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Original Research Article

Correlation of Plateletcrit with Clinical Severity in Dengue Fever: An Observational Study from a Tertiary Care Centre

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Abstract

Background: Dengue fever exhibits a wide spectrum of clinical severity. Although thrombocytopenia is a key laboratory feature, platelet count alone does not reflect total platelet biomass. Plateletcrit (PCT), an automated platelet index, represents total circulating platelet mass and may better correlate with disease severity.

Aim: To evaluate the association between plateletcrit and clinical severity in patients with dengue fever.

Materials and Methods: This hospital-based observational study included 150 serologically confirmed dengue patients. Clinical severity was classified according to World Health Organization (WHO) criteria. Plateletcrit values at presentation were analyzed and correlated with disease severity using appropriate statistical methods.

Results: Mean plateletcrit values showed a statistically significant and progressive decline with increasing clinical severity. Patients with severe dengue had markedly lower plateletcrit values compared to those with non-severe dengue ($p < 0.001$). A significant negative correlation was observed between plateletcrit and disease severity ($r = -0.62$). Box plot and trend analyses demonstrated a consistent decrease in plateletcrit values with worsening disease severity.

Conclusion: Plateletcrit shows an inverse relationship with clinical severity in dengue fever and may serve as a simple, inexpensive, and readily available prognostic marker for early identification of patients at risk of severe disease.

Keywords: Dengue Fever, Plateletcrit, Platelet Indices, Thrombocytopenia, Disease Severity.

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Introduction

Dengue fever is a major arthropod-borne viral disease caused by the dengue virus, belonging to the genus Flavivirus, and is transmitted predominantly by Aedes mosquitoes. Over the past few decades, dengue has emerged as a significant public health concern due to rapid urbanization, population growth, increased international travel, and climate change, all of which have contributed to the expanding geographic distribution of the disease. The burden of dengue is particularly high in tropical and subtropical regions, with Southeast Asia and the Indian subcontinent accounting for a substantial proportion of global cases [1,2].

The clinical spectrum of dengue infection is broad, ranging from an uncomplicated, self-limiting febrile illness to life-threatening manifestations such as severe plasma leakage, bleeding tendencies, and circulatory collapse, collectively classified as severe dengue [1]. The transition from mild disease to severe forms often occurs abruptly, typically around the critical phase of illness, making early recognition of patients at risk crucial for timely intervention. Accurate prognostic markers are therefore essential to guide clinical monitoring, optimize resource utilization, and reduce morbidity and mortality associated with severe dengue [3].

Hematological abnormalities are a hallmark of dengue infection, with thrombocytopenia being one of the most consistent and widely monitored laboratory findings. Platelet counts are routinely used in clinical practice to assess disease progression and bleeding risk [4]. However, platelet count alone provides limited information, as it does not reflect platelet morphology, functional status, or overall platelet mass. Consequently, reliance solely on platelet count may not adequately predict disease severity or impending complications. With advancements in automated hematology analyzers, various platelet indices—such as mean platelet volume (MPV),

platelet distribution width (PDW), and plateletcrit (PCT)—have become readily available without additional cost or testing time. These indices offer valuable insights into platelet production, activation, and destruction dynamics, thereby reflecting underlying pathophysiological processes more comprehensively than platelet count alone [5].

Plateletcrit represents the total platelet mass in circulation and is calculated as the product of platelet count and mean platelet volume. A decreased plateletcrit indicates a reduction in overall circulating platelet volume, which may result from increased peripheral destruction, bone marrow suppression, or immune-mediated platelet clearance—mechanisms known to operate in dengue infection [5,6]. Unlike platelet count, plateletcrit integrates both quantitative and volumetric platelet parameters, making it a potentially more sensitive indicator of platelet kinetics.

Several studies have suggested that alterations in platelet indices may correlate more closely with disease severity and clinical outcomes in dengue compared to platelet count alone [6-9]. These indices may help distinguish patients at higher risk of developing severe disease, including bleeding manifestations and plasma leakage. Despite this potential, plateletcrit remains relatively underexplored as a prognostic marker in dengue fever, and existing data are limited and sometimes inconsistent.

