https://doi.org/10.29309/TPMJ/2026.33.11.10301 www.theprofesional.com

ORIGINAL ARTICLE

Comparison of frequency with pattern of thrombocytopenia and prevalence of dengue hepatitis in patients with dengue fever and dengue hemorrhagic fever: A cross-sectional study from Rawalpindi Medical University.

Faran Maqbool[1], Javaria Malik[2], Muhammad Imran Saeed[3], Muhammad Saad Khan[4], Saima Mir[5], Seema Kanwal[6]

ABSTRACT… Objective: To assess frequency and severity of thrombocytopenia and evaluate prevalence and severity of dengue hepatitis among patients with DF and DHF. **Study Design:** Comparative Cross-Sectional Study. **Setting:** Department of Medicine, Rawalpindi Teaching Hospital (RTH), affiliated with Rawalpindi Medical University, Rawalpindi, Pakistan. **Period:** One Year from September 2024 to September 2025. **Methods:** A comparative cross-sectional study involving 200 serologically confirmed dengue patients (100 DF, 100 DHF) admitted to a Rawalpindi Medical University Teaching Hospital. Platelet counts were classified as per severity and dengue hepatitis was confirmed from noted elevations in ALT and AST. Chi-square tests and correlation were used to ascertain associations between fever type and laboratory variables. Statistical significance was robust at $p<0.05$. **Results:** Thrombocytopenia was common among all patients and severe thrombocytopenia ($<40\times10^3/\mu L$) was slightly more frequent among DHF. However, the association between fever type and platelet levels did not show significant correlation ($p>0.05$). On the other hand, Dengue Hepatitis Was Higher in Prevalence and Severity among DHF Patients with Increased ALT Levels ($P=0.011$). Higher AST elevations were seen in most patients. A significant negative correlation was identified between hepatic enzyme levels and disease severity (Spearman $r = –0.232$, $p=0.001$), suggesting transaminase levels progressively rise then fall during the course of ill clinical status. **Conclusion:** Although thrombocytopenia occurred frequently in both DF and DHF without a significant difference, dengue hepatitis was substantially more common and severe in DHF. Elevated liver enzymes, particularly ALT and AST, serve as reliable indicators of Severe Dengue and may aid in early risk stratification.

Key words: ALT, AST, Dengue Fever, Dengue Hemorrhagic Fever, Dengue Hepatitis, Thrombocytopenia, Transaminases.

Article Citation: Maqbool F, Malik J, Saeed MI, Khan MS, Mir S, Kanwal S. Comparison of frequency with pattern of thrombocytopenia and prevalence of dengue hepatitis in patients with dengue fever and dengue hemorrhagic fever: A cross-sectional study from Rawalpindi Medical University. Professional Med J 2026; 33(11):2229-2233. https://doi.org/10.29309/TPMJ/2026.33.11.10301

INTRODUCTION

Dengue virus continues to be the fastest spreading arthropod-borne viral infection in the world today not only in terms of incidence, but it presents public health challenges on a massive scale especially in tropical and subtropical countries.[1] Transmitted mainly by Aedes aegypti, dengue virus infection presents illness in a substantial clinical spectrum, ranging from uncomplicated dengue fever (DF), to more severe forms of the virus dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS), all of which are associated with plasma leakage, coagulopathy and ultimately the progressive dysfunction of organs.[2] To this day, despite the 2009 revised classification indicated by the World Health Organization (WHO), and many clinical scenarios, especially in Asia, are still using the DF/DHF models since it is both useful and considered the norm when stratifying patients' risk upon the clinical presentation.[3]

Dengue has become highly endemic in terms of burden in South Asia, including Pakistan, and seasonal outbreaks have become increased and amplified due to climate change, altered rainfall patterns, urbanization, etc., that expand vector habitats.[4,5] When dengue was first described, it was considered a self-limiting febrile illness; however, it is now recognized as a multisystem disorder as liver involvement is important, first reported more than 50 years ago.[6]

