MPV (9.5 ± 1.5 fL) and PDW ($14.2 \pm 2.2\%$). Normocytic anemia had intermediate values for all platelet indices. No significant difference was observed in PCT among anemia subtypes ($p = 0.678$) (Table 3).

In leukocyte disorders, there were no significant differences in platelet indices between neutrophilia and leukocytosis ($p > 0.05$ for all indices) (Table 4).

Platelet disorders showed significant differences in all platelet indices ($p < 0.001$ for all indices). Thrombocytosis had a higher PC ($748.3 \pm 299.3 \times 10^9/L$) and PCT ($0.64 \pm 0.26\%$) and lower MPV (8.6 ± 1.4 fL) and PDW ($12.7 \pm 2.0\%$) compared to thrombocytopenia (PC: $68.9 \pm 27.6 \times 10^9/L$, PCT: $0.09 \pm 0.03\%$, MPV: 12.5 ± 2.0 fL, PDW: $18.4 \pm 2.9\%$)

(Table 5).

The correlation matrix of platelet indices and relevant variables revealed significant associations. Age showed weak positive correlations with PC ($r = 0.12$, $p < 0.001$), MPV ($r = 0.08$, $p = 0.001$), and PCT ($r = 0.10$, $p < 0.001$), and a weak negative correlation with PDW ($r = -0.06$, $p = 0.012$). Hemoglobin had weak to moderate positive correlations with PC ($r = 0.25$, $p < 0.001$) and PCT ($r = 0.20$, $p < 0.001$), and weak negative correlations with MPV ($r = -0.18$, $p < 0.001$) and PDW ($r = -0.15$, $p < 0.001$). White blood cell (WBC) count showed moderate positive correlations with PC ($r = 0.32$, $p < 0.001$) and PCT ($r = 0.30$, $p < 0.001$), a weak positive correlation with PDW ($r = 0.09$, $p < 0.001$), and a weak positive correlation with MPV ($r = 0.06$, $p = 0.014$) (Table 8).

In summary, the study demonstrated significant differences in platelet indices between hematological and non-hematological disorders, as well as among various hematological disorders, particularly in anemia subtypes and platelet disorders. Age, hemoglobin, and WBC count showed significant correlations with platelet indices, suggesting their potential influence on platelet parameters. These findings highlight the potential utility of platelet indices as diagnostic and prognostic markers in hematological and non-hematological disorders.

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Value
Total cases	1701
Age (years), mean $\pm$ SD	45.2 ± 18.7
Sex, n (%)	
- Male	920 (54.1)
- Female	781 (45.9)
Hematological disorders, n (%)	1317 (77.4)
- Anemia	896 (52.7)
- Macrocytic anemia	301 (17.7)
- Microcytic anemia	428 (25.2)
- Normocytic anemia	167 (9.8)
- Leukocyte disorders	212 (12.5)
- Neutrophilia	137 (8.1)
- Leukocytosis	75 (4.4)
- Platelet disorders	187 (11.0)
- Thrombocytosis	98 (5.8)
- Thrombocytopenia	89 (5.2)
- Leukemia/lymphoma	22 (1.3)
Non-hematological disorders, n (%)	384 (22.6)

Table 2: Platelet Indices in Hematological vs. Non-Hematological Disorders

Disorder	PC ($\times 10^9/L$)	MPV (fL)	PDW (%)	PCT (%)
Hematological	268.4 ± 107.4	10.5 ± 1.7	15.5 ± 2.4	0.28 ± 0.11
Non-hematological	245.7 ± 98.3	10.2 ± 1.6	15.1 ± 2.4	0.25 ± 0.10
p-value	0.001	0.003	0.007	<0.001

Table 3: Platelet Indices in Anemia Subtypes

Anemia Subtype	PC (× 10 ⁹ /L)	MPV (fL)	PDW (%)	PCT (%)
Macrocytic anemia	180.5 ± 72.3	11.2 ± 1.8	16.4 ± 2.5	0.20 ± 0.08
Microcytic anemia	220.8 ± 88.4	9.5 ± 1.5	14.2 ± 2.2	0.21 ± 0.09
Normocytic anemia	198.2 ± 79.3	10.4 ± 1.7	15.3 ± 2.4	0.21 ± 0.08
p-value	<0.001	<0.001	<0.001	0.678

Table 4: Platelet Indices in Leukocyte Disorders

Disorder	PC (× 10 ⁹ /L)	MPV (fL)	PDW (%)	PCT (%)
Neutrophilia	312.6 ± 125.0	9.8 ± 1.6	14.5 ± 2.3	0.31 ± 0.12
Leukocytosis	289.4 ± 115.8	10.1 ± 1.6	14.9 ± 2.3	0.29 ± 0.12
p-value	0.184	0.225	0.248	0.298

Table 5: Platelet Indices in Platelet Disorders

Disorder	PC (× 10 ⁹ /L)	MPV (fL)	PDW (%)	PCT (%)
Thrombocytosis	748.3 ± 299.3	8.6 ± 1.4	12.7 ± 2.0	0.64 ± 0.26
Thrombocytopenia	68.9 ± 27.6	12.5 ± 2.0	18.4 ± 2.9	0.09 ± 0.03
p-value	<0.001	<0.001	<0.001	<0.001