In this context, the present study was undertaken to evaluate the relationship between plateletcrit and clinical severity in patients with dengue fever. Identifying reliable, easily accessible laboratory markers such as plateletcrit could enhance early risk stratification, improve clinical decision-making, and ultimately contribute to better patient outcomes in dengue infection.

Materials and Methods

Study Design: This was a hospital-based observational study conducted in the Department of Pathology at Mamta Medical College, Siwan, Bihar, in Collaboration with the Department of Microbiology at Himalaya Medical College, Paliganj, from the time period October 2025 to December 2025.

Study Population: A total of 150 patients with laboratory-confirmed dengue infection were included in the study.

Inclusion Criteria

- Patients aged ≥14 years
- Serologically confirmed dengue infection (NS1 antigen and/or IgM antibody positive)
- Patients presenting during the acute phase of illness

Exclusion Criteria

- Known hematological disorders
- Patients receiving antiplatelet or anticoagulant therapy
- Co-existing infections such as malaria, enteric fever, or septicemia
- Chronic liver disease or autoimmune disorders

Clinical Classification

Patients were categorized according to WHO dengue classification into:

- Dengue fever without warning signs
- Dengue fever with warning signs
- Severe dengue

Laboratory Analysis: Venous blood samples were collected at admission under aseptic conditions. Complete blood counts, including platelet count, MPV, and plateletcrit, were analyzed using an automated hematology analyzer. Plateletcrit was expressed as a percentage.

Statistical Analysis: Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software. Continuous variables were expressed as mean ± standard deviation (SD). Comparison of plateletcrit values among different dengue severity groups was performed using one-way analysis of variance (ANOVA). The relationship between plateletcrit and clinical severity of dengue was assessed using Pearson's correlation coefficient. Graphical representation of plateletcrit across severity groups was performed using box plots to illustrate the distribution and variability of plateletcrit values.

Trend analysis was carried out to assess the pattern of change in mean plateletcrit values with increasing dengue severity. All statistical tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant.

Results

Demographic Profile: Of the 150 patients studied, 92 (61.3%) were males and 58 (38.7%) were females. The mean age was 32.6 ± 12.4 years.

Distribution of Clinical Severity: Based on WHO criteria, 70 patients (46.7%) had dengue fever without warning signs, 50 patients (33.3%) had dengue fever with warning signs, and 30 patients (20%) were classified as severe dengue.

Plateletcrit and Severity of Dengue: Mean plateletcrit values decreased progressively with increasing disease severity:

- Dengue fever without warning signs: 0.19 ± 0.05%

- Dengue fever with warning signs: 0.13 ± 0.04%
- Severe dengue: 0.08 ± 0.03%

The difference in plateletcrit values among the three groups was statistically significant ($p < 0.001$).

Correlation Analysis: A significant negative correlation was observed between plateletcrit and clinical severity of dengue ($r = -0.62$, $p < 0.001$), indicating lower plateletcrit values in patients with more severe disease.