1. MBBS, FCPS (Medicine), Assistant Professor & Head Medicine, Rawalpindi Teaching Hospital, Rawalpindi.
2. MBBS, FCPS (Medicine), Medical Specialist Medicine, Rawalpindi Teaching Hospital, Rawalpindi.
3. MBBS, FCPS (Medicine), Medical Specialist Medicine, Rawalpindi Teaching Hospital, Rawalpindi.
4. Final Year Student, Rawalpindi Medical University, Rawalpindi.
5. MBBS, MD (Nephrology), Senior Registrar Nephrology, Rawalpindi Teaching Hospital, Rawalpindi.
6. MBBS, FCPS, Senior Registrar Medicine, Rawalpindi Teaching Hospital, Rawalpindi.

Correspondence Address:
Dr. Javaria Malik
Department of Medicine, Rawalpindi Teaching Hospital, Rawalpindi.
drjv.med@gmail.com

Article received on:
26/01/2026
Date of revision:
11/04/2026
Accepted for publication:
14/04/2026

There are various mechanisms of liver injury including, direct viral cytopathic effects, immunologically mediated hepatocellular problems, microvascular derangements, and hypoxic injury associated with plasma leakage and shock.[7]

Transaminase elevation is present in 50-97% of patients with dengue. Studies have shown that AST may be higher than ALT because transaminases are released from hepatic and extrahepatic sources, most notably muscle.[8,9] Dengue hepatitis is associated with more severe disease, longer length of stay, and greater risk of complications.[10] Thrombocytopenia is another prominent feature of dengue, which is caused by suppression of bone marrow production, immune-mediated platelet destruction, and increased peripheral consumption of platelets.[11] While low platelet counts are associated with bleeding and capillary leak, their correlation with the overall severity of the dengue illness has differed between populations.[12]

Although international research has been conducted extensively, local studies comparing thrombocytopenia patterns and hepatic dysfunction in DF and DHF in Pakistan are still lacking. As the burden of dengue increases, understanding these hematologic and biochemical markers is essential for enhancing early identification of severe disease. Rationale: This study was therefore designed to bridge the existing gap in local evidence by comparing frequency and severity patterns of thrombocytopenia, and assessing the prevalence of dengue hepatitis in DF and DHF at a tertiary care teaching hospital in Rawalpindi. The objective of this study is to compare the frequency and severity patterns of thrombocytopenia, and to assess the prevalence of dengue hepatitis in DF and DHF, specifically with respect to ALT as the biochemical marker.

METHODS

This comparative cross-sectional study was conducted in the Department of Medicine, Rawalpindi Teaching Hospital, affiliated with Rawalpindi Medical University, Pakistan. The study was conducted over a period of one year from September 2024 to September 2025. Ethical approval was obtained from the Ethical Review Board, Rawalpindi Teaching Hospital (ERB Approval No. 69/RTH, RWP; dated 05-06-2024). A total of 200 serologically confirmed dengue patients were enrolled during the study period, comprising 100 cases of dengue fever (DF) and 100 of Dengue Hemorrhagic F ever (DHF). Patients were selected consecutively after obtaining infor med consent.

Inclusion and Exclusion Criteria

-Patients could be considered if they had clinical features of dengue and were serologically positive for NS1 antigen or dengue-specific IgM. DHF was classified as per WHO 1997 criteria.

- Patients with pre-existing chronic liver disease, viral hepatitis A–E, drug-induced hepatotoxicity, -idiopathic thrombocytopenic purpura, sepsis, malaria or any other explanation for thrombocytopenia or hepatic dysfunction were not considered for inclusion.

Data Collection

Data were recorded on a structured performa and included demographics, clinical characteristics, complete blood count (CBC), and liver function tests (AST, ALT, albumin, and globulin). Laboratory investigations were performed in the hospital's diagnostic laboratory following standard protocols.

Statistical Analysis

Data analysis was completed using IBM SPSS version 25. Associations between Dengue type (DF vs DHF) and categorized platelet counts or ALT levels were assessed using the chi-square test. Continuous variables were compared using independent sample t-tests. Spearman correlation was used to assess the relationships between liver enzymes and platelet counts. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 200 serologically confirmed dengue patients were included, comprising equal proportions of DF (n=100) and DHF (n=100). The study population consisted of 107 males (53.5%) and 93 females (46.5%), giving a male-to-female ratio of approximately 1.15:1.