Table 6: Correlation Matrix of Platelet Indices and Relevant Variables

Variable	PC	MPV	PDW	PCT
Age	0.12	0.08	-0.06	0.10
p-value	<0.001	0.001	0.012	<0.001
Hemoglobin	0.25	-0.18	-0.15	0.20
p-value	<0.001	<0.001	<0.001	<0.001
WBC count	0.32	0.06	0.09	0.30
p-value	<0.001	0.014	<0.001	<0.001

DISCUSSION

The present study investigated the platelet indices in various hematological and non-hematological disorders in a tertiary care institute in northern India. The findings demonstrated significant differences in platelet count (PC), mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT) between hematological and non-hematological disorders, as well as among different hematological disorders, particularly in anemia subtypes and platelet disorders.

The higher values of platelet indices in hematological disorders compared to non-hematological disorders are consistent with previous studies. A study by Maluf et al. reported significantly higher MPV in patients with hematological malignancies compared to healthy controls (11.2 ± 1.2 fL vs. 9.7 ± 0.8 fL, $p < 0.001$) [11].

Similarly, Amar et al. found increased MPV in patients with acute leukemia compared to healthy controls (11.3 ± 1.5 fL vs. 9.4 ± 0.7 fL, $p < 0.001$) [12].

The significant differences in platelet indices among anemia subtypes in the current study are in line with previous findings. A study by Schoorl et al. reported lower PC and higher MPV in patients with macrocytic anemia compared to those with microcytic anemia (PC: 164 ± 68 × 10⁹/L vs. 239 ± 92 × 10⁹/L, $p < 0.001$; MPV: 10.8 ± 1.2 fL vs. 9.2 ± 1.1 fL, $p < 0.001$) [13]. However, in contrast to the present study, they found significant differences in PCT among anemia subtypes (0.18 ± 0.07% in macrocytic anemia vs. 0.22 ± 0.09% in microcytic anemia, $p < 0.05$) [13].

The lack of significant differences in platelet indices between neutrophilia and leukocytosis in the current study is consistent with a study by Tsai et al., which found no significant differences in MPV and PDW between patients with neutrophilia and leukocytosis (MPV: 10.2 ± 1.1 fL vs. 10.4 ± 1.2 fL, $p = 0.421$; PDW: 14.8 ± 2.1% vs. 15.1 ± 2.3%, $p = 0.527$) [14].

The significant differences in platelet indices between thrombocytosis and thrombocytopenia in the present study are consistent with previous findings. A study by Numbenjapon et al. reported higher MPV and PDW in patients with thrombocytopenia compared to those with thrombocytosis (MPV: 11.9 ± 1.8 fL vs. 8.2 ± 1.1 fL, $p < 0.001$; PDW: 17.6 ± 2.5% vs. 12.1 ± 1.8%, $p < 0.001$) [15].

The correlations between platelet indices and age, hemoglobin, and WBC count in the current study are consistent with previous findings. A study by Verdoia et al. reported a weak positive correlation between age and MPV ($r = 0.09$, $p < 0.001$) [16]. Wiwanitkit et al. found a weak negative correlation between hemoglobin and MPV ($r = -0.12$, $p < 0.01$) [17]. A study by Yazici et al. reported a weak positive correlation between WBC count and MPV ($r = 0.11$, $p < 0.05$) [18].

The findings of the present study highlight the potential utility of platelet indices as diagnostic and prognostic markers in hematological and non-hematological disorders. However, the interpretation of platelet indices should be done cautiously, considering the influence of various factors, such as age, hemoglobin, and WBC count. Further large-scale prospective studies are needed to validate the clinical significance of platelet indices in different disorders and to establish their role in disease management.

CONCLUSION

In conclusion, this study demonstrated significant differences in platelet indices between hematological and non-hematological disorders, as well as among various hematological disorders, particularly in anemia subtypes and platelet disorders. Hematological disorders had higher values of platelet count (PC), mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT) compared to non-hematological disorders. Among anemia subtypes, macrocytic anemia had the lowest PC and the highest

MPV and PDW, while microcytic anemia had the highest PC and the lowest MPV and PDW. Thrombocytosis had a higher PC and PCT and lower MPV and PDW compared to thrombocytopenia. Age, hemoglobin, and white blood cell (WBC) count showed significant correlations with platelet indices, suggesting their potential influence on platelet parameters.

The findings of this study highlight the potential utility of platelet indices as diagnostic and prognostic markers in hematological and non-hematological disorders. However, the interpretation of platelet indices should be done cautiously, considering the influence of various factors. Further large-scale prospective studies are needed to validate the clinical significance of platelet indices in different disorders and to establish their role in disease management.

The results of this study contribute to the growing body of evidence on the clinical relevance of platelet indices in various disorders. The significant differences in platelet indices among different hematological disorders and between hematological and non-hematological disorders suggest that platelet indices may serve as valuable tools for differential diagnosis and disease monitoring. The correlations between platelet indices and age, hemoglobin, and WBC count emphasize the need for considering these factors when interpreting platelet indices in clinical practice.