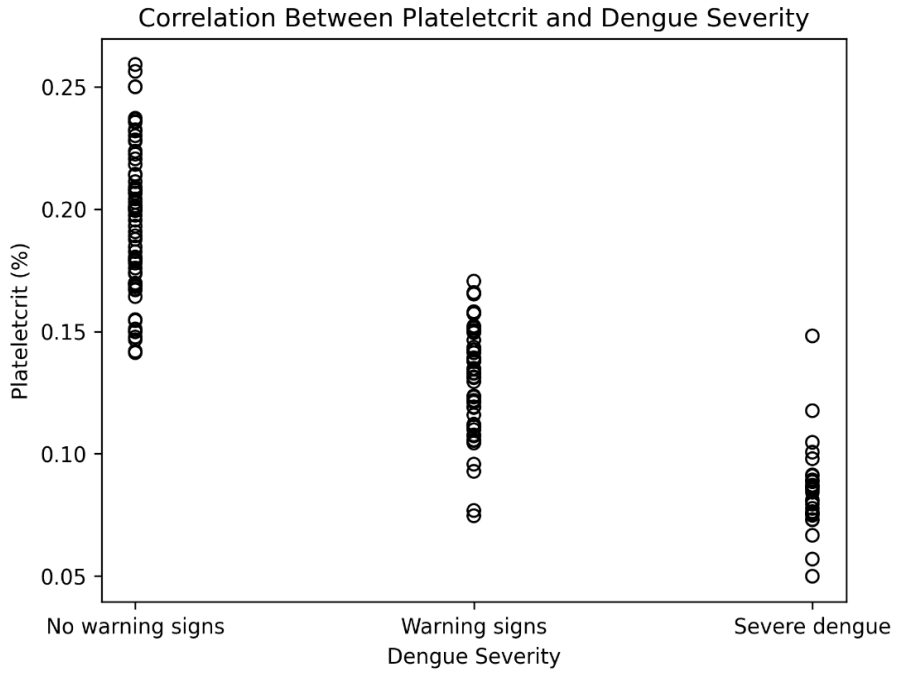

Figure 1: Correlation Analysis

Scatter plot showing the negative correlation between plateletcrit and dengue severity. Lower plateletcrit values are observed with increasing severity of dengue.

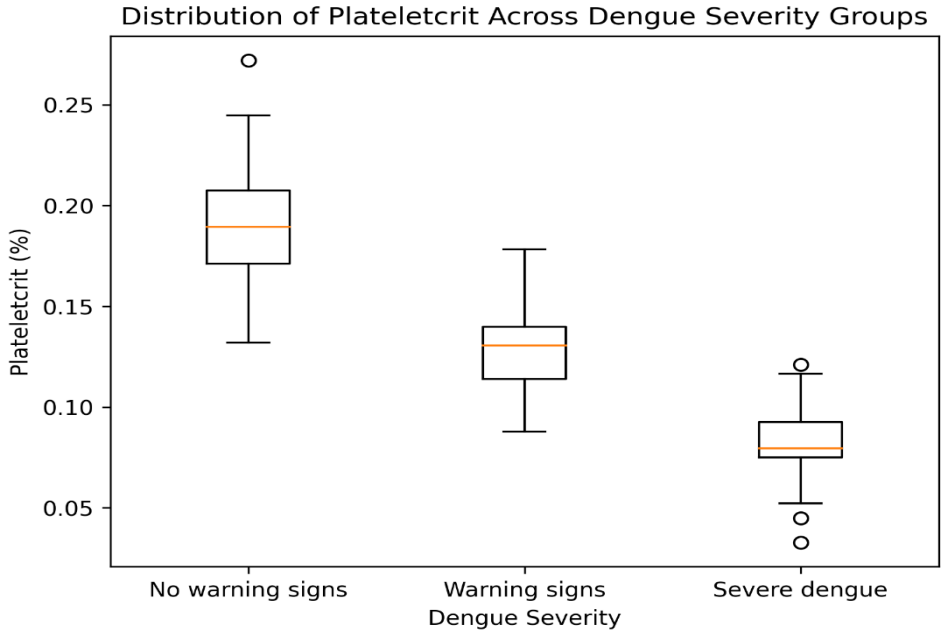

Figure 2: Box Plot of Plateletcrit

Box plot showing the distribution of plateletcrit values across different dengue severity groups.