Thrombocytopenia Patterns

Overall thrombocytopenia (<150,000/μL) was

present in 160 patients (80%). It occurred in 65% of DF patients and 95% of DHF patients, demonstrating a statistically significant difference in frequency (χ^2=25.84, p<0.001). Mean platelet count was significantly lower in DHF (70.5 ± 25.1 ×10³/µL) compared with DF (110.2 ± 35.8 ×10³/µL) (p<0.001).

When platelet counts were categorized (<20k, <40k, <60k, <100k, <120k, >120k), both DF and DHF groups showed considerable overlap across categories (Table 1).

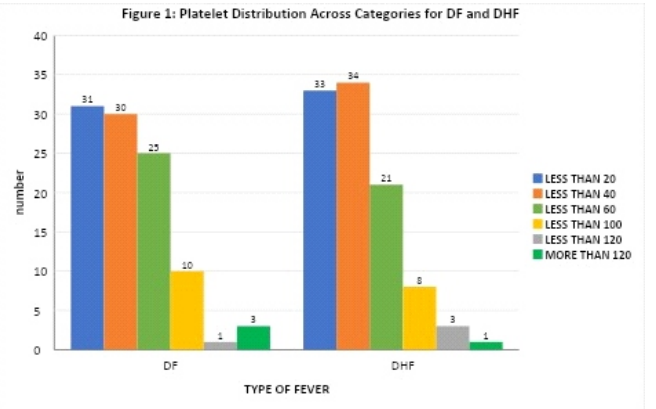
Platelet levels <20,000/µL were found in 48.4% of DF and 51.6% of DHF patients, while levels <40,000/µL were observed in 46.9% of DF and 53.1% of DHF. Chi-square analysis showed

Platelet levels <20,000/µL were found in 48.4% of DF and 51.6% of DHF patients, while levels <40,000/µL were observed in 46.9% of DF and 53.1% of DHF. Chi-square analysis showed no significant association between these platelet categories and fever type (χ^2=2.883, p=0.718), indicating similar distribution patterns despite DHF having a higher overall burden of thrombocytopenia.

A bar chart illustrating platelet distribution across categories for DF and DHF is shown in Figure-1.

FIGURE-1

Distribution of platelet count categories by type of fever (DF vs DHF)



X-axis: Type of Fever (DF / DHF) | Y-axis: Count | Legend: Platelet category (×10³/µL)

Liver Enzyme Alterations (Dengue Hepatitis)

Dengue hepatitis was identified in 32.5% (65/200) of patients. Its prevalence was significantly higher in DHF (45%) than DF (20%) (χ^2=17.52, p<0.001). Analysis of ALT categories (10–40, 40–80, 80–120, 121–200, 201–300, 301–400, >401 U/L) demonstrated a statistically significant association between ALT elevation and fever type (χ^2=16.461, p=0.011), with ALT values above 80 U/L predominantly occurring in DHF (Table-II).

TABLE-I

Type of fever * Platelets Crosstabulation

Type of Fever		Platelets (×10³/µL)						Total
		Less Than 20	Less Than 40	Less Than 60	Less Than 100	Less Than 120	More Than 120	
DF	Count	31	30	25	10	1	3	100
	% within Platelets	48.4%	46.9%	54.3%	55.6%	25.0%	75.0%	50.0%
DHF	Count	33	34	21	8	3	1	100
	% within Platelets	51.6%	53.1%	45.7%	44.4%	75.0%	25.0%	50.0%
Total	Count	64	64	46	18	4	4	200
	% within Platelets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

χ^2=2.883, df=5, p=0.718 | DF=Dengue Fever; DHF=Dengue Haemorrhagic Fever

TABLE-II

Type of fever * ALT Crosstabulation

Type of Fever		ALT (U/L)							Total
		10–40	40–80	80–120	121–200	201–300	301–400	>401	
DF	Count	12	51	16	16	3	0	2	100
DHF	Count	29	51	8	6	2	2	2	100
Total	Count	41	102	24	22	5	2	4	200

χ^2=16.461, df=6, p=0.011 | ALT=Alanine Aminotransferase (U/L)

AST elevation predominated over ALT in 85% of patients with transaminitis. DHF cases also demonstrated lower albumin levels and a reversed albumin-to-globulin ratio, consistent with plasma leakage patterns characteristic of severe dengue.