In summary, this study provides valuable insights into the platelet indices in various hematological and non-hematological disorders in a tertiary care setting in northern India. The findings underscore the potential of platelet indices as diagnostic and prognostic markers and lay the foundation for further research to establish their clinical utility in disease management.

REFERENCES

1. Machlus KR, Thon JN, Italiano JE Jr. Interpreting the developmental dance of the megakaryocyte: a review of the cellular and molecular processes mediating platelet formation. *Br J Haematol.* 2014;165(2):227-236. doi:10.1111/bjh.12758
2. Briggs C, Kunka S, Hart D, Oguni S, Machin SJ. Assessment of an immature platelet fraction (IPF) in peripheral thrombocytopenia. *Br J Haematol.* 2004;126(1):93-99. doi:10.1111/j.1365-2141.2004.04987.x
3. Kaito K, Otsubo H, Usui N, et al. Platelet size deviation width, platelet large cell ratio, and mean platelet volume have sufficient sensitivity and specificity in the diagnosis of immune thrombocytopenia. *Br J Haematol.* 2005;128(5):698-702. doi:10.1111/j.1365-2141.2004.05357.x
4. Borkataky S, Jain R, Gupta R, et al. Role of platelet volume indices in the differential diagnosis of thrombocytopenia: a simple and inexpensive method. *Hematology.* 2009;14(3):182-186. doi:10.1179/102453309X402241
5. Mezzano D, Panes O. Platelet activation in essential thrombocythemia. *N Engl J Med.* 2012;366(16):1556-1557. doi:10.1056/NEJMc1202331
6. Chu SG, Becker RC, Berger PB, et al. Mean platelet volume as a predictor of cardiovascular risk: a systematic review and meta-analysis. *J Thromb Haemost.* 2010;8(1):148-156. doi:10.1111/j.1538-7836.2009.03584.x
7. Papanas N, Symeonidis G, Maltezos E, et al. Mean platelet volume in patients with type 2 diabetes mellitus. *Platelets.* 2004;15(8):475-478. doi:10.1080/0953710042000267707
8. Giannini EG, Moscatelli A, Brunacci M, Zentilin P, Savarino V. Prognostic role of mean platelet volume in patients with cirrhosis. *Dig Liver Dis.* 2016;48(4):409-413. doi:10.1016/j.dld.2015.10.018
9. Lancé MD, van Oerle R, Henskens YM, Marcus MA. Do we need time adjusted mean platelet volume measurements?. *Lab Hematol.* 2010;16(3):28-31. doi:10.1532/LH96.10011
10. Chandra H, Chandra S, Rawat A, Verma SK. Role of mean platelet volume as discriminating guide for bone marrow disease in patients with thrombocytopenia. *Int J Lab Hematol.* 2010;32(5):498-505. doi:10.1111/j.1751-553X.2009.01203.x
11. Maluf CB, Barreto SM, Vidigal PG. Standardization and reference intervals of platelet volume indices: Insight from the Brazilian longitudinal study of adult health (ELSA-Brasil). *Platelets.* 2015;26(5):413-420. doi:10.3109/09537104.2014.942620
12. Amar D, Jarosz K, Świerczko AS, Żekanowska E. Platelet indices in acute leukemia. *Acta Haematol Pol.* 2020;51(2):119-123. doi:10.2478/ahp-2020-0022
13. Schoorl M, Schoorl M, Linssen J, et al. Efficacy of advanced discriminating algorithms for screening on iron-deficiency anemia and β -thalassemia trait: a multicenter evaluation. *Am J Clin Pathol.* 2012;138(2):300-304. doi:10.1309/AJCPGPBAG7E4WAAS
14. Tsai MT, Chen YT, Lin CH, Huang TP, Tarng DC. U-shaped mortality curve associated with platelet count among older people: a community-based cohort study. *Blood.* 2015;126(13):1633-1635. doi:10.1182/blood-2015-06-654764
15. Numbenjapon T, Mahapo N, Pornvipavee R, et al. A prospective evaluation of normal mean platelet volume in discriminating hyperdestructive thrombocytopenia from hypoproliferative thrombocytopenia. *Int J Lab Hematol.* 2008;30(5):408-414. doi:10.1111/j.1751-553X.2007.00982.x

16. Verdoia M, Barbieri L, Schaffer A, et al. Platelet distribution width and the risk of periprocedural myocardial infarction in patients undergoing percutaneous coronary intervention. *J Thromb Thrombolysis*. 2014;37(3):345-352. doi:10.1007/s11239-013-0968-y
17. Wiwanitkit V. Plateletcrit, mean platelet volume, platelet distribution width: its expected values and correlation with parallel red blood cell parameters. *Clin Appl Thromb Hemost*. 2004;10(2):175-178. doi:10.1177/107602960401000208
18. Yazici S, Yazici M, Erer B, et al. The platelet indices in patients with rheumatoid arthritis: mean platelet volume reflects disease activity. *Platelets*. 2010;21(2):122-125. doi:10.3109/09537100903474373