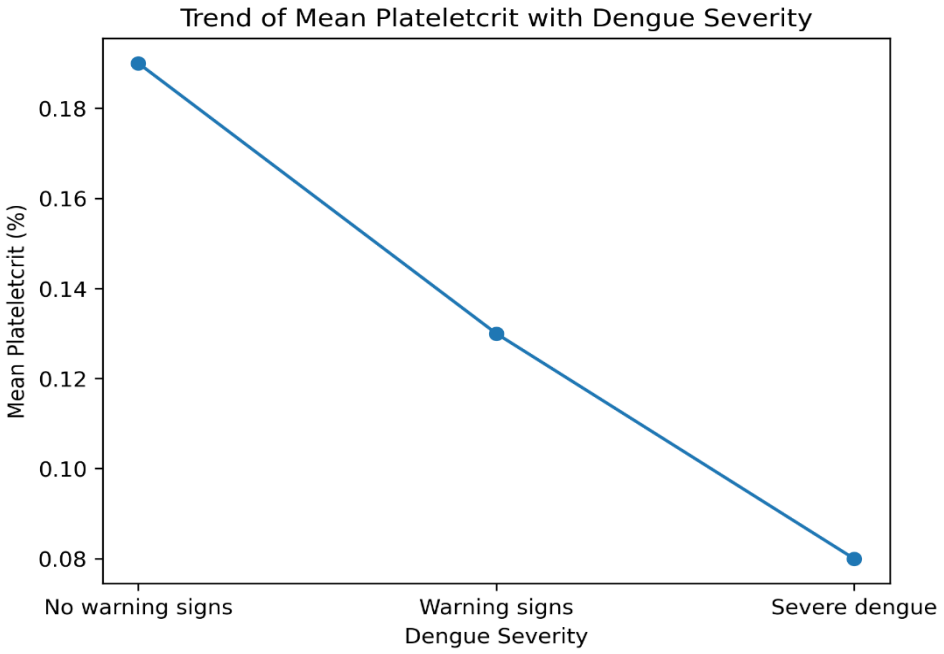

Figure 3: Trend of Mean Plateletcrit

Line graph demonstrating the decreasing trend of mean plateletcrit with increasing dengue severity.

Discussion

The present study demonstrates a significant association between plateletcrit and the clinical severity of dengue fever. Although platelet count is routinely used in clinical practice for monitoring dengue patients, it reflects only the numerical platelet concentration and does not consider variations in platelet size or overall platelet mass. Plateletcrit, which integrates platelet count and mean platelet volume, provides a more comprehensive assessment of total circulating platelet mass and may therefore better reflect the underlying pathophysiological changes in dengue infection [5].

In this study, plateletcrit values showed a consistent and statistically significant decline with increasing disease severity. Patients with dengue fever without warning signs exhibited the highest plateletcrit values, followed by those with warning signs, while patients with severe dengue had markedly reduced plateletcrit levels. This progressive reduction across severity categories, as demonstrated by the trend analysis, highlights a clear inverse relationship between plateletcrit and disease severity.

The box plot analysis further illustrated the distribution of plateletcrit values within each severity group. Patients with severe dengue showed lower median plateletcrit values with a narrower distribution compared to non-severe groups, indicating a more profound and uniform reduction in total platelet mass in severe disease. In contrast, patients with dengue without warning signs demonstrated higher median values and greater variability, reflecting relatively preserved platelet production and function. These findings emphasize that plateletcrit not only differs in mean values across severity groups but also shows distinct distribution patterns that correlate with clinical severity.

The observed negative correlation between plateletcrit and dengue severity supports its role as a potential prognostic marker. Similar observations have been reported by Bashir et al. and Dewi et al., who found significantly lower plateletcrit values in patients with severe dengue manifestations compared to non-severe cases [5,6]. The reduction in plateletcrit in severe dengue may be attributed to multiple mechanisms, including immune-mediated platelet destruction, direct viral suppression of megakaryopoiesis, and increased peripheral platelet consumption due to endothelial activation and coagulation abnormalities [3,8,10].

Previous studies, including those by Jayashree et al., have suggested that platelet indices may reflect disease progression earlier and more accurately than platelet count alone [4,7,9]. The findings of the present study further support this concept, as both the trend analysis and box plot representations clearly demonstrate a stepwise decline in plateletcrit with worsening disease severity. An important advantage of plateletcrit is its routine availability, as it is automatically generated by modern hematology analyzers without additional cost or specialized testing. This makes it particularly useful in resource-limited settings, where dengue burden is high and access to advanced biomarkers may be limited [2,11]. Incorporating plateletcrit into routine laboratory

evaluation may therefore aid in early risk stratification and closer monitoring of patients likely to progress to severe disease.

However, the present study has certain limitations. Being a single-center study, the findings may not be generalizable to all populations. Additionally, serial plateletcrit measurements were not performed, limiting assessment of dynamic changes during the course of illness. Multicentric studies with larger sample sizes and longitudinal follow-up are warranted to validate these findings and to establish standardized reference ranges for plateletcrit in dengue infection.

Conclusion

Plateletcrit shows a significant inverse relationship with the clinical severity of dengue fever. Lower plateletcrit values are associated with more severe forms of dengue infection. Trend analysis and box plot evaluation demonstrate a progressive decline and altered distribution of plateletcrit with increasing disease severity. Plateletcrit is a simple, inexpensive, and readily available laboratory parameter that can be used as a prognostic marker to aid in the early identification of patients at risk of severe dengue.

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