Correlation Between Liver Enzymes and Platelet Count

A statistically significant negative correlation was found between platelet count and ALT levels (Spearman r = –0.232, p<0.001). Similarly, bilirubin and SGPT levels showed strong negative correlations with platelet count (p<0.0001), indicating that worsening liver injury was associated with decreasing platelet levels.

DISCUSSION

This study provides important insights into the hematologic and hepatic manifestations of dengue infection and their association with disease severity. Although thrombocytopenia is widely recognized as a hallmark of dengue, our results show that platelet count alone may not reliably distinguish DF from DHF. While thrombocytopenia was more frequent in DHF, the distribution of platelet categories showed no statistically significant difference between groups. Similar findings have been reported in previous studies, indicating that bone marrow suppression and immune-mediated platelet destruction occur across the clinical spectrum of dengue, producing considerable overlap between DF and DHF.[11,12] Thus, while thrombocytopenia remains a useful indicator of bleeding risk, it may have limited value as an isolated predictor of severe disease.

In contrast, hepatic impairment showed a much stronger relationship with dengue severity. DHF patients exhibited a significantly greater incidence of ALT elevations and severity, consistent with previous findings indicating liver involvement as a marker of disease progression.[7,8] The pathogenesis of dengue hepatitis is multifactorial, involving direct viral invasion of hepatocytes, cytokine-mediated injury, microvascular injury and hypoxic injury during shock or plasma leakage.[9,10] The predominance of AST over ALT in most cases corresponds to the findings in India, Sri Lanka and Brazil where AST elevations reflect combined hepatic and extrahepatic injury with skeletal muscle involvement.[12-14]

The strong negative correlation between platelet count and ALT provides additional evidence linking hepatic inflammation to hematologic deterioration. Similar associations have been seen in other cohorts across Southeast Asia and India, where worsening thrombocytopenia is associated with rising transaminase levels.[13-15] Overall, these data suggest that liver dysfunction in dengue may occur congruently with or even precede capillary leak, suggesting the utility of hepatic markers as early identifiers of severe dengue.

Markers of hepatic synthetic impairment—such as hypoalbuminemia and reversal of the A:G ratio—were more common in DHF, supporting the presence of increased vascular permeability and impaired hepatocellular function. These findings are aligned with WHO descriptions of DHF pathophysiology and prior studies reporting similar biochemical derangements in severe dengue.[3,15]

Overall, the combined evidence highlights that while thrombocytopenia occurs widely in dengue and remains a critical marker for bleeding risk, hepatic involvement—particularly elevated ALT and AST—offers a more reliable reflection of overall disease severity. Several studies have documented transaminase elevations in more than half of dengue cases, with higher enzyme levels associated with shock, hæmorrhage and prolonged hospitalization.[8,15] The clear gradient of ALT abnormalities observed between DF and DHF in this study reinforces the importance of routine liver function testing in dengue management.

These findings are particularly relevant for resource-limited settings, where early identification of severe dengue may be challenging. Incorporating hepatic markers alongside platelet trends may improve early risk stratification, guide timely clinical intervention and ultimately reduce morbidity.

CONCLUSION

Thrombocytopenia was common among patients with both dengue fever (DF) and dengue hemorrhagic fever (DHF), but patterns of platelets alone were not enough to differentiate patients with DF from those with DHF. In comparison, hepatic dysfunction, especially ALT elevation, was noted more frequently,

and with greater severity, in DHF compared with DF and was strongly inversely correlated with platelet levels. So not only DHF, DF should also be seen critically for sever thrombocytopenia need platelet transfusion These results suggest that liver enzyme abnormalities represent a more sensitive and clinically relevant marker of dengue severity compared with thrombocytopenia alone. Accordingly, routine evaluation of ALT, AST, platelet counts, albumin, and A:G ratio should be added to standard assessments for dengue patients to assist in identifying severe disease earlier and support prompt clinical management.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Copyright© 14 April, 2026.

REFERENCES

1. Ilic I, Ilic M. **Global patterns of trends in incidence and mortality of dengue, 1990–2019: An analysis based on the global burden of disease study.** Medicina. 2024 Mar 1; 60(3):425.
2. Liu Y, Wang M, Yu N, Zhao W, Wang P, Zhang H, et al. **Trends and insights in dengue virus research globally: A bibliometric analysis (1995–2023).** Journal of Translational Medicine. 2024 Sep 3; 22(1):818.
3. World Health Organization. **Dengue and Severe Dengue.** WHO Fact Sheet. Geneva: WHO; 2022. Available at: https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue
4. Roy SK, Bhattacharjee S. **Dengue virus: epidemiology, biology, and disease aetiology.** Canadian Journal of Microbiology. 2021; 67(10):687-702.
5. Thach TQ, Eisa HG, Hmeda AB, Faraj H, Thuan TM, Abdelrahman MM, et al. **Predictive markers for the early prognosis of dengue severity: A systematic review and meta-analysis.** PLoS Neglected Tropical Diseases. 2021 Oct 5; 15(10):e0009808.
6. Saghir H, Tariq M, Safdar N, Zahoor A, Rashid F, Khan SE, et al. **Association of Liver Function Test with severity of dengue fever in suburbs of Islamabad.** Journal of Community Hospital Internal Medicine Perspectives. 2023 Nov 4; 13(6):95.
7. Kalluru PK, Mamilla M, Valisekka SS, Mandyam S, Martinez EC, Posani S, et al. **Aminotransferases in relation to the severity of dengue: A systematic review.** Cureus. 2023 May 24; 15(5):e39436.
8. Ayaz F, Furrukh M. **Assessment of severity of dengue fever by deranged alanine aminotransferase levels.** Cureus. 2020 Sep 19; 12(9):e10539.
9. Prasad D, Bhriguvanshi A. **Clinical profile, liver dysfunction and outcome of dengue infection in children: A prospective observational study.** The Pediatric Infectious Disease Journal. 2020 Feb 1; 39(2):97-101.
10. Hossain MJ, Das M, Shahjahan M, Islam MW, Towhid ST. **Clinical and hematological manifestation of dengue patients in 2022 outbreak: A tertiary care hospital-based cross-sectional study.** Health Science Reports. 2025 Jan; 8(1):e70356.
11. Khazali AS, Hadrawi WH, Ibrahim F, Othman S, Rashid NN. **Thrombocytopenia in dengue infection: Mechanisms and a potential application.** Expert Reviews in Molecular Medicine. 2024 Jan; 26:e26.
12. Huy BV, Toàn NV. **Prognostic indicators associated with progresses of severe dengue.** PloS one. 2022 Jan 5; 17(1):e0262096.
13. Moallemi S, Lloyd AR, Rodrigo C. E**arly biomarkers for prediction of severe manifestations of dengue fever: A systematic review and a meta-analysis.** Scientific Reports. 2023 Oct 14; 13(1):17485.
14. Alam R, Fathema K, Yasmin A, Roy U, Hossen K, Rukunuzzaman M. **Prediction of severity of dengue infection in children based on hepatic involvement.** JGH Open. 2024 Mar; 8(3):e13049.
15. Venkatesan P. Global upsurge in dengue in 2024. The Lancet Infectious Diseases. 2024 Oct 1; 24(10):e620.

AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Faran Maqbool:** Data collection.
2	**Javaria Malik:** Data analysis, writing.
3	**Muhammad Imran Saeed:** Drafting.
4	**Muhammad Saad Khan:** Data interpretation.
5	**Saima Mir:** Data entry.
6	**Seema Kanwal:** Revisions.